British TELECOM Journal

Winter 1980/81 Volume 1 Number 4 Price 24p

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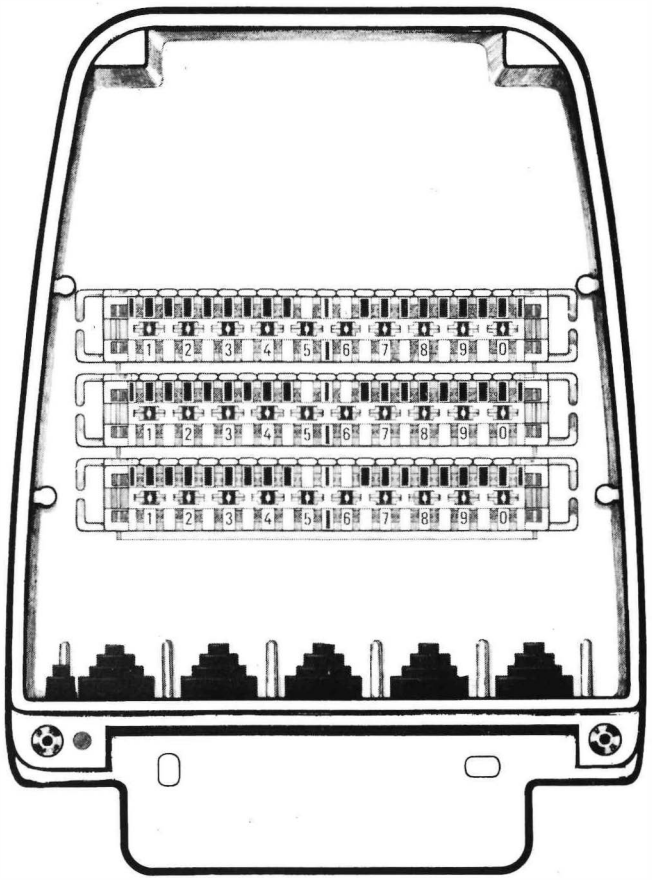

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THE MALDEN FILE (1)

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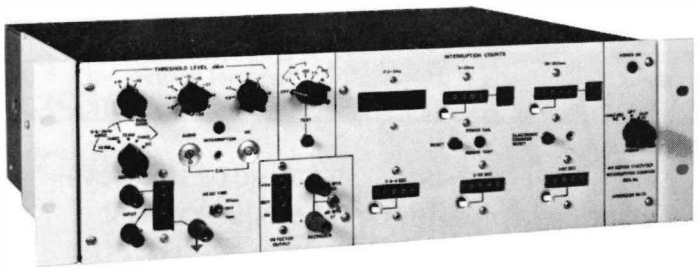

Interruption Counter

Model Number – 297
British Telecom (P.O.) ref. – 173C

- Designed to meet CCITT recommendation 0.62
- Times the duration for which audio frequencies or d.c. inputs are interrupted
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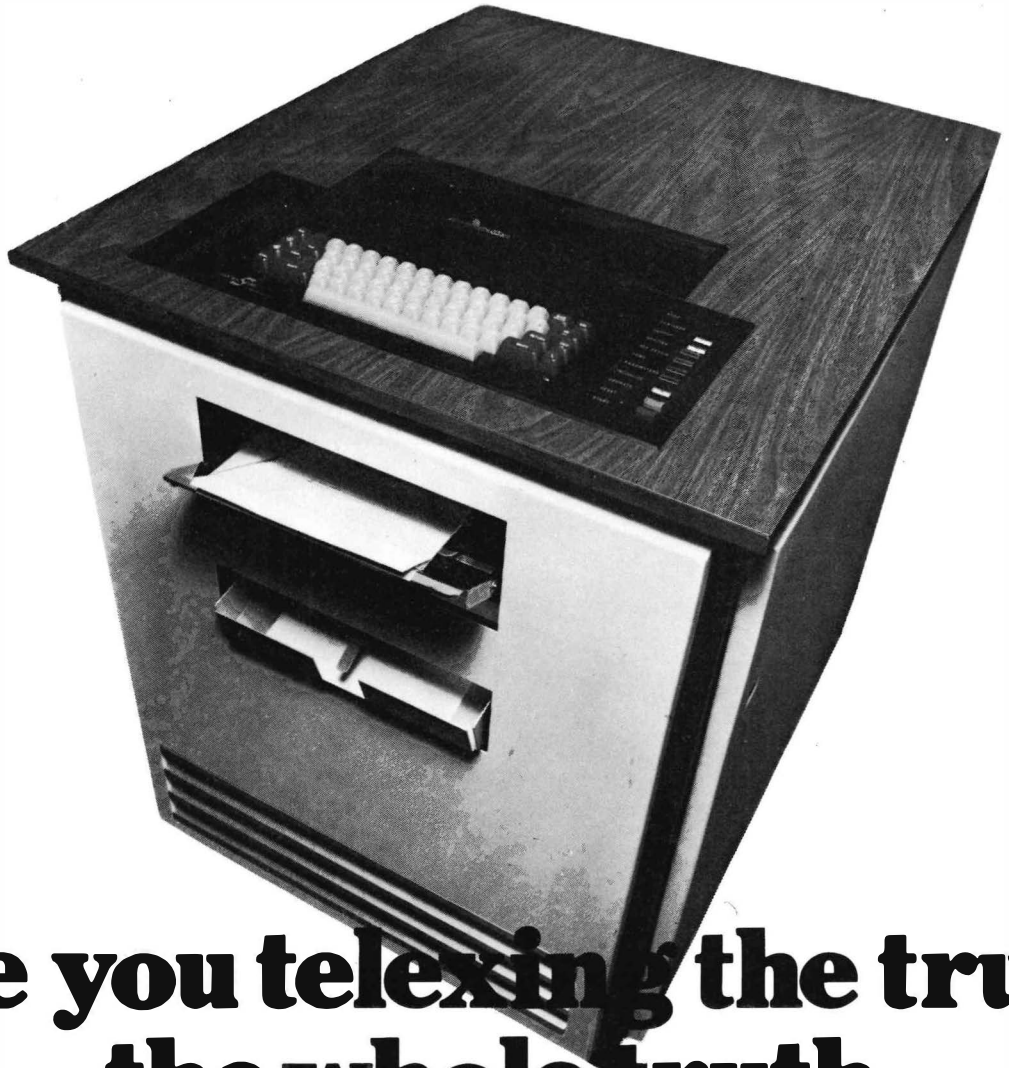
Mullard manufacture and market electronic components under the **Mullard, Philips** and **Signetics** brands.



Are you telexing the truth, the whole truth, and nothing but the truth?

The telex room is a vital communications centre. But it can also be the source of inaccuracies and delay. For if the telex operator has to rekey original copy, precious time can be lost. And last-minute panics can so easily result in mistakes creeping in.

Because it can read typewritten script and output directly to a punched tape or message switch, the Alphaword OCR frees operators to fulfil their proper function. And because any Selectric typwriter can be the input station, the responsibility for accuracy remains with the original author.

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British Telecom Journal

Winter 1980/81 Volume 1 Number 4

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

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Cover: On the rain-lashed main road between Machynlleth and Dolgellau in mid-Wales, engineers install one of the first overhead sections of optical fibre cable to be erected in Britain. The route is one of 15 throughout the country now being equipped with the cables which will make a major contribution to the nation's telecommunications system by the mid-1980s.

Facing tomorrow's challenge

A new era awaits British Telecom as the Business shapes up to meet the threat of private sector competition. Already, legislation is in hand to relax the monopoly and formally set up British Telecommunications. Within a few months, the knife edge of real competition will begin to make itself felt throughout the organisation.

But Government proposals will still allow British Telecom to retain certain monopoly rights, including the provision and maintenance of the network, the first telephone on any exchange line, and the maintenance of private automatic branch exchanges. Particularly valuable will be the freedom for British Telecom to enter new markets related to telecommunications.

On the other hand, the Government proposes not only to give private firms the opportunity to supply and install certain telecommunications equipment in competition with British Telecom, but to allow some services, provided by other people, to use the existing network.

All these measures give both British Telecom as well as private enterprise, a new legal platform from which to serve the interests of customers, encourage much greater use of the network, and provide opportunities for new United Kingdom-based industries.

In the final reckoning it is the standard of service which will be the main criterion on which British Telecom's efficiency will be judged and it is in this area that there must be success if the Business is to compete effectively in the new environment.

British Telecom's already firm foundation of service stems from a long tradition of staff loyalty and sense of duty. It is from this base that the building of a strong tomorrow must begin.

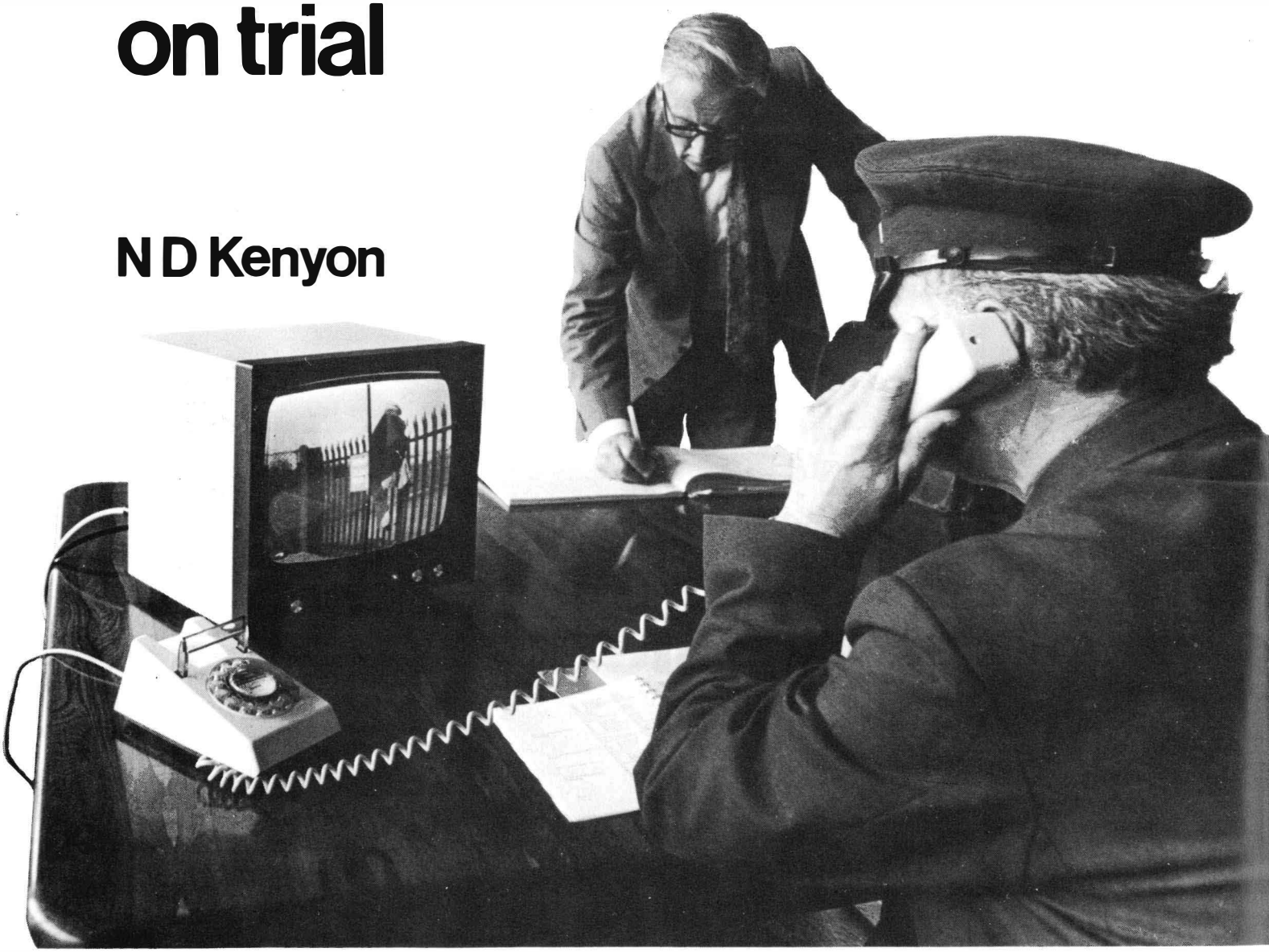
Excellent value

To continue to maintain the high standards our readers have come to expect and to meet escalating production costs it is with regret that the price of the Journal will be increased to 30 pence from the Spring issue this year. At an overall cost of only 10 pence per month we feel the Journal still remains excellent value for money.

The revised method of deduction from pay for staff will shortly be announced in the Post Office and Telecom Gazettes. Details of annual postal subscription payments will be announced later.

Slow-scan TV goes on trial

N D Kenyon



While a security check is made on the latest visitor to a large company, a burglar is spotted on a slow-scan television screen.

As part of a feasibility study of television transmission for commercial purposes, British Telecom has developed a digital slow-scan system which can use telephone or data circuits on the public network. Trials have already started to probe the operational potential of this medium.

If the cost of transmitting a television signal over long distances were not so high, there would be many commercial applications in which television could play an important part. Obvious examples are the surveillance of widely-dispersed sites and the substitution of travel by video-conferencing.

Conventional television, however, is exceedingly expensive to transmit because of the large bandwidth of the basic signal format – 5.5 MHz for the 625-line system. For distances greater than a few hundred metres special cables have to be laid, and for trunk connections a satellite or a chain of microwave links may have to be used. Frequently the capital and operating costs of such systems are so high that only rarely can a case be made for the use of television on economical grounds.

For some years British Telecom has been studying ways of reducing the cost of television transmission so that more applications can be brought within the compass of economic viability. All the methods employed involve compromising the quality of the television display in some way – by sending less information than the basic television signal is capable of carrying – which calls into question the acceptability of such a display for a particular purpose. This can only be judged by realistic trials.

Accordingly, British Telecom has embarked on the industrial development of a range of equipment, including slow-scan television converters, narrow-band (1 MHz) television equipment, video-conferencing terminals, and real-time picture-compression converters, and during the next two to four years, will be conducting trials with both private and public sector companies.

The first of these developments to go into industrial production and practical trials is a slow-scan television system which operates over the public telephone network or any data circuit.

Conventional television equipment delivers a signal which has a bandwidth equivalent to almost 2,000 telephony circuits. Much compression is therefore needed and there are three distinct methods of achieving this. In increasing order of complexity – and cost – these are: reducing picture clarity, reducing the speed of transmission of each image (sending fewer frames in a given time) and reducing the 'redundancy' in the picture.

The most significant reduction can be made in speed. It is recognised that for many purposes it is not necessary to transmit 25 frames per second, so an immediate reduction factor of 100 or 1000 is realised by taking four or 40 seconds to send one image. A further factor of five is achieved by reducing the clarity, sending only one field instead of two as in a conventional 625-line transmission, and limiting the horizontal resolution to about 210 visible points per line, as compared with about 600 usually.

In conventional television cameras and monitors, each television field is generated and displayed in 20 milliseconds. To make a unique field available for transmission and viewing over a much longer period, a picture store must be provided at both the transmitting and receiving terminals.

At the start of a sequence (see illustration at top of next page), a television field is captured in store (T). From there it is transferred point by point at a rate determined by the available transmission network to the identical receiver store (R),

USE	DISTANCE	SPEED
Protection of radio station following bomb threats.	5 km	4.8kbit/s dial-up on PSTN*
Detection of illegal dumping. Rapid installation, temporary use.	2 to 3 km	4.8kbit/s dial-up on PSTN
Protection of bullion vault.	5 km	48kbit/s on metallic pair
Security of premises at night monitored from other company location – two cameras on one system.	120 km	4.8kbit/s dial-up on PABX
Traffic monitoring for control of signals.	25 km	48kbit/s on repeatered pair
Extension of radar systems to port control position.	10 km	48kbit/s on metallic pair
Underwater surveillance from submersible (via ultrasonic transmission link).	—	Data via acoustic transmission
Security of premises at night, monitored from other company location.	400 km	4.8kbit/s dial-up on PSTN
Occasional access to remote camera for traffic control.	20 km	4.8kbit/s dial-up on PSTN
Transmission of X-rays between remote hospital and specialist.	100 km	4.8kbit/s dial-up on PSTN
Editorial submission to upper management.	80 km	9.6kbit/s on private voice circuit
Liaison between processing plants.	300 km	4.8kbit/s dial-up on PSTN
Aid to project collaboration between British Telecom and development contractors.	150 km	4.8kbit/s dial-up on PSTN
Audio-conferencing between two locations of same firm.	250 km	4.8kbit/s dial-up on PSTN
Audio-conferencing between two locations of same firm.	40 km	48kbit/s on private groupband circuit
Audio-conferencing between two locations of same firm.	200 km	4.8kbit/s on private telephony system
Editorial conferencing between newspaper offices.	150 km	4.8kbit/s on private circuit

*Public Switched Telephone Network

Selection of trial cases used to study slow-scan TV limitations.

A technical officer at a switching centre in London carries out a security check with the officer in charge of a remote radio station.

whose contents are continually displayed on the monitor. The viewer thus sees the new picture gradually over-writing the previous one from left to right – hence the term 'slow-scan television'.

But slow-scan television in itself is not new. Analogue systems operating over voice-band telephone lines have been around for some time. They suffer from accumulation of noise, especially over the longer distances where slow-scan offers the greatest savings. Distortions also show up directly. Digital transmission systems do not suffer from these defects, and provided that digit errors are infrequent, the quality of picture is independent of the distance travelled.

Moreover, with the advent of silicon-chip television digitisers and cheap digital memories, the terminals match much better to digital transmission than analogue, and there is also scope for the processing of digitised pictures to remove some of the redundancy mentioned earlier.

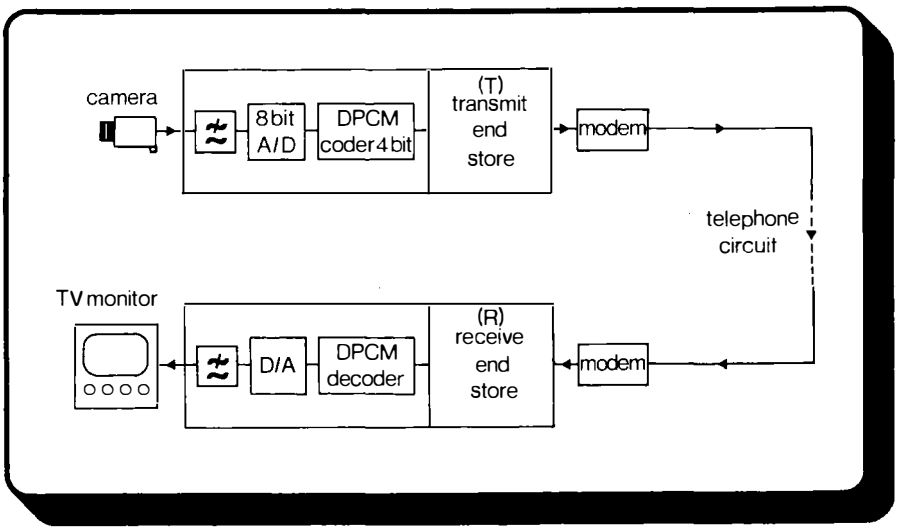
In present equipment, only relatively simple coding is used. The picture is captured as 290 visible lines of 210 visible picture elements (pels) each. Instead of storing each element as a full 8-bit pulse code modulation (PCM) word however, a 4-bit word is used to represent the difference between that pel and the one immediately above it in the picture.

In this way both picture stores are only half the size that they would be for 8-bit PCM, and transmission time is also halved, but picture quality, at least to the practised eye, is slightly reduced. In the receiver terminal, the 4-bit differential words are 'decoded' to 8-bit PCM before display, and also field-repeating is necessary to feed the 625-line television monitor.

A further extension of the coding scheme reduces the 4-bit words to an average of two to three bits, depending on the content of the picture. There is, however, a good prospect that in later generations of slow-scan systems, more complex processing will eventually reduce the average information to perhaps 0.5 to 1 bit per sample, with a corresponding reduction in update time.

The use of wholly digital apparatus has the additional advantage that it can interface with any digital circuit. Thus, while a good quality voice-band circuit can support a data rate of 9.6 kbit/s, giving a picture time of between 15 to 25 seconds, an international dial-up circuit will be slower than this. On the other hand, a private wire or a packet-switched connection may be a good deal faster.

But for applications where service must be provided very quickly, or on a temporary basis, slow-scan television may be attractive if the limitations of resolution and update time are acceptable. The same is true of connections longer than a few kilometres where real-time television becomes too costly or impractical.



How the slow-scan television system operates.

To study these limitations, a wide selection of trial cases has been made. (See panel on page 3.) The upper group can be classed as remote surveillance, the systems being unidirectional and the transmitting end usually unmanned. Some are permanently in operation, but those using dial-up circuits, either private or public, require an auto-answering or alarm-triggered auto-dialling facility.

A minority of the cases are 48 kbit/s; all the others are on voice-band circuits which although precluding higher picture speeds, are by far the most readily available, especially if dial-up access is acceptable. Not surprisingly, many security-surveillance systems are not required during working hours, and the continuous use of lines and switch outlets at night makes for economical use.

The lower group in the panel involves two-way communication, although, as in the first two of this group, not necessarily sending pictures both ways. In all these cases, the principal use is as an aid to working discussions between people in different locations and closely involved with the same project, product or service. It is in these 'conferencing' cases that there is greatest room for doubt about the quality and speed of the picture available.

The limited resolution of 210 × 290 visible pels is thought to be adequate for sketches, diagrams, many X-rays, newspaper lay-outs, and most solid objects such as printed circuit boards, but does not reproduce 200mm-wide typescript well enough for comfortable viewing.

It is, of course, technically feasible to make a slow-scan system of, say, 420 × 580 pels, but the transmission time then becomes four times greater which is perhaps an even greater impediment than legibility for conferencing.

Slow-scan television is a form of picture presentation which is not familiar to most people who are likely to use it in the trials or in the first years of a public service. Many react favourably at first contact, but it is now becoming established that such spontaneous opinions are a poor guide to the true worth of the system. Consider the frustration of the security man who feels sure something is in need of attention but must wait 50 seconds to be sure, or that of the energetic designer who wishes to display several modifications to his sketch or plan in quick succession.

Only a prolonged test in a real operating environment can give a reliable indication of the acceptability of the system for a particular job. Equally, the economics of the system can only be assessed against alternatives which enable the same essential task to be done – for instance, the physical presence of a security guard at the site to be protected. A fundamental aspect, therefore, of British Telecom's visual service trials is the feed-back from triallists on these operational factors, usually after six months.

The engineering requirements of these cases also provide valuable indications as to the directions that further system developments should take.

Findings of the slow-scan television trial will be the subject of a report to be made later this year.

Dr N. D. Kenyon heads the video systems section at the British Telecom Research Laboratories, Martlesham.

Serving a common interest

R Harper

With hindsight it is perhaps surprising that it took so long for British Telecom and the gas, water and electricity supply industries to get together to discuss their common problems, particularly as they are not in direct competition. In the past local co-operation has depended largely on personalities and its extent has consequently varied from place to place.

Probably the greatest spurs to national consultation and co-ordination were the Public Utilities Street Works Act Conference, the Health and Safety at Work Act and other legislation, and by 1977 the National Joint Utilities Group (NJUG) was set up to co-ordinate areas of common interest.

The NJUG (pronounced enjug) main committee meets about three times a year, with each of the four participating authorities taking turns to act as hosts. Each utility can provide up to four senior representatives and in the case of British Telecom these are a deputy director, a head of section and two heads of group drawn from Telecommunications Headquarters (THQ) Network Executive.

The main committee aims to 'seek out points of common interest and undertake such action, research or development as may seem necessary'. Although NJUG is not intended as a pressure group, it is clearly useful in the presentation of a united argument. It is financed on a cost-sharing basis between the member authorities and already the list of subjects covered is both long and varied and ranges from electricity cable sheath design, to the operation of a one-call system known as Susie.

Until recently, electricity cables were usually heavily armoured and covered by concrete slabs or earthenware tiles for further mechanical protection. The electricity industry has now introduced a PVC-sheathed concentric neutral earthed cable (CNE), laid without tiles or slabs. A metal object piercing a CNE cable is automatically earthed through

Posters such as this are playing an important role in the prevention of damage to underground plant by contractors . . .

. . . while Susiephone girls are being used to publicise the one-call system.

With the aid of special track locating equipment British Telecom staff are able to trace and mark the route of a telephone cable at a roadworks site.

contact with the outer conductor thus eliminating risk of electrical shock. The risk of burns from molten metal, caused by arcing at the point of contact, still remains a problem, as the PVC sheath is considered neither thick enough nor hard enough to withstand accidental impact damage. Through NJUG, British Telecom demonstrated its own cable impact tester and as a result, the electricity supply industry has now built a modified version to study the problem in more detail.

In the ground, one pipe, duct or cable can look very much like another and the consequences of mistaken identity can be very serious. Once, a Water Board employee punctured what he thought was a gas main and immediately informed the Gas Board who promptly sent men to the site. They began to drill a clean hole to fit a repair plug while at the same time, in the Central Electricity Generating Board control room, a gas pressure alarm sounded. A CEGB plant protection officer arrived on site just in time to stop the gas men piercing a 132 kV cable contained in the steel pipe and surrounded by pressurised nitrogen. There have also been several cases where British Telecom jointers have come close to cutting into the sheath of a live electricity cable.

Mistakes such as these would be avoided if pipes and cables were colour coded to identify ownership. Although the British Standards Institution had done some work along these lines it had

A typical below street level labyrinth of cables, ducts and sewers.

The result of careless digging is often serious damage to telephone cables.

met with little success, but NJUG has now managed to reach an agreement in principle, aided perhaps by the change-over to plastic pipes and cable sheaths, which makes colour coding more feasible.

The proposals are that British Gas retains yellow as at present, British Telecom changes to grey for ducts up to 75 mm diameter and the Electricity Council uses black sheathing on low voltage cables and red for high voltage. The water industry has the option of using blue or green but they will first have to ensure that any pigments used in the sheathing cannot contaminate the water supply. One solution is to apply a spiral tape or outer skin to the existing basic black pipe.

Damage to underground plant means loss of service to the consumer and, in the case of gas and electricity, can prove positively dangerous. Often, problems arise because excavators do not know where plant is buried. Help is available through an NJUG document which details physical appearances, capabilities, manufacturers and prices of existing pipe and cable locators. Although not produced to show a best buy, the document – entitled Cable Locating Devices – highlights what is available and gives guidance on suitability for a particular application.

Although each utility keeps a record of its own plant, it does not have ready access to records of others. A two-year field trial has already started in Bradford using microfiche to store the full range of records. Here, each utility uses a microfiche viewer/printer to scan and copy details of everything likely to be encountered on site. All damage cases are being documented to provide a comparison with earlier damage statistics to see whether the idea proves economically viable and can indeed save money.

One of the more promising imports from the United States has been the one-call system which, in the case of British Telecom has become known as Susie – Scottish underground services information for excavators. As in the case of records exchange, a two-year trial was launched, this time in the Lothian region of Scotland early last year and was accompanied by an extensive publicity campaign.

By phoning Susie, a contractor seeking information on the location of underground plant near his roadworks site only has to make one freefone call 48 hours before he proposes to start work instead of several individual ones. He is then furnished with the information he requires.

When an inquiry is received at the Susiephone centre, a message is relayed simultaneously to all the utilities by facsimile equipment. Each studies its records and advises the Susiephone operator whether or not they have an interest in the site concerned. The contractor is told which utilities have plant in the area and this advice is followed up by the individual authorities, who may choose to send a plant protection officer to site, deliver drawings to the contractor or provide him with details by telephone.

One NJUG working party is currently studying the potential for translating records into digital form for computer storage. If feasible, the next step may be a trial in which all the utilities will work with the Ordnance Survey office. Together, with Susiephone, computerised records could lead to a major step forward in avoiding plant damage and result in safer working conditions.

Another area to which NJUG have devoted much effort are the problems surrounding housing estates. In 1977 a design bulletin was issued by the Department of the Environment (DoE) as a guide for housing authorities. This document aimed to encourage the mews court/cul-de-sac layout rather than straight lines of houses along a grid system of estate roads. Although attractive for residents, it does raise problems in providing service to individual premises. Mews courts, for instance, require plant to carriageway standards with the attendant problems of access for maintenance purposes.

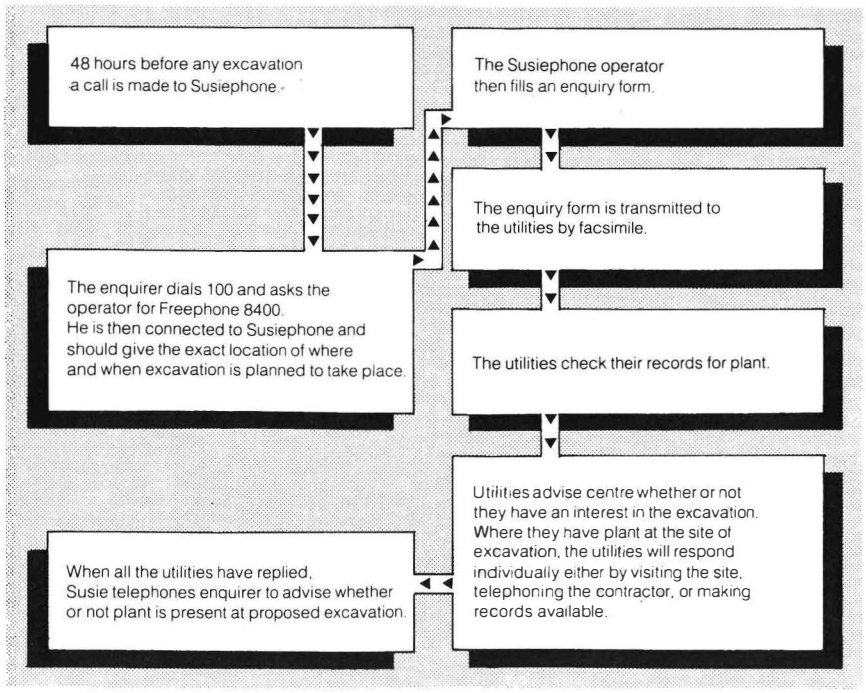
The positioning of mains in the pavement, a common trench lead-in arrangement and a code of practice to improve co-ordination between the housing estate developer and the utilities have all been subjects of discussion, and many misconceptions held by builders – such as the reasons for siting a telephone exchange in a particular place – have now been finally dispelled.

The group has published three documents giving guidance in three major areas – avoidance of danger from underground electricity cables, provision of plant in housing estates and, as already mentioned, cable location devices – and these have been distributed to staff in the major utilities, including British Telecom.

The first issue of a newsheet, aimed at making people more aware of NJUG activities, was issued in August. Although only a few were circulated within British Telecom, future newsheets will receive a wider distribution.

How Susiephone works

The one-call system is simple and quick to operate, and the call can be made from any telephone, including a public phone box.



Mr R. Harper is an executive engineer in the Transmission Department of the Network Executive. His duties include responsibility for research for the National Joint Utilities Group.

British Telecom Journal, Winter 1980/81

Market review for Prestel

Recent changes in the marketing strategy for Prestel should bring greater rewards to both British Telecom and its information providers.
Here **Richard Hope-Smith** outlines the new approach.

Most successful innovative products tend to pass through four distinct phases. The first mainly involves the researchers, inventors and engineers who develop ideas into prototypes, leading to tentative pilot trials and test marketing. The second phase starts when the product enters the real market-place bearing a true price, and it is here that marketing plays a prominent role. Phase three is lift-off, when production and sales attain peak rates, and rewards in the form of a profitable return on investments made are reaped. The fourth and final phase – the high plateau – is reached only when the market is saturated.

A good example of a product that has reached the fourth phase is colour television, while the video cassette recorder is an example of another electronic product which after some years in phase two now shows signs of having attained phase three. Prestel is well into phase two and all three parties to its development – British Telecom, the set manufacturing industry and the information providers – are striving to bring forward the date of lift-off.

British Telecom recognises that as well as ensuring that the Prestel computer network performs efficiently and carries the capacity to cope with demand, it is also responsible for making the market for selling the service. During the 1980s, Prestel aims to establish the service as a mass-market medium of communication through hundreds of thousands of sets in businesses and homes. But this will not happen easily or quickly. Paramount, however, is the need for an important solid base, involving tens of thousands of customers over the next two years, most of whom will come from the business sector.

Experience has shown that Prestel cannot be sold by just publicising its general benefits and enormous potential. Each new customer uses the service for a specific reason. Although general information services available will be used, it is the existence of regularly-required information on the Prestel database meeting a particular need that will be the main reason for a customer's purchase decision. For example, a dealer needing up-to-date commodity prices will buy Prestel only if the information is available. But once a set has been purchased, ready use will be made of other information services on the database – such as financial statistics, weather reports, racing results, and entertainment guides – but the availability of these services will be peripheral in the customer's original decision to buy Prestel.

Clearly, Prestel's prime task in marketing the service is to identify and develop information services which will stimulate set sales. The marketing strategy adopted in autumn 1980 seeks to do this by first determining which groups can best benefit by having Prestel and then positively selling to those sectors. Criteria for selecting market sectors are based on the ability of Prestel to meet an immediate need for rapidly updated information which can be simply structured without the need for extensive data storage. So there must be an established base of good information services to meet this need on the database.

It is currently believed that sectors standing to benefit most from Prestel are finance/investment, travel, commercial property, agriculture, construction, hotel and legal. Closed user groups, where users reserve pages on the database for specialist business or confidential applications, and the sale of sets to the affluent residential sectors, also merit priority attention.

As information quality is so vital to Prestel's sales success it is important that only the very best information providers should have their wares on the database. British Telecom has never sought to censor database contents, but for commercial reasons, its past neutral editorial position will not be continued. Database pages will not in future be allocated on a first come, first served basis, but will only be leased to organisations which can demonstrate an ability to set up information services actively contributing to increased set sales and network traffic. Conversely, information providers who have shown little inclination to provide an acceptable level of service or whose services command a low level of access may not be given the opportunity to renew contracts.

To encourage involvement in providing not only useful and attractive sections of the database but also in active sales promotion, information providers and the set manufacturing industry are working together to develop market sectors and co-operate in publicity activities through sales force briefings and, where appropriate, joint advertising ventures. One incentive in the form of an introductory payments scheme has already commenced whereby Prestel charges to information providers are rebated by £25 for every directly attributable sale to a business customer and £10 for every certificated residential sale.

Prestel's now legendary 'beckoning finger' series of television advertisements have succeeded in building up overall awareness of the service, essential when launching a product so radically new in concept. A third of the total UK population is now aware of Prestel, and in the target groups, encompassing those who are most likely to purchase sets, the levels of awareness and depth of product knowledge are encouragingly high.

Last autumn saw the first of the advertisements reflecting the philosophy behind the new marketing strategy. With awareness achieved, emphasis is now directed to securing set sales, particularly in key business sectors. Three continuing press campaigns are being run, the first of which are full-page and double-page advertisements in specialist publications featuring information pages selected from areas of the database which have a particular relevance to the sector.

The second campaign is 'topically'-based using advertisements in national newspapers highlighting the more useful

general areas of the database. Here, for example, an advertisement featuring the restaurant information available on Prestel will be placed in the entertainments section of the paper and Prestel's racing results service will be advertised in the sports section.

The third campaign is aimed at business decision-makers, and will consist of half-page advertisements in those national newspapers with the highest senior management readerships showing in business locations. All insertions carry freepost reply coupons so that sales leads can be taken up. Response has so far been very encouraging and it is planned to continue these specialist campaigns well into 1981, extending their scope to include further selected sectors.

Returning to the part of the system that British Telecom is directly responsible for – the network – Prestel is ahead of schedule in expanding local call access to the system. London was the first area with the full service in September 1979 – Birmingham and Nottingham followed soon after in December 1979. In March and April last year, Glasgow, Edinburgh, Manchester and Liverpool came on-stream. And last autumn, the network took in Leeds, Newcastle, Brighton, Reading, Sevenoaks, Cardiff, Bristol, Bournemouth, Luton, Chelmsford, Norwich and Belfast.

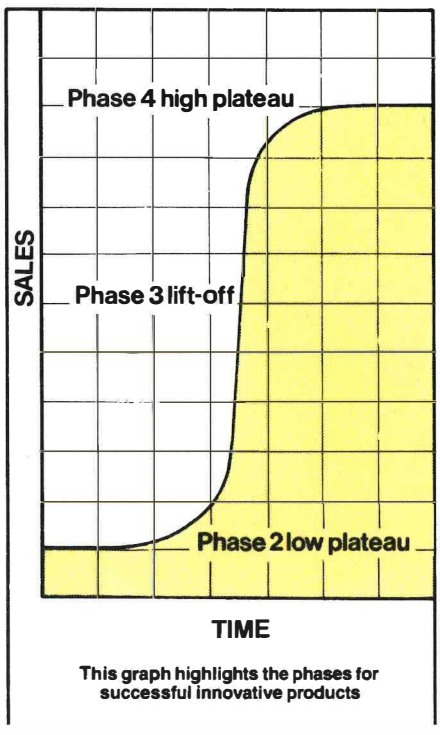
Prestel has scored notable international successes, particularly in sales of viewdata know-how to overseas administrations. Six countries have now bought the Prestel system. Five administrations – West Germany, The Netherlands, Switzerland, Austria and Hong Kong are now setting up systems and running public service trials. In the case of the latest country – Belgium – the sale was to a company concerned with developing private viewdata services. Competition is fierce especially from the French and the Canadians but Prestel leads as still being the only system to have cleared the all important hurdle of operating a fully proven public service.

Although current UK marketing is aimed at business customers, Prestel has not forgotten the residential market, as it is in large scale penetration of this sector that Prestel's long-term success lies. But several factors, mainly receiver set costs, act against large volume sales being made in the short term, although the availability during 1981 of relatively low-cost adaptors may influence this situation. In laying the foundations, particularly in the television showroom area, Prestel will be prepared to meet demands for the service generated by costs which will continue to fall during the next two or three years.

Prestel has come a long way since the full public service was launched in London in September 1979. The network of information retrieval centres now gives local call access to over 60 per cent of UK telephone customers. Already over 7,500 registered sets are accessing the 170,000-strong database which continues to grow daily. More than 400 information providers maintain the database and over 30 set and adaptor manufacturers have obtained approval for more than 70 models – a tremendous springboard for the venture to achieve the marketing success Prestel is now striving for.

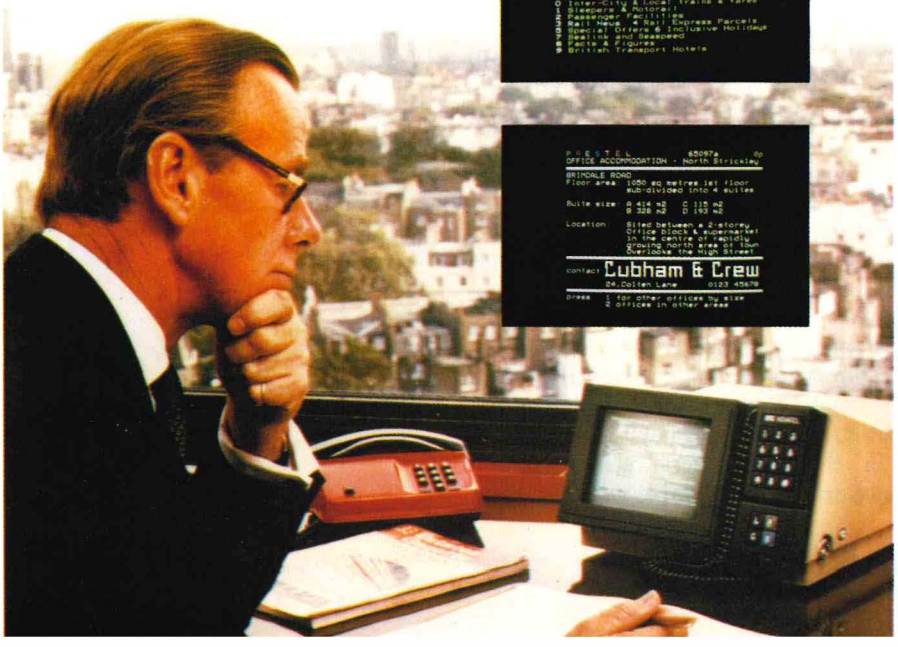
Mr R. Hope-Smith is British Telecom's Prestel public relations executive based in THQ Public Relations Department.

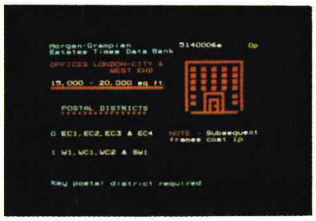
British Telecom Journal, Winter 1980/81



This graph highlights the phases for successful innovative products

Commercial property companies are among those likely to benefit from Prestel services.





Waves of success

A F O Butler

Eight years ago, a small group of British Telecom planners and engineers met to begin the task of assessing the oil industry's communications needs in the North Sea. Today, thanks to the tropospheric scatter technique, a host of drilling platforms have access to a full range of telecommunications services and the network continues to grow.

Although it is now commonplace to pick up a telephone and dial almost anywhere in the world, to be able to do so from an isolated oil platform, buffeted by icy polar gales and mountainous seas 200 miles out in the North Sea, may still cause mild surprise. Add to this the ability to telex main centres of industrial activity and exchange digital information with mainland-based control rooms and computer terminals, and this will surely cause the occasional raised eyebrow!

The success of the North Sea communication venture owes much to a small group in British Telecom's International Executive, known as the North Sea Task Force. Formed in 1973, the group's brief was to assess the oil industry's communications needs in their North Sea operations and to lay plans for the Post Office to meet those requirements.

Early discussions with the oil companies confirmed that existing and projected service capabilities in the MF (medium frequency) and VHF (very high frequency) bands at coast radio stations could cope with the needs of exploration and drilling rigs, but were totally inadequate to satisfy the long-term, large-capacity requirements of production platforms.

High density traffic meant using systems with large bandwidth capability. Undersea cables with main and reserve provision would not only prove costly but would be vulnerable to trawler activity in the relatively shallow waters of the North Sea Continental Shelf. For this reason, the Task Force had to look high in the frequency spectrum for a solution.

Microwave line-of-sight systems, despite their high capacity, are only satisfactory over short distances and would be unable to give service in the 100 to 250 mile range needed for the production platforms. And satellite working was not considered viable as at that time, no suitable alternative was available over the North Sea. Thus having rejected all these techniques, the Task Force were compelled to consider the only other viable alternative, the tropospheric scatter system of communication. This decision heralded a period of close co-operation between the Post Office, the Marconi Company and the oil industry, which has endured to this day. The project progressed with minimal friction and continued to observe strict Post Office parameters, themselves influenced by recommendations agreed by the International Telegraph and Telephone Consultative Committee (CCITT).

In the tropospheric scatter system adopted by British Telecom for these

New aerials for the Fulmar oil field near completion at Mormond Hill near Aberdeen.

nks 1 kW of microwave power at round 2 GHz is concentrated in a very arrow beam, commonly 0.5 to 0.7 egrees in width and this is launched at a ɔw angle towards the horizon. The beam ; intercepted by a similar beam from a istant aerial, say on an oil platform, and is at the common intercept point that ıe characteristic scatter occurs. This is shown in the diagram at the top of page 12. Microscopically small amounts of energy coincide with the secondary beam and can be collected by the platform receiver. A good analogy is that of an observer below the horizon being able to see a searchlight beam reflected from cloud formations.

The signal loses power along its path through space, and suffers further loss at the point of scatter, the amount varying according to the elevation angle of the launched beam. The launch angle therefore must be as low as possible towards the horizon and this can be greatly helped by installing equipment on an elevated site. Also the larger the aerial, the stronger is the signal, and since there are severe limitations to the size of aerials on oil platforms, compensation can be made by installing large on-shore aerials. Typically, 12- or 18-metre billboard aerials on land work to six or nine metre aerials offshore. The billboard aerials form part of a parabola which is illuminated from an offset, separately mounted, feedhorn launch unit. This arrangement avoids partial blocking of the beam which happens with conventionally centre-fed dish aerials.

Total losses over a typical North Sea transmission path are generally around 200 decibels. Simply, this means that of the original 1 kW, only a fraction of a millionth of a microwatt actually arrives at its destination! Although this is still usable and capable of carrying all the information required, special efforts have to be made to avoid further signal decrease and degradation to meet a service requirement of 99.98 per cent availability. Four distinct and simultaneous propagation paths are used, two taking advantage of vertical and horizontal polarisation characteristics and two being separated in space by two separate aerials. The quadruple diversity signals are received by four distinct receivers having ambient temperature parametric amplifiers at the inputs and the four signal paths are combined before they are detected.

Two hilltop sites – Mormond Hill in North Aberdeenshire and Scousburgh in the Shetlands – were duly developed, with construction work starting in autumn 1974. Service was given to the Beryl Alpha oil platform in December 1975 closely followed by services to the Piper, Frigg and Manifold platforms in 1976. All traffic from Scousburgh was routed to the mainland via Mormond Hill by a 72-channel tropo system before installation of the line-of-sight microwave system now routed via Fair Isle and the Orkneys.

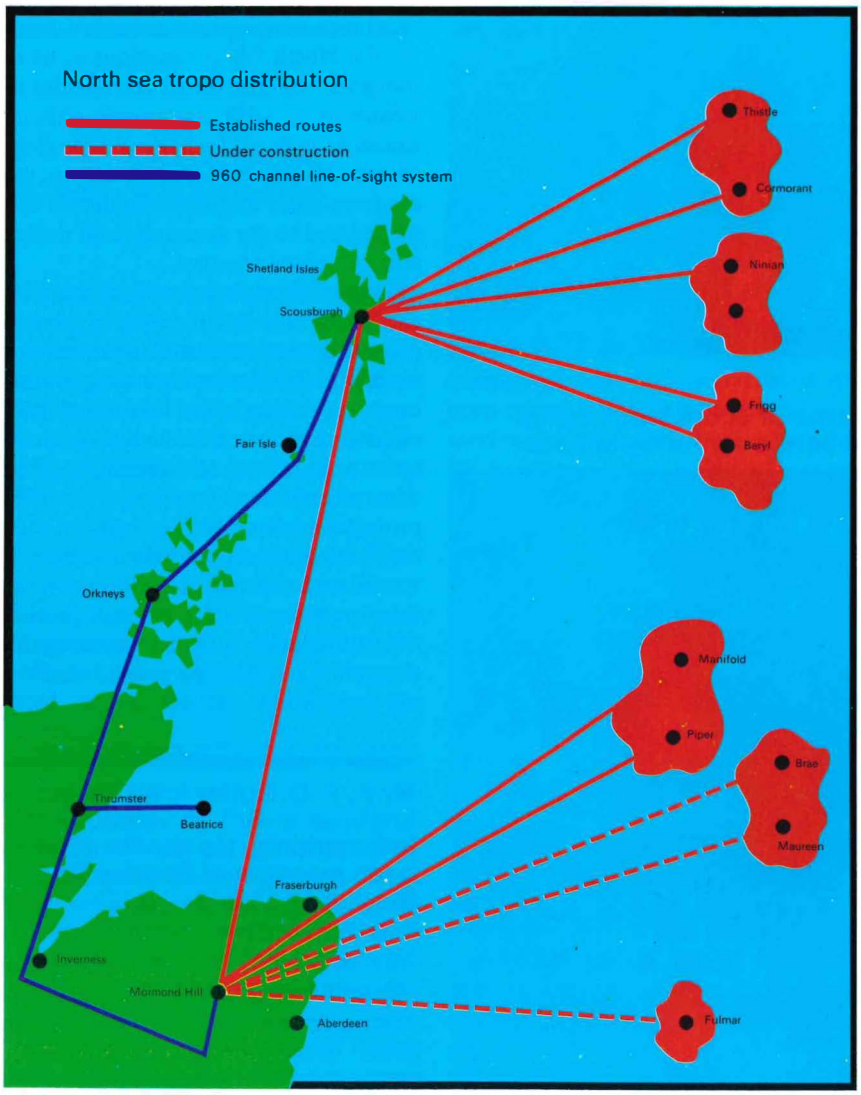
The complexity of service to a group of platforms in a given area is typified in the Thistle/Cormorant system. Service is given from Scousburgh to either Thistle or Cormorant who act as 'hosts' on behalf of all the subsidiary platforms connected to the hosts by line-of-sight microwave links. Any fault affecting traffic automatically changes the direction of propagation from Scousburgh directing traffic to the alternate host. If a fault occurs in the line-of-sight system offshore, then traffic can be alternated manually between hosts to ensure an equitable share of traffic to dependent platforms.

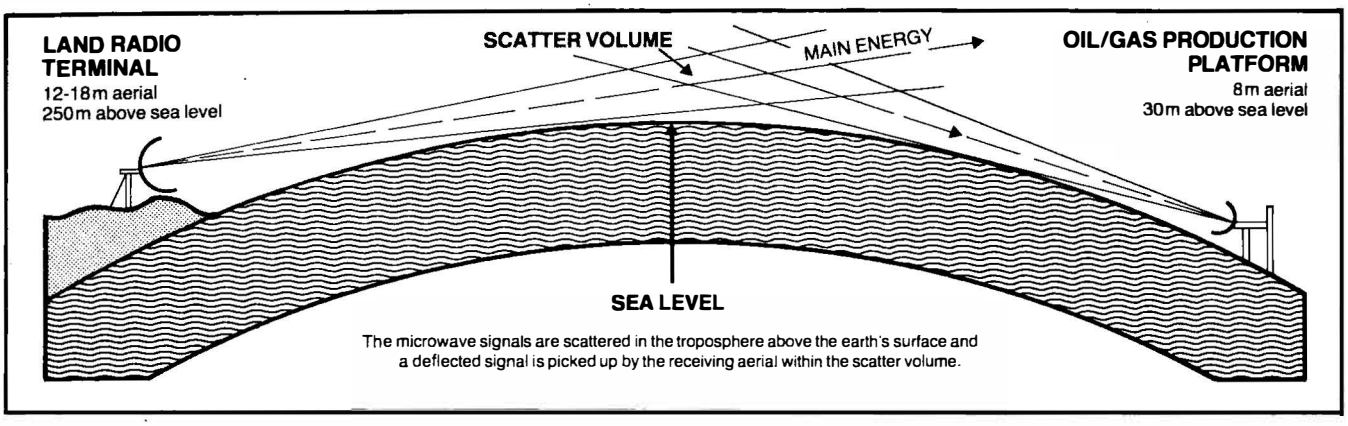
Working to a group of platforms, British Telecom International is in fact providing service not only to different platforms but to different oil companies via host platform equipment not belonging to or under its direct control. Not only do agreements need to be clear, precise and binding, but British Telecom maintenance staff working closely with oil company workers need to do so with tact and diplomacy. Exchange visits between oil platform staff and British Telecom engineers are encouraged and these help to foster mutual appreciation of each other's problems.

System equipment is extremely reliable and complete loss is rare. There are often occasions when it is necessary to reduce to two or even one path, while repairs are continuing elsewhere. For months on end there are no faults in a traffic sense and the nine minutes per month failure rate is comfortably achieved.

Both stations are provided with no-break power supplies with the customary one hour battery rating and backed up by two diesels either of which will run the station on its own. Because of the isolated nature of the sites, their vulnerability in bad weather, and often unreliable mains supplies, care is taken to ensure that a sufficient reserve of oil is carried to last at least 60 days.

Weather, particularly in the Shetlands,

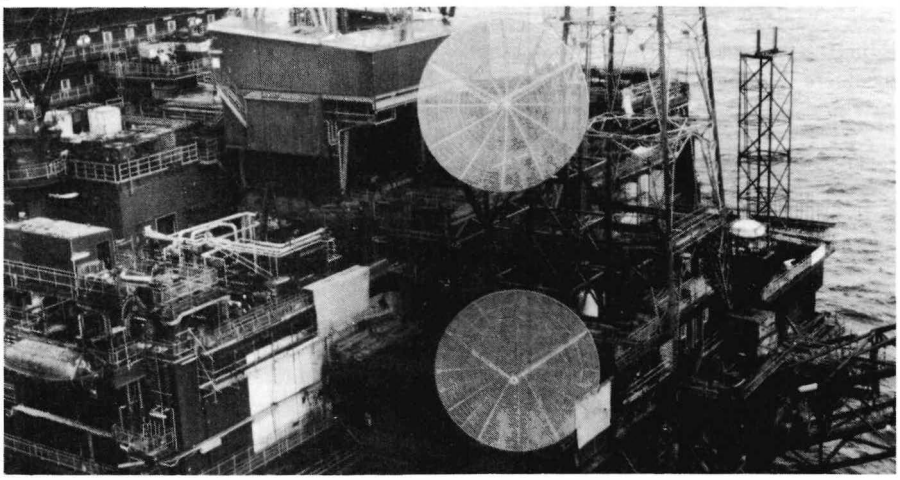




In the trans-horizon system, microwave signals are scattered in the troposphere seven to ten miles above the earth's surface, and a deflected signal is picked up by the receiving aerial.

is, of course, a major consideration. The wind at Scousburgh can exceed hurricane force and within three months of commissioning an anemometer, speeds of 136 mph were registered for four hours continuously. At these speeds, sheet steel left on site by contractors has been hurled against the main building with such force that it has penetrated the outer corrugated steel skin and the inner skin of breeze block. It says much for the engineering of the aerials and their mounting blocks that they have been able to withstand this colossal battering. Snowfalls in the Shetlands and resultant drifting in high winds can also cause problems and sometimes mean that staff must be airlifted into Scousburgh by helicopter. Emergency rations and accommodation are provided at both stations and experience in these conditions have prompted the purchase of a tracked vehicle at Scousburgh.

These two tropo-scatter aerials on Shell Expro's Cormorant A platform have been installed at the base of a 100-metre tower.



Jim Macfarlane, technical officer in charge of Scousburgh trans-horizon station, checks the wind speed before venturing outside.

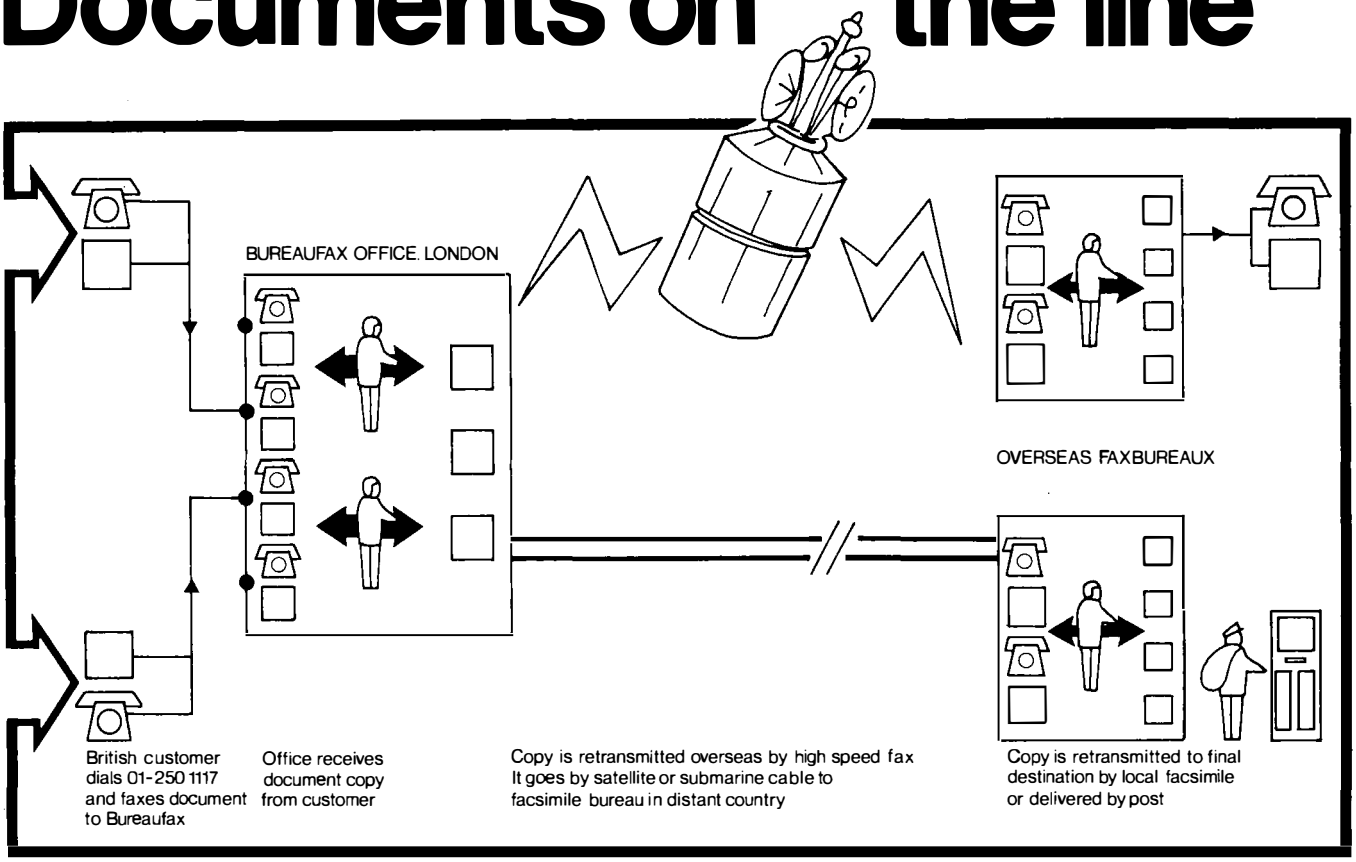
Everyone employed in communications for the North Sea is conscious of its importance and that direct and continuous involvement with customers, although unusual, is vital. Important though the services may be to British Telecom, they are even more important to the oil companies and to the economic and defence strategy of the country.

Now, nearly eight years after formation, the Task Force is still deeply involved in providing terminals and equipment to meet British Telecom's growing commitment in the North Sea. It is also carrying out investigations into such problems as system expansion, the use of 9.6 kbit/s data transmission equipment on tropo propagation experiments, the more effective use of aerials, and the adoption of special techniques for changing propagation direction. With so much in prospect the future looks even more exciting than the past – and that has proved challenging enough.

Mr A. F. O. Butler is an executive engineer in British Telecom International. He has for 10 years been manager of Bearley Radio Station and for the last five years, has also been manager of both Mormond Hill and Scousburgh trans-horizon stations.

British Telecom Journal, Winter 1980/81

Documents on the line



K J Webb

Bureaufax, an international facsimile service for sending and receiving copies of customers' documents, opened recently in London.

With the increasing use of facsimile internationally, telecommunications administrations and Recognised Private Operating Agencies (RPOAs) have been seriously considering the problem of interworking between facsimile machines of different types and manufacture.

And because it is likely to be some time before machines are universally compatible, a number of countries have introduced Bureaufax. The customer in the origin country passes a document to his Bureaufax office and it is then transmitted to a similar office in the destination country for onward transmission or delivery to – or collection by – the addressee.

The UK service has been opened on a one-year trial basis and was inaugurated by Sir Ronald Gardner-Thorpe, Lord Mayor of London, who sent a message to the Mayor of New York, Mr Edward Koch, and to US President Mr Ronald Reagan. By the end of last year, service was available to Australia, Bahrain, Costa Rica, Guam, Hong Kong, the Philippines, New Zealand, Taiwan and the United States.

It is, however, intended to extend the service to as many countries as possible during the trial and negotiations have been taking place to provide Bureaufax service to Argentina, Bermuda, Chile, Italy, Japan, Kuwait, Nigeria, Puerto Rico, Singapore, Spain, Sweden, Switzerland and Thailand.

Aimed primarily at the business market, Bureaufax acceptance in the UK was initially by facsimile only, from telephone subscribers transmitting document copy to the Bureaufax office over the public telephone network. Copy can be accepted from virtually all second generation (three minute) machines as well as from a number of first generation (six minute) machines.

Early this year however, it is planned to provide counter acceptance facilities both within and out of London for customers without their own facsimile machines, thus increasing the market base for the service. Meanwhile acceptance by post and by hand is allowed at the Bureaufax office in London. Incoming facsimile documents are delivered by facsimile or first class post or may be collected.

But what of the future? If the year's trial is successful, a decision will be taken to provide Bureaufax on a more permanent basis. In this event, it is likely that it would be further equipped to cater for acceptance from an even larger number of customers' facsimile machines including third generation (one-minute digital) machines. But Bureaufax's main role will be to cater for those customers without machines of their own. Increasingly, telephone subscribers are using machines which are compatible with each other, and this process could be made available in the future by computerised store and forward equipment which adapts standards between otherwise incompatible machines.

Mr K. J. Webb is a head of group in the International Executive and is responsible for new international services.

British Telecom Journal, Winter 1980/81

Where Moles unearth

Before anyone thinks of contacting the Secret Service it should quickly be added that the Moles below are not spies but novel items of test equipment designed and developed by SETR's Test Equipment Design (TED) Centre. While Telecommunications Headquarters departments get on with the job of designing and developing advanced systems to take telecommunications into the next century, the SETR TED Centre and its counterparts in other regions are busy designing and developing modern maintenance aids for existing systems.

At work in the regional electronic centre at Seaford are (left to right) technical officer Peter Jackson, technician Richard Oxley and Richard Walder, another technical officer.

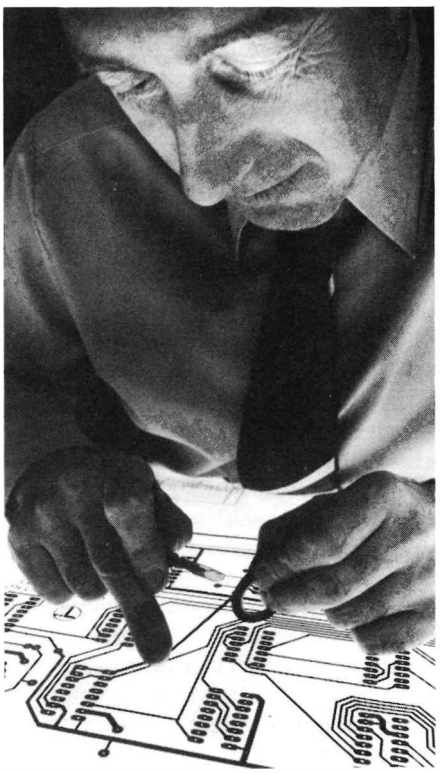
For SETR, it all began more than ten years ago when a small workshop was set up to undertake this development work. Situated in the building once occupied by Brighton's Preston exchange, the workshop now has a development and construction area as well as a light engineering facility equipped for sheet metalwork. Its success can be seen in a register published by British Telecom's Tester Co-ordination Working Party, a national committee set up to avoid duplication of effort, and to share successful developments. The documents show that more than a third of all past projects are attributed to SETR.

Six years ago, an electronics design workshop was established in Seaford exchange, 15 miles east of Brighton. Over the years, this workshop has produced a host of electronic gadgets of which the Mole measurement and overground location equipment is probably the best known. And just two years ago an executive engineer joined the group to co-ordinate the work of the Brighton and Seaford units which until then had worked independently. Today the two workshops with a total staff of eight technicians complement each other, with initial design and development being undertaken at Seaford and mechanical and production engineering at Brighton.

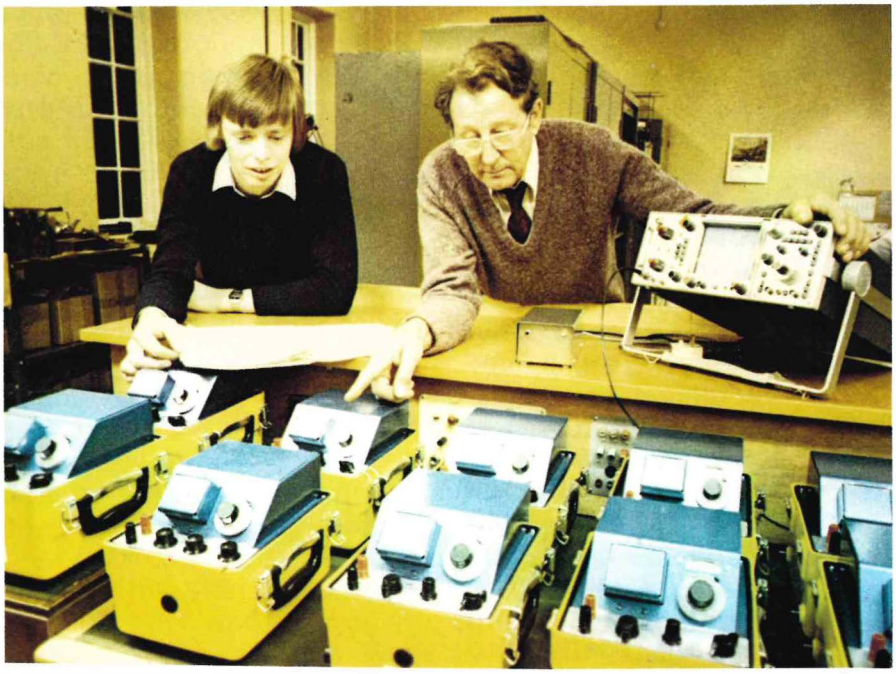
Another group playing an increasingly important role in the region's development effort is the regional drawing office. For many years they have provided the development group with circuit diagrams and working drawings. Now, with about one printed wiring board design each week, the drawing office is providing a new and valuable service.

Development of the Mole began at Seaford about six years ago. The aim of the project was to provide faultsmen jointers with easy-to-use equipment which could locate accurately faults which were hitherto difficult to find. Twelve prototype Moles were ready by 1976. Unlike conventional pulse echo sets which need highly accurate calibration and are read by measuring a trace on a cathode ray tube screen, the Mole uses the novel technique of obtaining coincidence of pulses on a small cathode ray tube screen and reading the distance of the fault directly from a dial. This technique has now been patented by the Post Office, and owes much of its success to the fact that it cost much less than a conventional pulse echo test set.

The tester quickly went into production and in 1978, 85 sets were manufactured. These Moles were comprehensive fault location sets and included a constant current bridge circuit also developed at Seaford. Further developments continue through Telecommunications Headquarters and under external development contracts, although SETR are now concentrating on a smaller cost-reduced version known as mini-Mole which is equipped with a fine tuning control to add to its accuracy. Although electrically the same as the original, the equipment was completely re-engineered to fit into a



In the regional headquarters drawing office at Brighton, draughtsman Brian Rogers prepares a circuit tape up of Autocrat, a project using a family of monitoring systems to check call charge rates.



Technician Ian King (left) and technical officer Jack Tate check out a batch of mini-Moles at the Test Equipment Design Centre. The first production run of mini-Moles was completed last year.

standard moulded carrying case and a production run of 200 was completed during 1980. Mini-Mole has evoked great interest in other regions and a species indigenous to the South East may soon be seen by Mole-spotters in other parts of the country.

Another device which has recently been introduced in SETR is the Checkmate digit display unit – notable, among other things, for the fact that its name is *not* an acronym! Originally designed to help trace calls through common control exchanges, Checkmate and its inevitable successor Checkmate II have found many uses throughout the region, including checking Prestel receivers.

Checkmate is designed to accept trains of digits in either loop/disconnect or battery/earth form, store the information and display the digits dialled on a light emitting diode display. This can show 12 dialled digits and recognise the international code 010. For long international dialling codes the 12 digits following 010 can be displayed with a special indication to show that the call is to an overseas number.

To keep costs down, the digits were at first displayed on arrays of individual light emitting diodes. Of this version, 100 were produced and are now in regular use. As part of a later cost-cutting exercise, it was found that not only had the cost of seven-segment displays fallen below that of the individual light emitting diode arrays, but that seven-segments displays only needed one instead of two printed wiring boards, so reducing assembly costs dramatically.

Checkmate II, the latest version now being evaluated, has an extra facility for Prestel sets to confirm that the pulses under inspection are the right speed and ratio. Whereas most other testers rely on the correct speed before they can measure the ratio, Checkmate gives a 'Go/No/Go' indication on each parameter independent of the other.

Although Mole and Checkmate typify the work of the group, they are special in that they account for 500 individual items – 200 Checkmate and 300 Moles. Other projects include:

- Setit (South east telecom interval timer). A small hand-held device to measure pulse width or pulse repetition rate from 0.01 seconds up to one minute. This is primarily intended for checking tariff pulse rates.
- Midas (Money inserted digital analysis system). This measures the rate of money input to call offices by counting coin pulses at the exchange. It is an aid to coin-box emptying and avoids 'box full' conditions.
- Cosmic (Call office service monitor integrated circuits). A device to monitor pulses from call offices. It checks the line and operation of the coin-box mechanism from the exchange.
- Autocrat (Automatic charge rate analysis terminal). A family of monitoring systems which check that the various charge rates in an exchange remain within limits from the cheapest local rate to the dearest IDD rate. It can also check and record the exact time of charge rate changeover.

Although some projects use discrete electronic components and electro-mechanical devices, most of the group's development work relies on integrated circuits which must have a high immunity to electrical disturbances, such as in exchanges. Large systems have the choice of either low power consumption devices or large expensive power supplies which may require forced cooling. Small battery-powered items must have an extremely low power consumption if they are to give long battery life. Modern CMOS (complementary metal oxide semiconductor) integrated circuits meet all these requirements, and are used exclusively by the TED Centre.

The microprocessor will almost certainly be used to solve some of the problems currently being dealt with and to this end, the centre has acquired a microprocessor facility. Where possible, of course, cheaper and simpler solutions will be adopted.

With such high demand for the centre's services, the group is faced with either accepting all new work and then coping with the inevitable backlog, or closing the doors on new work and only dealing with jobs already accepted. Only the former choice offers the service that the group was set up to provide. The technical challenge of the projects is therefore matched by the challenge of project management – the need to weigh up priorities, the choice of quick, cheap solutions to increase project throughput, and the allocation of time to be spent on careful production engineering.

As in the past, the centre will continue to apply its three tried and tested ingredients for success – technological change, prudent project management and, above all, teamwork.

the faults...

E Coaker

Mr E. Coaker is an executive engineer at South Eastern Regional Headquarters and is responsible for the work of the Test Equipment Design Centre.

British Telecom Journal, Winter 1980/81

The Welsh connection

Whenever the telephone rings at her remote cafe-cum-farmhouse nestled 1,400 feet up among the Plynlimon mountains of mid-Wales, Mrs Lynn Thomas still considers it a minor miracle. And in a way it is. For until British Telecom was able to set up a very special link, Mrs Thomas had to travel five miles to make or receive a call.

Although the cafe is situated beside the main A44 Aberystwyth-Llangurig road, the surrounding terrain makes conventional methods of providing service far too costly and anyway, winter maintenance would have proved very dif-

High up on the mountainside, engineer Bill Jones checks the specific gravity of the 12 volt battery used to power the radio equipment in the terminal building at Eisteddfa Gurig – the cafe end of the VHF radio link. Attached to the pole is a four-element aerial.

Inset: Hikers walking the Plynlimon range are frequent visitors to the cafe and many are glad to use the phone. Here Mrs Thomas helps pinpoint a map reference.

ficult. The only practicable solution was to provide a VHF radio link using a line-of-sight path down the valley – thus creating a unique connection in Wales.

First step was to provide a terminal building close to the customer's premises. To meet all the technical requirements, this had to be sited 400 yards from the cafe higher up the mountainside and it had to be weatherproof and robust yet light enough to be carried.

The only structure to fit the bill was a fibreglass reinforced toilet cabin. One of these was taken to the site, bolted to a concrete base and held down by stay wires. A pole was erected for the aerial and the cabin linked to the cafe via a moleploughed cable down the mountainside to another pole immediately opposite it.

The other terminal building – about three miles away – is a standard battery hut situated in a much less exposed position near Dyffryn Castle at the end of the cable network. An aerial cable connects it by the local line network to Ponterwyd Exchange.

Racks are installed at each terminal to house the equipment and provide test facilities. Power is supplied from 12 volt car batteries at each end. At Dyffryn Castle, the battery is kept charged by a feed from a modified rectifier unit at the exchange, while at the cafe end, charging is achieved through a feed from Mrs Thomas's own generator starter battery via a control box. Relay sets at the terminal buildings convert the radio signals into pulses which make the phone ring.

But it is not only Mrs Thomas who can keep in touch with her very special phone. Because her cafe is a haven for hikers and lorry drivers, a private meter has been attached to the equipment which allows customers to make their own calls.

As Mrs Thomas says: "The day the phone arrived was a real red letter occasion. I do not know what I would do without it now."

British Telecom Journal, Winter 1980/81

At the top of the telephone pole opposite the cafe, technician John Edwards checks the speech circuits from the terminal building 400 yards away up the mountainside. The pole is linked to the terminal building by moleploughed cable.

Changes in store

K Argent

While an army is alleged to march on its stomach, British Telecom marches on stores. Indeed, it is undeniable that field managers regard a balanced diet of stores essential to the success of their operations.

The Procurement Executive (PE) takes its job of satisfying regional and other appetites very seriously. It battles, sometimes over very difficult terrain, to keep the supply lines full. It can succeed handsomely yet still be found wanting. Although it is easy to blame performance changes on outside influences – such as spending cuts or variations in the level of economic activity, no-one could fairly argue that this represents the whole story. So during the last year or so, PE has been taking a hard look at not only itself, but at stores management in the areas.

One of the first priorities was to bring PE's organisational structure up to date. Like the former THQ, PE was organised largely on a functional basis. The various units (provisioning, production planning, purchasing, quality assurance, progressing, distribution and warehousing) were preoccupied with functional goals rather than providing a full procurement service to the customer. This diffuseness of responsibility, inherent in the organisation, had a number of undesirable effects and led to firm plans to reorganise PE in four ways:

- Disbanding the old Purchasing and Supply Departments and regrouping them into a Major Systems Procurement Department and a Materials Department.
- Establishing a Major Systems Procurement Department which would look after the supply and installation of telephone exchange equipment, transmission equipment and of course, current development and supply of System X equipment. The new Department is to be responsible for certain other apparatus purchases for installation in both inland and international networks. Its prime responsibility, however, is to service the needs of the Network, International and Technology Executives.
- Establishing a Materials Department to be responsible for all other items of stores – engineering or otherwise – including all customer apparatus. Its prime responsibility is to service Marketing Executive, regions and telephone areas.
- Allowing both Factories Division, headed by a Deputy Director, and the Intellectual Property Unit to report direct to the Senior Director, Procurement.

All this is good news for field staff waiting for stores to get on with the job. Materials Department aims to improve its service to field operations and significantly reduce the level of cash tied up in stocks. Targets of a 90 per cent service level and a stock level moving down below six months provide something positive to aim for within the next few years. But such an achievement would require radical changes. Indeed, it represents the best service coupled with the lowest stock levels achieved over the last decade. With current service level at more than 90 per cent – the best for years – the aim now must be to keep it there while trimming stock levels.

The new organisation is a first step, and for Materials Department, the main aims are:

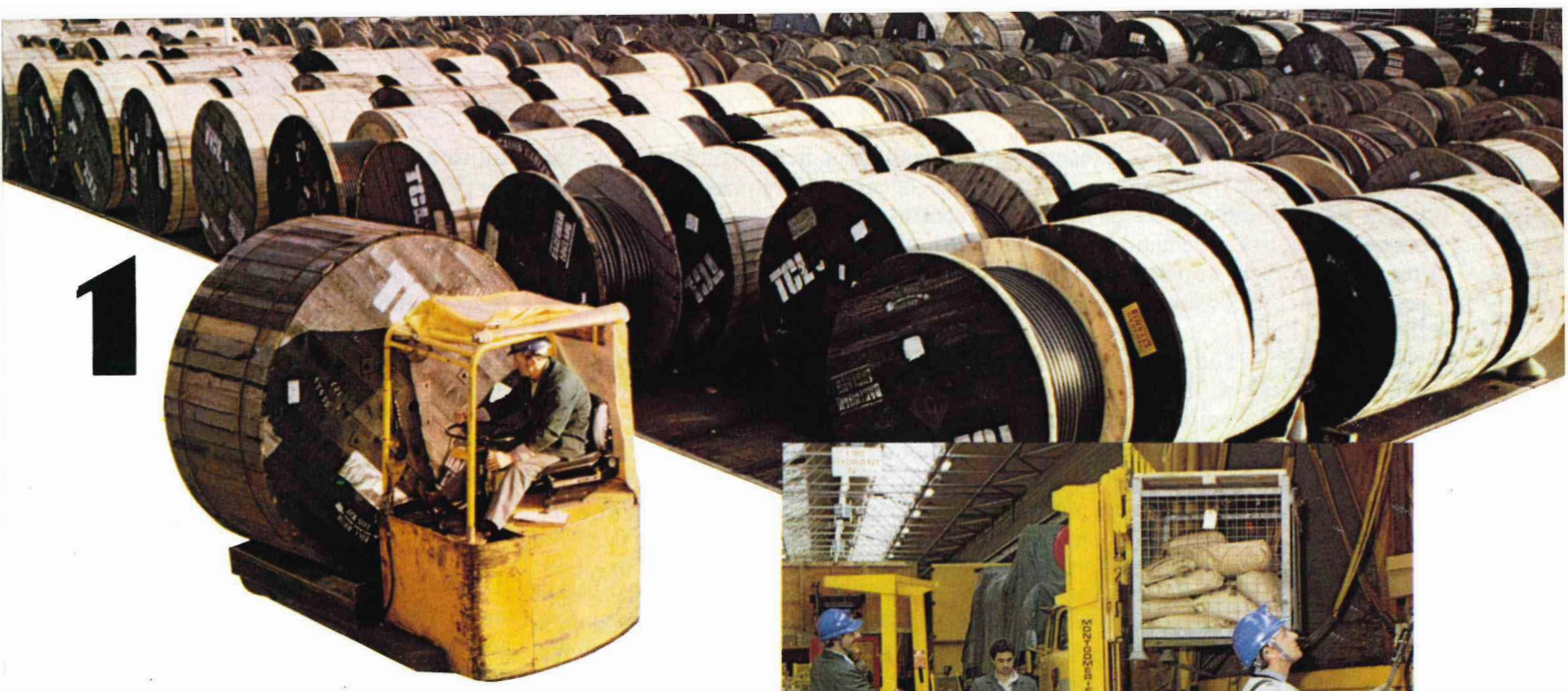
- To combine the functions of provisioning, production planning, purchasing and progressing where, previously, they had been in different departments. With changes in the authority levels, this will better use the talents of procurement staff, speed up decision making and aid control.
- To set up a dedicated warehousing and distribution operations unit to meet the demands expected from British Telecom's new competitive position and to strengthen communications with areas.
- To integrate the specialisms of quality assurance, technical costs, accountancy investigation, technical liaison supplier assessment and long-term production planning in a single division, so that knowledge and expertise can be pooled.
- To strengthen and bring together the finance, management services and computing units, so that they can develop and run the information and control systems needed, and to co-ordinate computing and management services resources throughout the Procurement Executive.

During the next few years, Materials Department will aim to bring related work together at the same locations. At present, most provisioning work is carried out at Swindon while the purchasing function is based in London. The plan is to establish procurement units for product groups, some located in Swindon and others in London.

The new stores organisation aims to match the structure of Telecommunications Headquarters Executives as well as strengthening links with regions and areas. In the case of Marketing Executive, this is particularly important and it will be seen from the organisation chart on page 20 that divisions dealing with customer products mirror the organisation of Marketing Executive.

A start has been made on redefining the part played by regions and areas, without sacrificing the economies of scale inherent in a centralised procurement organisation. This will include the launch of a scheme for using stock-holding sources, accessible to regions and areas, under call-off or local purchase arrangements. But it is essential that regions and areas effectively control stores issues and recoveries; make the most efficient use of the stores for which they are responsible; check the practice of building up 'squirrel' stocks and contribute more directly in forecasting short to medium-term needs. Joint action to improve these points has already started with particular emphasis on improving materials management in areas. As a first stage, a mini-computer-based scheme – the area stores module (ASM) – is on trial in Edinburgh Area.

To be successful, the new PE organisation needs to be complemented by effective working systems. For a start, forecasting techniques currently in use are being re-examined as are the extent of



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British Telecom's largest engineering stores depot at Crayford in Kent doubles as both a Central Supplies Depot (CSD) and Territorial Supply Depot (TSD) serving the whole of south-east England. It carries stocks of new engineering stores valued at about £50 million and recovered stores worth £18 million.

1 Storekeeper Albert Lovell collects a drum of external cable which is due for delivery to an engineering cable store.
2 Asphalt for use around manholes in LTR South Area is loaded at the despatch bank.
3 Stores assistant Carl Stevens straps up telephone instruments for despatch.
4 Lengths of recovered cable are stacked before buyers come along to make their offers.

4

contributions from THQ executives, regions and areas. One of the main challenges is to achieve a closer relationship between forecasts of demand for specific items of customers' apparatus needed for procurement purposes, and the Sales and Installation Plan.

On provisioning and purchasing, items will be subject to regular provision reviews with the aim of establishing flexible contract cover for a defined period during which delivery schedules can be regularly controlled in line with changes in demand. This is a major shift from the present system of provision review which mostly generates re-order signals for 'batch quantities' at intervals determined by the run-down stocks. The new arrangements will provide for many flexible-term contracts in place of the existing fixed-quantity, fixed-time variety.

The new method of provisioning and contracting is already under way and at the same time complementary mini-computer systems – known as Kim and Prosper – have been designed, and these will greatly ease the near-term scheduling of deliveries, contract progressing, stock level monitoring, and hence the management of materials flow. These computer systems provide immediate access via visual display units to all the basic information needed for the job and will certainly play a key role.

Warehousing and distribution networks and systems are also being studied with a key objective to speed up delivery of customers' apparatus. The Territorial Supply Depot (TSD) and Central Supplies Depot (CSD) organisation is being modernised and rationalised, with particular emphasis on the choice of items to be held at TSDs and how distribution from CSDs, or indeed from contractors' holdings, can be most effectively improved.

Until now, the financial accounting systems for stores have been inadequate. The introduction of a new computerised system (ACES) will remedy the persistent discrepancies between the financial control account and the underlying stores records. ACES2, the stores creditor's part of the system, is due to be implemented this summer while ACES1, the stock asset system, is to be introduced in 1983.

The cash limit regime highlighted the need to introduce better budgetary controls on accrued purchases (deliveries) and on stocks. Systems are being set up to define budgets for stores purchases by giving responsibility to individual product groups. Computers will also be able to monitor and control accrued purchases, particularly for high annual demand value items which make up the bulk of expenditure. The new budgetary control systems have a vital part to play in reducing the amount of cash tied up in stocks and in making the best use of that cash in providing the best possible service to the field.

New computer systems are being introduced as a short-term measure to control operations, and updating of existing computer applications is crucial to almost all facets of the improvement programme. While these short-term measures to improve computing facilities are vital, a radical overhaul of computer systems in the longer term is now essential. But a comprehensive study has already begun to determine the strategy for the development and implementation of future compatible computer applications for procurement up to the year 2000. The aim is to develop a modular and flexible approach to meet a wide range of organisational options and to cater for the changes in practices that liberalisation of the monopoly is bound to bring in the years ahead.

Mr K. Argent is deputy director, Materials Department, Policy and Planning, and has special responsibilities for co-ordinating many of the Department's plans for the future.

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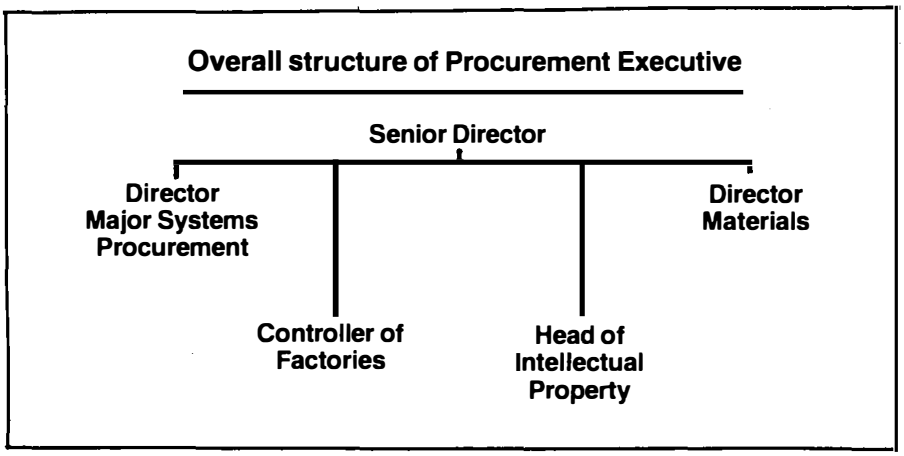
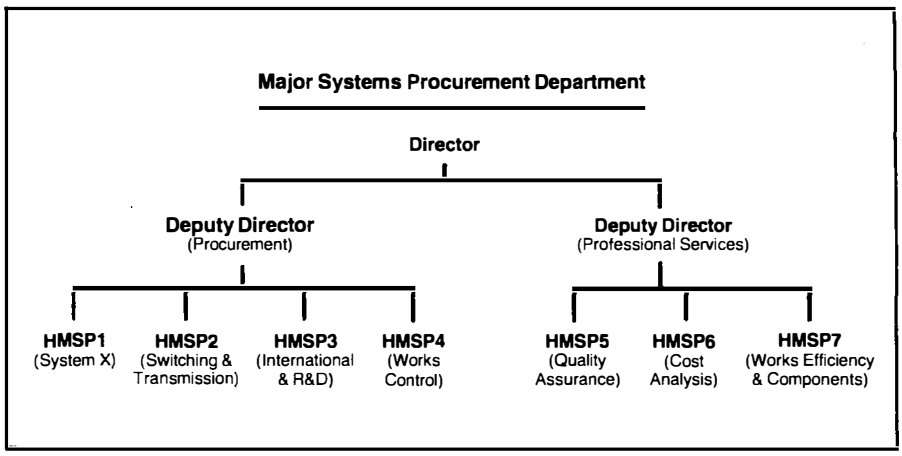
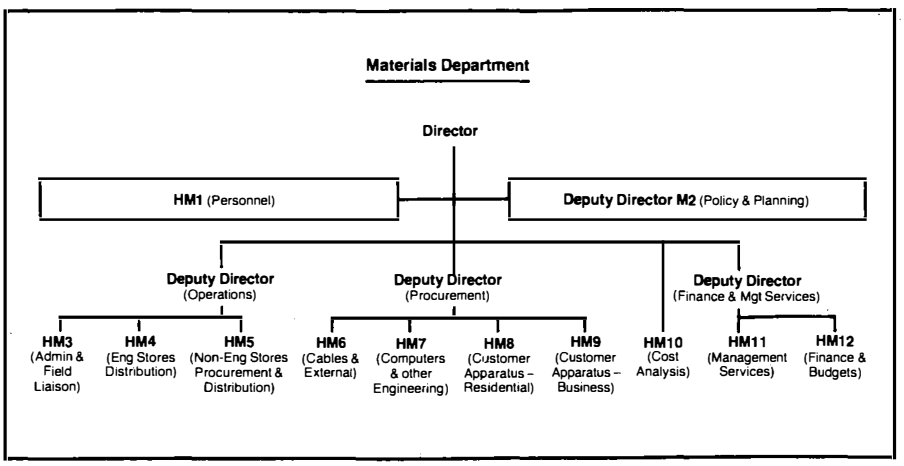






Growing in the sunshine

The Spanish telephone network, with the highest growth rate in Europe, is the subject of this, the fourth article in our series on foreign administrations.

Thousands of holidaymakers will almost certainly have experienced the Spanish telephone system through one of the many hundreds of temporary coinboxes and booths which dot the Mediterranean beaches in the summer months and which enable them to phone home and confirm their safe arrival.

They owe this convenience to the main operating company in Spain, La Compañía Telefónica Nacional de España (CTNE) which differs from the usual run of European telecommunications administrations (generally government ministries or nationalised industries) by being a private sector, state owned, public, quoted company. If that sounds like one of those old Spanish customs, then a word or two of explanation would not come amiss.

CTNE is a limited liability company founded in 1924 to develop urban and trunk networks, with ITT as the biggest shareholder. The State nationalised all ITT shares in 1945 and began to play a greater part once the basic framework had been established. Despite holding some 48 per cent of the equity, the Government today tries not to interfere in the routine activities of CTNE but limits itself to the function of overseer – rarely using its power of veto and only then in the last resort.

The company is not the only carrier in the country but shares the responsibility for telecommunications with the Dirección General de Correos y Telecomunicación (DGCT). This is a government department which provides postal, telegraphic, telex and leased message switching services while CTNE supplies the remaining telephone, data, facsimile, leased circuit, mobile and maritime services and satellite stations. There is a monopoly in all but data transmission which the Government has left open to competition. But so far, no other company has come forward to stake a claim and currently CTNE remains the sole provider. Both CTNE and DGCT are accountable to the Ministry of Transport and Communications.

In fact, DGCT is a branch of the Ministry and manages a mainly crossbar telex network comprising four international exchanges, eight inland transit exchanges and terminal exchanges in 62 cities. At the start of 1980, there were over 20,000 telex subscribers, about a quarter of the size of the UK network and much less developed in terms of penetration with 10 machines per 1000 business connections compared with 24 in the UK. But the network is growing at a much higher rate, and so the service can look forward to many years of expansion.

CTNE, like British Telecom, operates on three levels – a headquarters in Madrid, nine regional directorates or boards and 50 provincial offices. Seven of the regional directorates are on the Spanish mainland with the remaining two on the Balearic and Canary Islands. On average, CTNE regions and provincial offices cover more than twice the area of their British Telecom equivalents, but handle only half as many connections and stations. This is partly the result of relatively low (in European terms) telephone penetration – 29.4 stations per 100 inhabitants – but mainly the result of a very large geographic area and low population density which is at the root of many of the problems facing the company today.

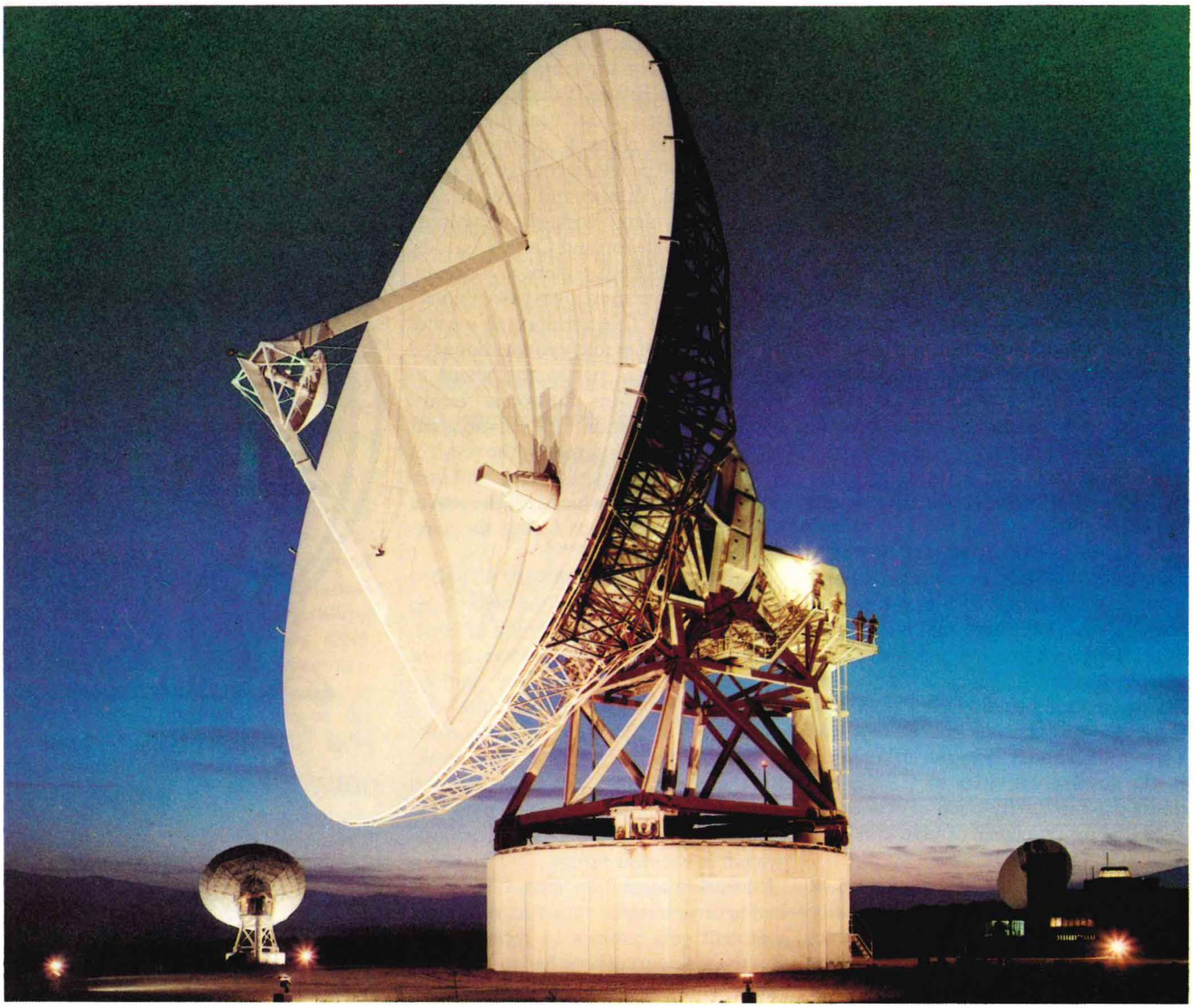
Complete automation of CTNE's telephone network has not yet been achieved and, at the beginning of 1980, some two per cent of stations were served by manual exchanges. The widely-dispersed networks serving the few subscribers in Spain's rural areas make automatic dialling facilities expensive. But there is a scheme, known as the Rural Automation Plan, which aims to automate the whole of the national system in the near future.

Like other administrations, CTNE has had to carry out vast construction and investment programmes in recent years. But these resources have had to be spread rather thinly as the provision of a basic telephone service to remote and underdeveloped areas has absorbed much of the available investment capacity – leaving a 600,000-strong waiting list throughout the past 10 years. Even in urban areas a residential customer can wait up to 16 months for a new line, but the company hopes to reduce waiting time in the next few years.

The company is currently looking closely at its tariff structure with a view to encouraging higher use from those already with telephones. Spanish tariffs are not high compared with other developed countries, except perhaps the connection fee which reflects the cost of expanding the system. Annual rentals seem to be cheaper in Spain than in the UK, but call charges appear broadly similar. And with 90 per cent of subscribers paying bills by direct debit, CTNE does not face any major payment problems.

The Spanish telephone network of over 11 million stations is the ninth largest in

Part of the new electronic data communications exchange designed by CTNE engineers.



Spain's international communications links are boosted through these aerials at Buitrago earth station.

the world and, with the fastest growth rate in Europe, has more than doubled in the last 10 years. Particularly in data transmission, the high level of technology attained by CTNE has provoked the admiration of market leaders such as the United States. In 1971, CTNE introduced one of the first public packet switching sytems in the world at a time when most other countries were still looking at the problems. Called the special data transmission network (SDTN), it precluded the need for private networks and was designed largely for major users. The system allows interconnection between terminals and computers and even computers alone. Both switching and pre-transmission centres and their linking high-speed circuits are duplicated for back-up, and circuits are alternately routed for increased security.

Pilot schemes for Teletex – communications between word processors – and various public facsimile services using the SDTN have already begun, as has a trial videotex service. The videotex service is a home teleinformatics system which uses, like Prestel, a combination of keypad telephones and television facilities. And a project with Spanish financial institutions to incorporate into the SDTN an electronic funds transfer system with point-of-scale terminals has already begun.

Awareness of customer needs is supported and reinforced throughout the company by high levels of efficiency and productivity. There were 180 stations per CTNE employee at the beginning of 1980 compared to a British Telecom figure of 112, although this is partly accounted for by differences in services provided and scales of activities undertaken such as research, development, purchasing and supply, and telex and telegraph services. Local automatic service quality in Spain is broadly similar to that in the UK although the British trunk service is somewhat better. But operator services seem to be more efficient in Spain despite more manual connections and more limited access to subscriber trunk dialling.

However, the range of services provided by CTNE is not as extensive as that provided by British Telecom.

Although fault incidence in British Telecom is about the same as in CTNE, they cleared more faults by the end of the next working day in their last financial year. This may be due to the higher proportion of overhead cable in Spain and their fault service organisation and methods of operation. Their computerised fault reporting system ensures that when faults are reported, operators can check a visual display unit to see if it is a first report. They can also see if the line is

working, ceased or disconnected and inform callers of their findings. Where necessary, fault testing and repairs can be instigated via an input console and then sent automatically to the testing groups. In the event of a fault, a despatch clerk will allocate the job and direct repairmen and stores vehicles to the trouble zone. Repairmen work their own territory, often using public transport and even operating on foot in busy city areas, and call in after finishing one job to be given the next. They are supported by 'floating stores' vans which are sent out with replacement parts and spares.

Another factor affecting fault clearance is the percentage of modern exchange equipment. Because the Spanish system was originally slow to grow, it has been able to take advantage of more up-to-date switching equipment. Some 70 per cent of telephone lines are connected to ARM and P-1000 crossbar exchanges, with the balance on rotary, manual and electronic equipment. Already several Ericsson AXE-10 and ITT 12-L electronic exchanges have been installed.

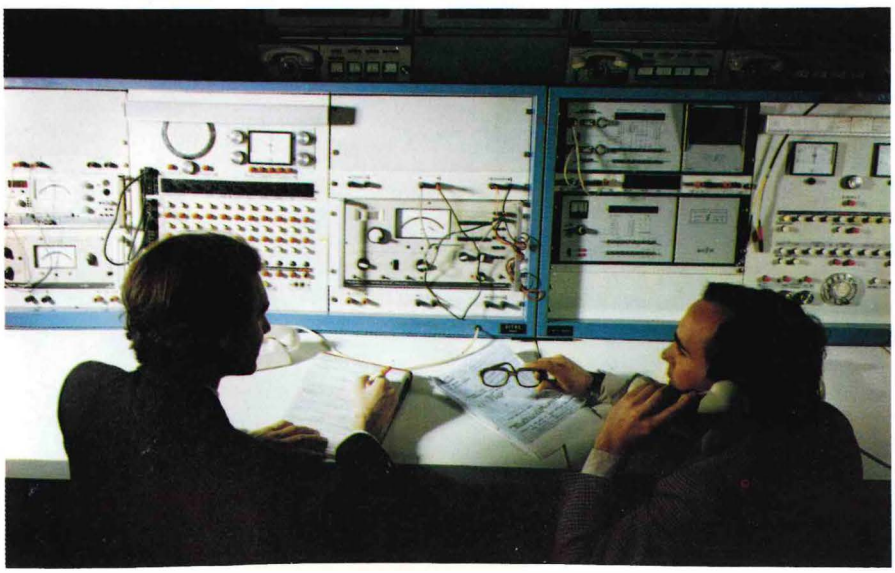
Although CTNE does not manufacture equipment it has shareholdings in its normal cable, transmission and switching suppliers. The Government has encouraged active participation, and CTNE already contributes to factory development, so safeguarding the supply of materials and equipment, gaining control over prices, taking advantage of technological developments and ensuring domestic manufacture. It now has a controlling interest in 10 companies and invests heavily in others with a view to an eventual takeover. CTNE will sign supply contracts with major international manufacturers such as L M Ericsson, Telettra and the General Cable Corporation and will encourage them to establish local subsidiaries again for eventual takeover.

Because of CTNE's close involvement with manufacturers, particularly an ITT subsidiary called Standard Eléctrica, the company did not get really involved with research and development work until fairly recently. It now has a Centre for Research and Studies which employs about 120 staff, evaluates new equipment and keeps abreast of developments at home and abroad. Although it does not undertake much fundamental research or design, the centre ensures CTNE can benefit from new technologies.

CTNE has over the years, been able to establish a firm foundation for future expansion and development. The company's growth plans are ambitious, aiming at a target of 20 million exchange lines and 39 million telephones – more than three times the current system size – by the end of this century. It appears to have the organisation, drive and human potential for such rapid movement and, if the Spanish Stock Exchange can recover from its present recession, it might well have the financial means also. (T)

The next article in this series looks at telecommunications in Australia.

Where the old and the new meet – CTNE public call offices have local, trunk and international facilities.



Below: An engineer replaces a card in CTNE's new electronically-switched PABX.

Left: Part of the equipment associated with Spain's public data transmission service.

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 Peformance Department of THQ.
They acknowledge the help of **Senor J. J. Pérez Isar** of CTNE.

Power at their fingertips

A new regionally-based consultancy service called Phonepower has been introduced by British Telecom and is designed to help business customers use telephone services more effectively.

Phonepower attacks four basic problems which exist in varying degrees in all businesses. It aims to optimise time used by sales staff for selling, to service an existing market cost-efficiently, to achieve better market coverage and to accelerate cash flow. Benefits for British Telecom include an increase in the volume of calls and the possibility of more equipment being rented – in short, extra business.

It is a fact that the average travelling sales representative spends only 40 per cent of his day in actual face-to-face selling, and figures published by the *Financial Times* early last year made the point that the 'man-on-the-road' cost more than £16,000 a year. This, of course, would be even higher today. These facts reinforce the argument that savings can be made by qualifying prospects and making appointments by telephone before a sales representative starts out. This cuts down travelling and waiting time, thus leaving more time for selling.

For most firms, 20 per cent of their market brings in 80 per cent of their revenue and as sales representatives spend their time where the money is it is likely that the 80 per cent do not receive the attention they deserve although each may have the potential to become one of the big revenue earners. The Phonepower answer to this problem is a pre-planned mix of in-person and telephone sales calls. Field sales staff can concentrate on the high volume, priority customers while equally competent telephone sales staff retain and expand the marginal accounts at less cost. Better customer contact and improved cost-effectiveness are the benefits of this approach.

Another fundamental idea in Phonepower is to see customers regularly. Most customers have regular buying patterns, usually re-ordering when stocks are down to about one third. This is when a customer wants to place an order and is most vulnerable to competition. By timing calls to customer buying needs and by regular telephone checks, customers receive the attention they want. Marginal customers are retained and given better service, selling costs are controlled and the field sales force can spend more time bringing in new business.

Although all the approaches already described do help achieve better market coverage, more specific programmes of market building are aimed at, reactivating old accounts, introducing new products, and opening new accounts. Many companies do not realise that their richest prospect list can be those customers who for some reason stopped buying from them. The need is to find out why, solve the problem and win as many of them back as possible.

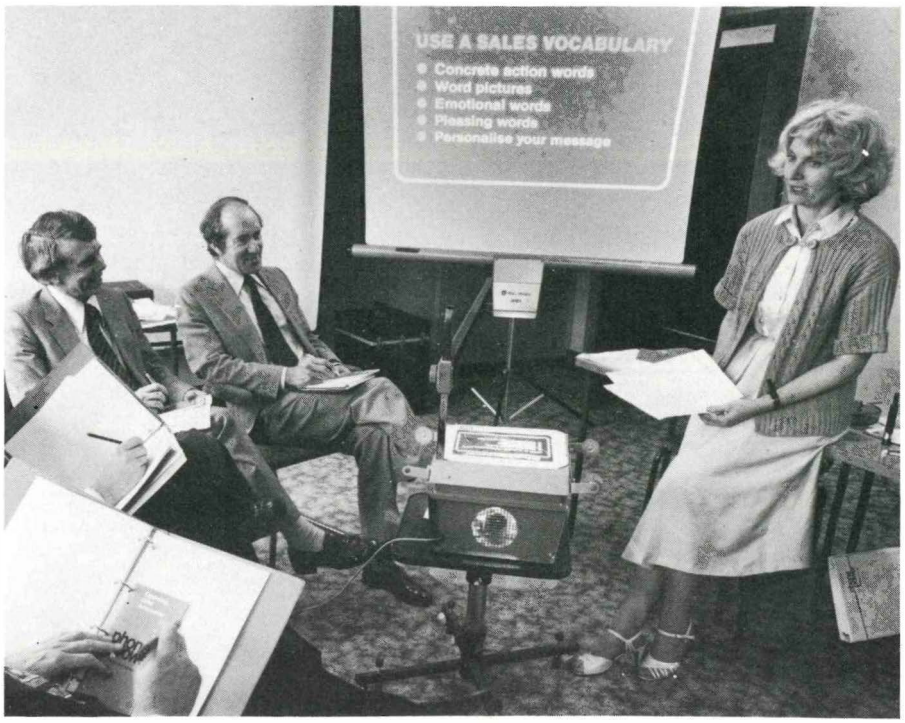
Introducing new products by using the telephone in conjunction with publicity or mailshot can be an efficient way of conducting a launch. Questions can be answered and discount quoted on the spot. Opening new accounts using the telephone can be achieved by cold calling – a subtle and highly skilled art, and by making appointments for sales representatives to visit.

Today, many businesses are finding traditional mailing methods too slow a way of collecting overdue accounts. By using the telephone as the first contact medium and by tactful handling of collection matters using the Phonepower method, the persuasive power of voice contact and reasoned problem solving can usually accelerate cash flow.

Also, with the increasing trend in credit card payments for direct ordering by telephone, it is likely that consumers will shortly be able to deal directly with wholesalers, distributors, mail-order companies and booking agents in the fields of travel, theatres, sports events and hotels. Even supermarkets could trade in this way if managers could be convinced of the financial advantages.

Phonepower is available to any business

In training for Phonepower. Here, Mrs Barbara Rosatti, Phonepower's national training manager, talks to British Telecom sales managers.



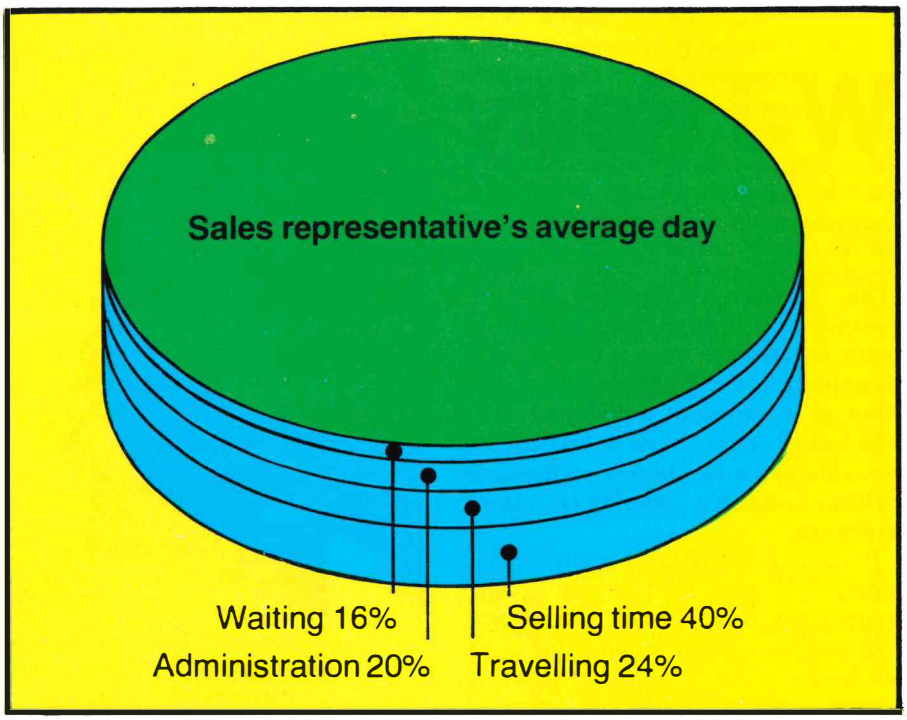
J R YorkWilliams phone power

needing detailed or general advice on adapting the telephone more to suit their requirements. Along with other regional and headquarters marketing managers, Phonepower is promoting the idea and philosophy of business telecommunications by providing speakers at industry conferences and exhibitions throughout the country.

But there is still much to do to convince the British business community that Phonepower really can save them money and improve their sales. Currently, Phonepower consultants throughout the country are dealing with more than 100 cases. It is this effort which is not only certain to provide measurable long-term benefits, but will also greatly boost British Telecom's business image in the years ahead.

Mr J. R. YorkWilliams is a head of section in British Telecom's Marketing Executive and his responsibilities include Phonepower Consultancy.

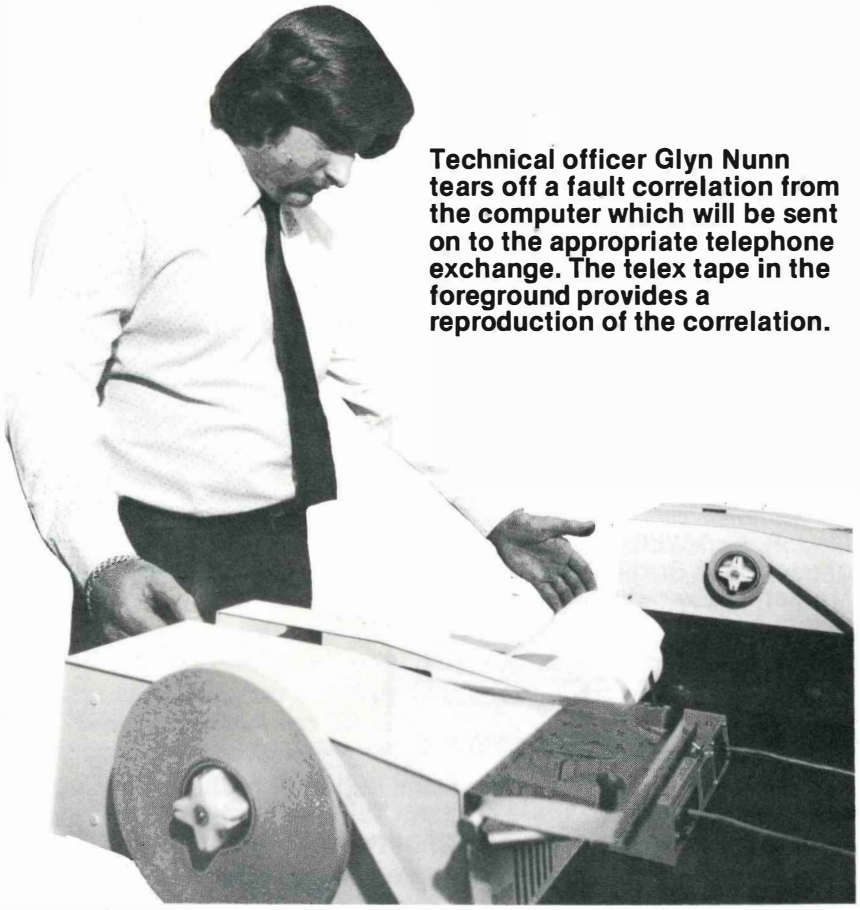
British Telecom Journal, Winter 1980/81



In a corner of Coca-Cola's tele-sales unit at Perry Barr, Birmingham, tele-seller Lorraine Brodwick chats to a potential customer, while Midland Telecommunications Region Phonepower consultant John Walshaw (right) discusses the day's sales figures with Coca-Cola area manager Gary Guiel.

Finding London's trouble spots

W J Reilly



Technical officer Glyn Nunn tears off a fault correlation from the computer which will be sent on to the appropriate telephone exchange. The telex tape in the foreground provides a reproduction of the correlation.

The London Reference Centre sounds as if it might be a grand library or perhaps even a museum. It is neither. It is a sophisticated collection of equipment developed over the last 10 years aimed at identifying trouble spots as quickly as possible within London's complex telephone network.

But how does a reference centre actually operate? Perhaps the best way to illustrate this is to take a small interconnecting telephone network consisting of six exchanges. To establish a reference centre, a matrix as illustrated in figure 1 must be devised. On this can be plotted, on a day-to-day basis, the call failures arising from customers' reports collected from the associated automanual centre. These can then be entered on the matrix.

Figure 1 shows 11 failure reports from which emerge a number of interesting facts. It can be clearly seen that three calls from Embankment subscribers to different numbers on Cannon Street failed and this indicates a fault on the last selectors or levels at Embankment exchange or a function or first selector at Cannon Street.

It can also be seen that three exchanges, Blackfriars, Temple and St James are all experiencing difficulty when calling a number on Temple starting with 88. This indicates a fault between the second and final selectors leading to the 88 final selector group or a fault on the 88 final selectors themselves.

Although the Reference Centre can highlight faults at the time when reports are made, and pinpoint their probable position, it cannot clear them. This has to be done by passing as much information as possible to the appropriate exchange

Figure 1

Outgoing service \ Incoming service	Tower Hill	Cannon St	Blackfriars	Temple	Embankment	St James
Tower Hill	5876		1234			3031
Cannon St						
Blackfriars				8876	3125	
Temple	3754			8852		
Embankment		3125 7697 8106				
St James				8814		

Operators at the LTR Reference Centre receive fault reports from AMCs in the Region and then key in information direct to the computer.

engineers who then search for the specific fault.

In practice, even in a reference centre for a network as simple as that illustrated, it would be necessary to expand the matrix to indicate selector levels through each exchange so that the well-established manual pegboard method favoured for reference centre operations can be used.

The problem of establishing reference centre working in London's director area was one of scale. Even in 1970, there were about 400 exchange units and seven tandem exchanges, and this has now expanded to 465 exchanges and 12 tandems.

The early reference centre for LTR director area was therefore limited to the four central areas, and thus it was that eight years ago in a room below Euston automanual centre (AMC), a small but enthusiastic team of engineering, operating and clerical staff, pinned up their wall charts, laid out their translating and call routing books and awaited the first reports of customer difficulties from other AMCs. The London Fault Reference Centre (LFRC) had gone live, and from these humble beginnings, at first beset with operational and technical problems, has grown a highly sophisticated and efficient centre.

The original LFRC at Euston used the manual technique based on wall charts set up in a matrix form. Reports of customer difficulties to AMC staff, which were then passed to the reference centre, provided the basic information on which the centre operated. The routing of each report was plotted on the charts and where a number of reports occurred at a cross point in the matrix it could be shown that a failure existed in the telephone network and that there was a need to investigate.

In its three-year existence, the Euston reference centre expanded to process the reports from all AMCs in Central London totalling about 1,700 reports each day. Because of the size and complexity of the complete London Director network, however, it became evident that expansion of manual plotting techniques to include reports from outer areas was not practical. It was, therefore, decided to investigate the use of computer techniques for reference centre working.

In 1975, the Euston reference centre moved to Colombo House and combined with the subscriber trunk dialling (STD) reference centre from Camelford House, which also had been working by manual methods for a number of years. By this time, the initial work on computerisation of reference centre working had begun, and progress continued with aid from Telecommunications Headquarters (THQ) and the Post Office Data Processing Service, with the installation of a Ferranti Argos 700E computer. This began operations in May 1976.

As in the case of the manually-operated system, operator receptionists in the reference centre receive information from the AMCs but instead of preparing a manuscript copy, they input to the computer using a keypad employing only numerics, which means the operator has to change the failure symptom information in the receive report – such as 'no tone' or 'wrong number' – into a number.

Each report consists of 15 numerical digits comprising originating subscriber code and number (seven numerics), distant subscriber code and number (seven numerics) and failure symptoms (one numeric). The keypad, consists of 10 numeric keys plus a send and cancel key together with a visual register which makes message verification easier before the send key is pressed passing the message into the computer. A visual indication is also provided to show that the computer channel is open and ready to receive the next report.

To cope with some 6,000 reports each day, most in the busy hours, the computer was designed to have up to 10 inputs. The input information from customer reports is processed directly it is received by the computer. A two-part analysis – routing digit and dialled digit – is then set in motion.

Resulting from the routing digit analysis is an indication of where network failures have risen to a significant level. For the computer to look for such a correlation of failures, complete network information had to be stored in the computer file. In all, there are five categories of call routing with about 20 per cent of calls in the LTR director network routing indirectly via a tandem exchange.

From the originating and distant exchange information contained in each report, the translated routing digits are derived together with identity of a tandem unit, if one is involved. Thus each exchange and the switching stages involved with the call that failed is known. With this information held in the computer for each report processed, the number of failures routing via each

switching stage can be counted and compared with a pre-determined number.

When this count equals the action parameter of a particular switching stage, the failure reports contributing to the count are assembled in the form of a failure history and a fault action print-out will occur at the reference centre. This will show things such as complete information of each failure including routing digits and identity of tandem and indicate the switching stage where correlation has occurred.

Dialled digit analysis is only carried out if correlation has not been found in the routing digit analysis. The purpose is to detect common equipment (director) faults in the originating exchange. Correlation on the first dialled digit is looked for to identify the level of the director.

Fault action parameters control the number of failures routed via a particular switching stage before a fault action print-out is originated by the computer. Experience within the reference centre on size of routes, traffic carried and other factors is taken into consideration when setting these parameters which can be altered at any time by the input of a control message to the computer. All computer output is on a teleprinter, with the two basic types being fault action output and daily statistics indicating the number of input messages associated with each unit. Weekly statistics are also supplied.

When correlation becomes evident, following analysis of input messages, an output occurs showing complete routing information for each customer's report in the list of reports contributing to the fault action output. An asterisk indicates the point of correlation. Print-out is continuous and is dealt with by engineering staff in the reference centre for the four central London areas. It is their responsibility to interpret output and pass information and advice if necessary to units concerned. For the seven outer areas, computer output is sent direct to a central point where it is dealt with in a similar fashion to the four central areas.

Experience in the manually-controlled centre showed that long-term statistics were of great help to units in identifying possible trouble spots and also as an indicator of where maintenance effort was required. Records are kept which show selector levels in originating and tandem units and the weekly total of reported failures routed via these levels.

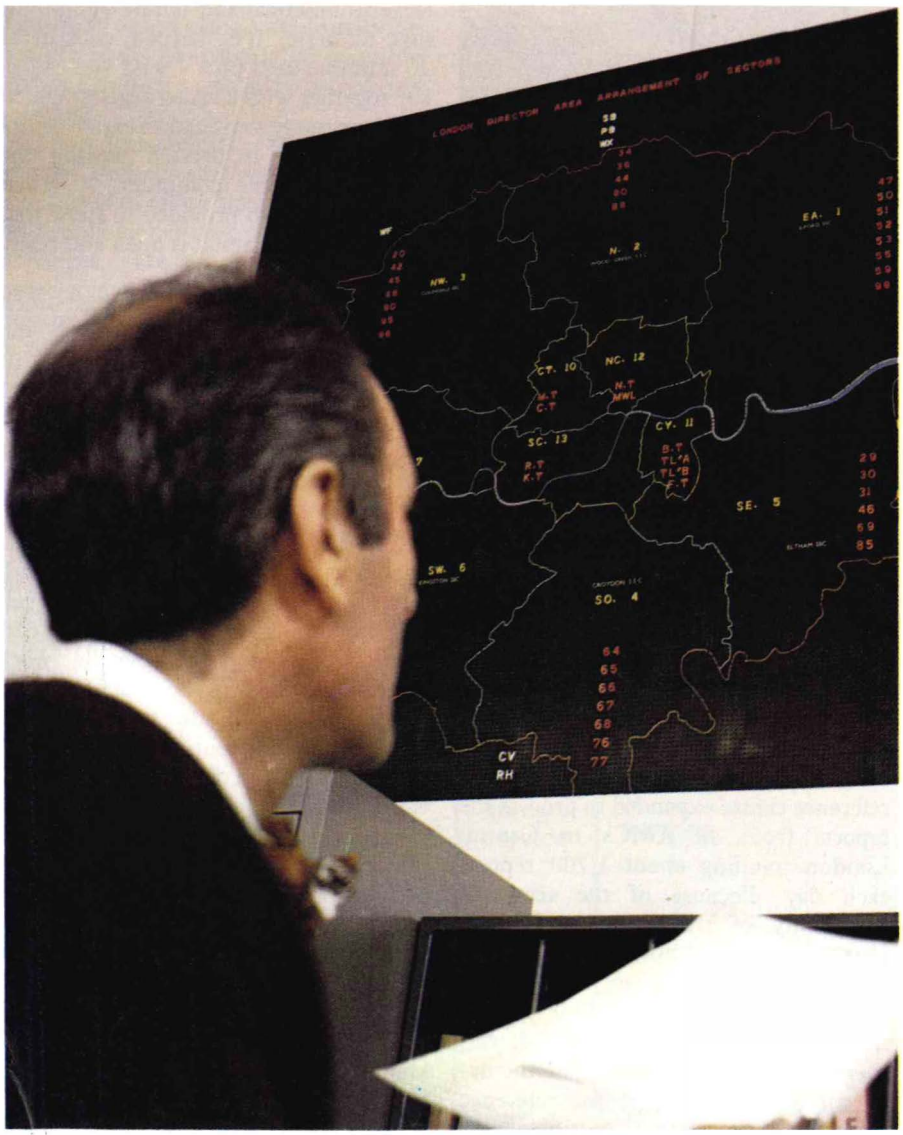
Computer control messages are input to the computer by teleprinter and as well as stop and start, include changes to fault action parameters, minor updating of translation and other reference files, requests for repeat fault action output and requests for file print-out.

In LTR there are around 100,000 director translations covering more than 200 units. During a year, about 14,000 changes to the translations are made owing to factors such as alterations of routings, and new exchange openings. With the preparation of the reference centre computer files, the opportunity was taken to put the translation chart for each LTR unit on to a central computer file which, after physical reduction of print-out, is suitable for use in frame charts in operational units.

This central file information is then transferred to the reference centre computer file. When a minor translation change occurs, updating is carried out by teleprinter at the reference centre and also at the central computer terminal at LTR headquarters. Should a major change of translation take place for a particular unit for a new director opening with a complete new translation chart, information is transferred from the central computer by paper tape into the reference centre computer file.

This computerised system has proved a valuable aid to reference centre working and, in fact, has since been enhanced to enable the STD section of the reference centre to be computerised. It is, however, still early days and a constant look-out is maintained for more information which can be fed into the computer to provide more efficient ways of improving the network as the move is made towards a modernised telephone system.

Don Baston, a technical officer at the Reference Centre, checks for a common fault route against a map of the LTR.



Mr W. J. Reilly is a head of group in LTR's Service Division. Operation of the London Reference Centre is one of his responsibilities.

British Telecom Journal, Winter 1980/81

Teletex – spreading the word

A J Bott and G A Routhorn

The concept of electronic mail is not new. Telegrams, facsimile and telex are all versions of it, each developed using the technology of the time, to meet the user's requirements and each improving as technology has advanced. The use of the computer has not only improved existing services but, in its microprocessor form, is enabling new and demanding requirements to be met.

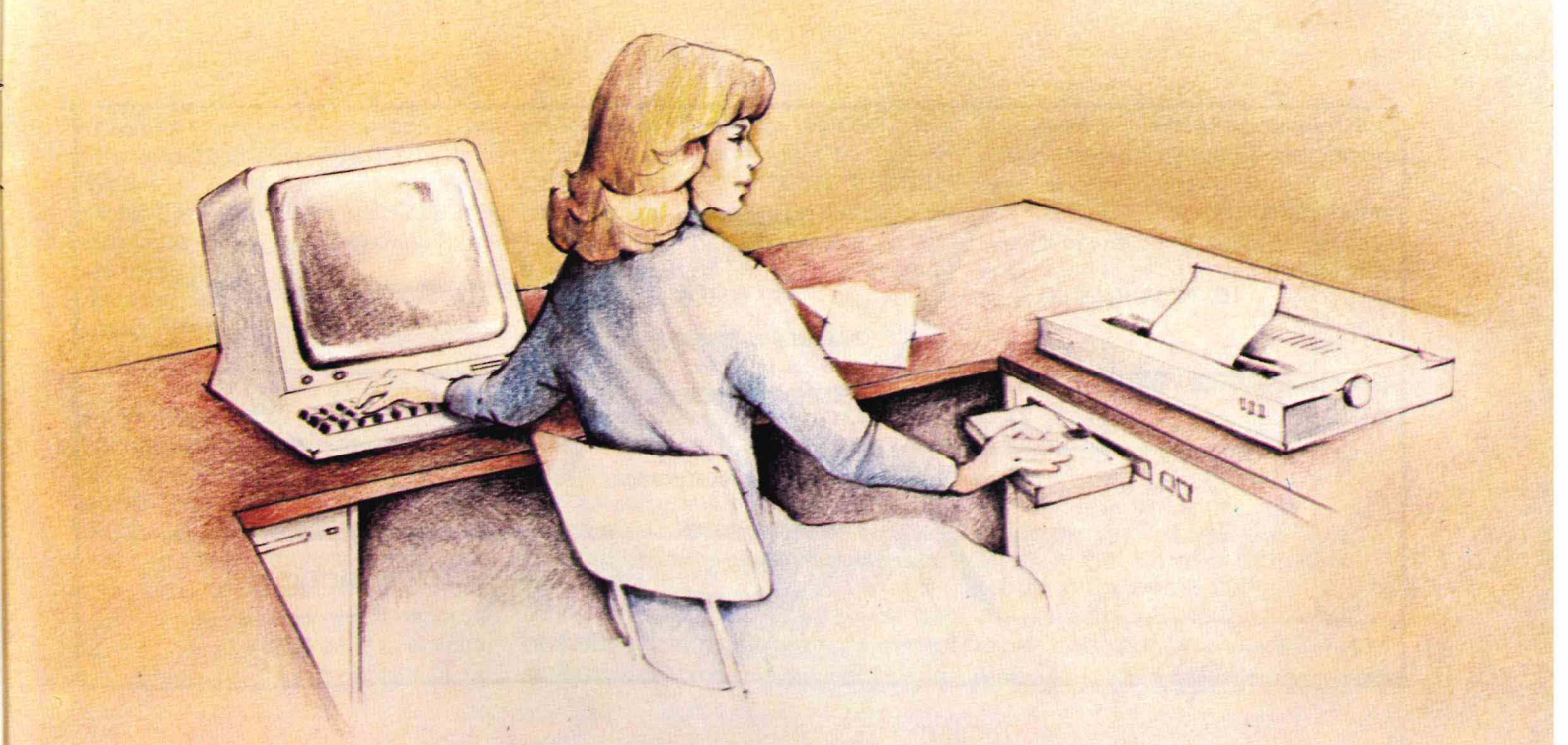
Plans to introduce Teletex – a new, sophisticated electronic text communication service – are currently being formulated by British Telecom following the ratification of draft recommendations by the International Telegraph and Telephone Consultative Committee in Geneva.

Equipment known as 'editing typewriters' or, alternatively, 'word processors' is rapidly becoming part of the office scene because of the improved text preparation and manipulation facilities it offers compared with the simple typewriter. Economic and efficiency considerations as well as an indifferent postal service in some countries lead to the need for this type of equipment to be able to communicate electrically.

At present in the UK potential electronic mail traffic comes from more than 10 million letters sent daily between businessmen. Using current cost-effective technology, about half of these could be handled without the need for any graphics capability and potentially this is many times the existing telex volume.

The products of different manufacturers however, are often incompatible and unable to intercommunicate. This situation, which in the past restricted the growth of facsimile, clearly demonstrates the need for a standardised text communication service.

In 1976, the International Telegraph and Telephone Consultative Committee (CCITT) began to study the technical and service requirements for a new text communication service which would offer more sophisticated features than the existing telex service. The name chosen for this service was Teletex and five draft recommendations were ratified at the 1980 Plenary Assembly. Recommendations are designed to leave as much scope as possible for the introduction of new



facilities which may well be required at a later date.

The service recommendation for Teletex fixes the rules to be followed by administrations and operating agencies in the provision of an international service. It is intended that subscribers will be able to exchange correspondence on an automatic basis between electronic memories.

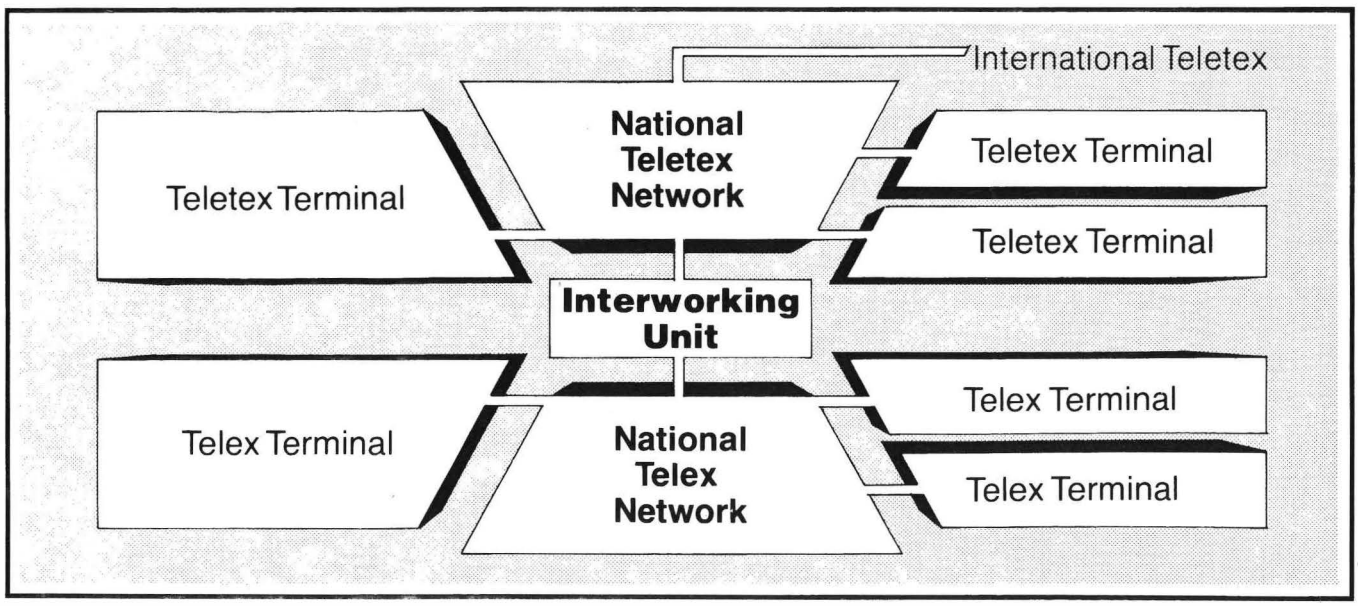
A simple terminal of the communicating office typewriter type is envisaged as the basic terminal although more sophisticated terminals will be subjects for the next stage of standardisation, which might be, for example, a unit incorporating a cluster of work stations.

The important feature is that users should be able to prepare their correspondence and enter it into the memory for the system to deliver it. This is analogous to posting a letter and relying on the postal service to deliver it. The provision of a memory at the receiving station ensures that a user preparing correspondence need not be interrupted by incoming traffic.

At 2400 bit/s the recommended transmission rate for international working is much greater than the 50 bit/s used in the telex service. This rate has been chosen to allow a high grade of service to be given and the service recommendation lays down requirements which should mean that delays to traffic caused by called terminals being engaged will be small. Initially at least, however, administrations may elect to use a lower rate within their own country in order to keep down costs.

The service recommendation demands a unique identification signal for each terminal participating in the service and administrations are required to publish directories which include an alphabetic list of subscribers with their business descriptions and the identification signals which have been allocated to them. Interworking with telex is an essential feature of the basic service and this should give users a useful communication service even before a significant number of Teletex terminals has been built up.

A technical recommendation lays down the requirements for a Teletex terminal. In drafting this recommendation, a guiding principle has been that, as far as practicable, users of the service should have as much freedom in the way they prepare correspondence as they have when using mail services. This obviously gives rise to problems because, when pre-



paring a document for mail transmission, the sender is in control of the reproduction and has freedom to choose type fount, colour of paper, colour of type, and size of paper.

In the case of Teletex, however, reproduction is done remotely from the sender and, for the received document to have the same content, layout and format as that sent, all usable options have to be standardised together with the protocols needed for controlling their use. In practice it has been necessary to define a basic service incorporating features which must be provided by all terminals. Additional optional facilities are also standardised but will not necessarily be available on all terminals working within the service.

The basic terminal is designed to work on a page basis with the common usable area of A4 and American standard paper as the basic page. The paper can be used with the typing parallel to either the short or long dimension. In the latter case it is referred to as 'A4 landscape' or more commonly 'A4L' format.

To feed paper automatically in either format upon demand presents mechanical problems in the design of equipment. The terminals designed so far have avoided the problem either by adopting insertion of paper wholly by manual means or by automatically inserting paper in the A4 mode but manually in the A4L mode.

Either method is quite acceptable even at the receiver because traffic is stored electrically when received and the printing need not take place until an operator is in attendance. In fact printing of the received text is not mandatory as other forms of display are permitted under international regulations.

Because of the international nature of Teletex the basic character repertoire is much greater than that normally provided by a typewriter. The repertoire comprises some 52 small and capital letters of the Latin alphabet, the characters formed from these by adding distinguishing marks such as accents and cedillas as well as numerals, punctuation marks, and currency signs. The total is in excess of 300 and a Teletex receiver must be capable of displaying or printing all of them in an adequate and perfectly legible manner.

It is accepted that to obtain an accurate reproduction of character form it may be necessary to change the print element for one designed specifically for a particular sub-set of the repertoire. For example, while a British user would be able to receive text prepared in the Icelandic language, his printer would normally be optimised for English so that, if he regularly received traffic from Iceland, he might wish also to have a print element based on the Icelandic alphabet which he could fit prior to printing out Icelandic traffic.

The transport service recommendation has been designed to allow organisations providing a Teletex service to use the public switched telephone network, a circuit switched data network or a packet switched data network whichever is most appropriate.

The procedures specified cover the establishment and clearing of calls as well as the transmission of data and correction of errors when and where they occur.

The end-to-end protocol recommendation makes use of the transport service for passing commands and responses which are exchanged by terminals in order to organise themselves to transmit text and to confirm satisfactory transmission. Some examples of things which must be agreed between terminals before transmission of text are paper orientation, character spacing, line spacing and extended character repertoires. The last item relates to CCITT-registered repertoires as well as the mandatory basic one mentioned earlier.

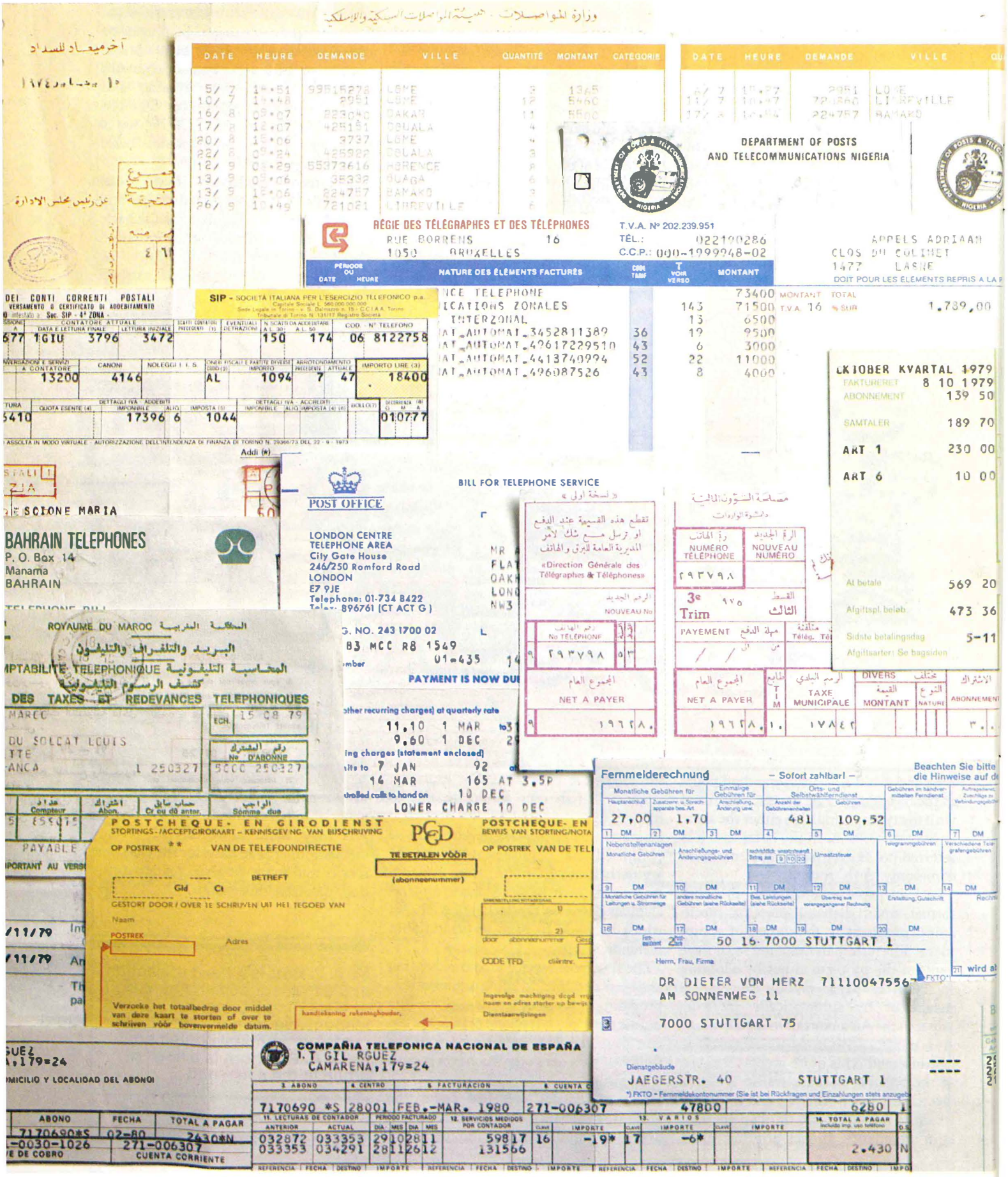
The recommendations have been drafted in a very short period of time and although they are complete for the basic service, much further standardisation work needs to be done. In future, for example, it is intended to include a mixed facsimile/text mode of operation which would enable a signature or other graphic material to be included.

As they stand however, the recommendations are the basis for the start of a service and some countries plan to introduce one later this year.

Mr A. J. Bott is a head of section in the Product Development Unit of Marketing Executive responsible for non-voice customer terminal equipment. **Mr G. A. Routhorn** is a head of group in the same unit.

British Telecom Journal, Winter 1980/81

We help make these more acceptable.



We can't promise to make your subscribers actually welcome the bills you send them. However, we believe we can help you to make the bills more acceptable.

People get annoyed at having to wait for an extra telephone to be installed, or having to share a line, or not always having a clear conversation.

STC has the answers.

What's more, as well as making your subscribers more contented, we can help you generate extra revenue.

Here are some of the ways in which we can do it.

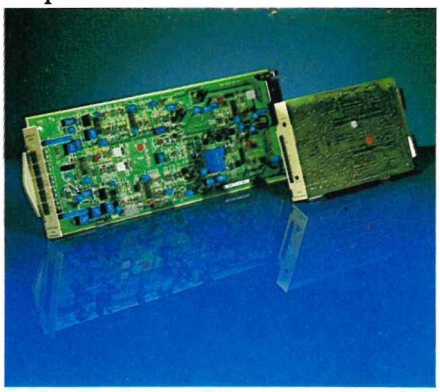
Extra phones, without extra cable

You can double subscriber service over existing cable with STC's EXTRAPHONE subscriber carrier system. Each subscriber enjoys complete privacy, and each has uninhibited access to the exchange, because they do not have to share a line.

Installation is simple and not expensive, because subscriber units can be installed and removed as easily as the handsets. This makes the system particularly attractive for temporary applications, like shows and sporting events.

Extra voices, and how to suppress them

Some communications systems introduce voice echoes which your subscribers find intrusive. STC echo suppressors overcome the problem.



They are designed compactly, with integrated circuit logic and components of proven reliability.

Built-in tone disablers remove echo-suppression during data transmission. Additionally, commissioning and maintenance procedures are simplified and power consumption is reduced.

Extra clarity, over H.F. radiotelephony

On long-distance, high-frequency radiotelephone links, increased speech intelligibility and ease of conversation make STC's Lincompex equipment a clear advantage.

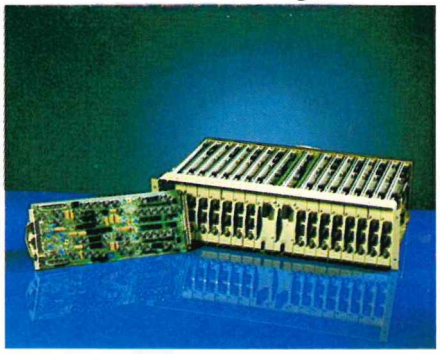
Users have said: "estimated increase in useable circuit time was up to 20%"; "marked improvement noticeable"; "greater potential call-handling capacity"; "lack of noise."

This means that there's every chance your system will be used more often, because Lincompex equipment helps conversation flow.

Extra revenue: 3kHz, and all the rest

While 3kHz bandwidth channelling costs more to install, increased system capacity and savings in space make it well worthwhile. Figures show that capital cost can be recovered in well under a year.

On a typical 7-year, 15% interest loan, return on annual expenditure can be expected in the region of 360% to 490%. You not only provide better service—you make substantial savings!



For more detailed information on how STC's specialised transmission equipment can help you to improve subscriber service, complete the coupon or attach it to your letterheading.

This advertisement is one in a series presenting STC's wide-ranging capabilities in telecommunications and electronics.

To STC, Dept 810,
190 Strand, London WC2R 1DU,
England. Telex: 22385

Please send more information about STC's leadership in specialised transmission equipment.

- ☐ EXTRAPHONE System
- ☐ Echo Suppressors
- ☐ Lincompex Equipment
- ☐ 3kHz Channelling

Name _____

Position _____

Company _____

_____

Address _____

_____

G3/1

Standard Telephones and Cables Limited
A British Company of ITT

STC. We help people communicate.

MISCELLANY

Speeding delivery

A vital first step has been taken to cut costs and speed delivery in the new slimline telegram service. Incoming international telegrams are now being sent directly by computer in London to the telex machine of a customer with a registered telegraphic address, whenever telex delivery is specified.

Formerly, the computer, at the retransmission centre in London, would send the telegram to the nearest international telegraph office. This would then telex it to the customer. The new facility bypasses manual handling and cuts out one step.

Autotelex delivery paves the way to speed delivery to customers without registered telegraphic addresses. The computer automatically routes their telegrams to those postal delivery offices which are already equipped with teleprinters.

Nine main telegraph offices being phased in over the next two years to replace the 25 existing offices handling either inland or international telegrams now, will integrate the handling of both types.

Yellow Pages change

A better service to both advertisers and the public is promised following the award of the latest Yellow Pages directory contract to two companies, ITT World Directories (UK) and GTE Directories.

The name Yellow Pages, with its walking fingers logo, has been established in the UK for 15 years – first published by the Post Office, and now issued by British Telecom. Around 20 million copies, in 67 editions, are currently sent free to all telephone customers. Yellow Pages revenue, at £45 million this year, is soon expected to reach about £100 million.

British Telecom Chairman Sir George Jefferson makes the inaugural call on a new high-capacity undersea cable link between Britain and Spain. With him is Snr Don Pedro Ortiz Armegol, representing the Spanish embassy, and behind them, a photograph showing the UK to Spain cable being brought ashore at Porthcurno, Cornwall. (See this page.)

The directories are self-financing and profits contribute to British Telecom income.

Improvements will include a new easy-to-use index, pages of local information, a buyer's guide, street maps and a newly-designed cover. Advertisers will be given help in writing and presenting advertisements, and agencies are to be paid on a fee basis, rather than commission.

The two new contractors will have their own geographical areas, ITT operating north and west of a line drawn from Kings Lynn to Lyme Regis, and GTE handling the areas to the south and east of that line.

Buzby abroad

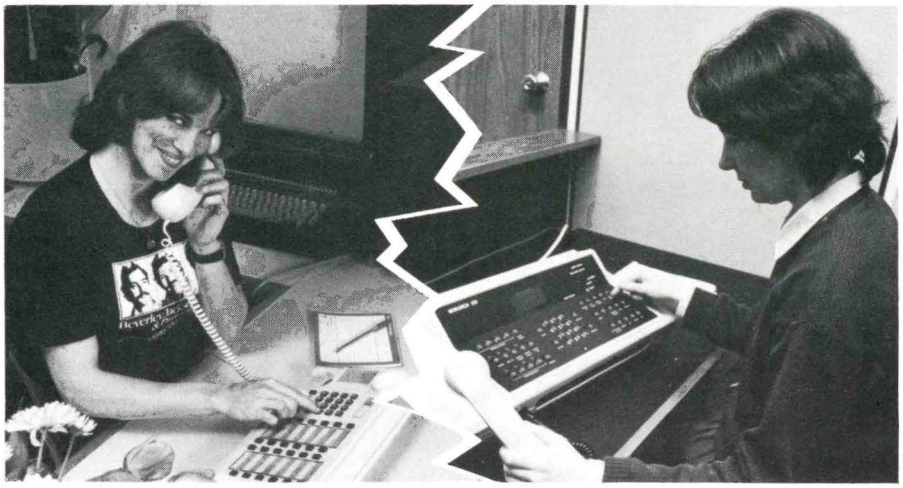
Buzby is making his first real trip abroad – to Finland. The national association of telephone companies in Finland has just signed a contract with British Telecom for the exclusive rights in Finland to the Buzby character for all advertising, excluding merchandising.

The association represents more than 60 private companies and Buzby, who will be known as Tintti, will be used to stimulate local calls.

New link with Spain

More than 4,000 simultaneous telephone calls can be made over a new £19.5 million undersea cable link between Britain and Spain recently inaugurated by British Telecom.

Paving the way to improved telephone links with Europe, the new cable –



British Telecom's own Monarch – the new advanced all-electronic office telephone system (PABX) – is now in service. The first unit has been supplied to Astley and Pearce Limited, the international money brokers based in the heart of London's financial world.

And a busy advertising agency is the first company to use Herald, the latest advanced communication system. Smaller than Monarch, Herald is ideal for the smaller office and provides a wide range of new facilities. Receptionist Gill Bergamo (far left) is obviously pleased with her Herald, while Rose Mather of Astley and Pearce gets to grips with the Monarch 120.

known as UK–Spain 3 – spans 423 nautical miles from Rodiles in north-west Spain to Lands End, and is part of British Telecom's £210 million programme to boost international services and keep pace with customer demand.

As well as improving communications with Spain, the new cable will be used to improve access to Italy, North Africa and the south Atlantic countries from the UK, and will boost Spain's links to Scandinavia, Ireland, Belgium and the Netherlands. It will also connect with a new cable between the UK and the USA – known as TAT 7 – due to open in 1983.

Jointly financed by British Telecom and the Compañia Telefónica Nacional de España, the cable was manufactured in England by Standard Telephones and Cables.

Radical programme

Addressing members of the Business Equipment Trade Association at their annual lunch in London recently, Sir George Jefferson, Chairman of British Telecom said the Business was determined to drive through its short-term programme to improve service to customers and that the programme was the most radical in history.

Sir George commented: "While acknowledging the real problems still to be overcome here in London, our overall programme is beginning to show encouraging results and to prove to our customers that, given the resources, we can give a good service. But neglect of investment and determination in previous years will inevitably leave us with difficulties in some places for a while yet."

Sir George went on to outline the many fine achievements which had been recorded since corporation status in 1969 and looking to the future and the British Telecommunications Bill, reaffirmed his intention to cope with any challenge issued by the Government.

"I believe there is an increasing feeling in Telecom that, handled wisely, the new arrangements will help to accelerate the whole communications business and be beneficial both to the industry and to Telecom," he said.

Do-it-yourself datel

Users of British Telecom's datel service can now save time and money by dialling their own calls to North America instead of going through the international operator.

By dialling a special number customers are connected to circuits which have been conditioned for data transmission and they can choose between satellite and cable circuits. No extra charge is made for the new service. Customers pay for their calls at the normal IDD rate which is cheaper than the operator rate that they have used until now. Services available to the USA are Datel 200, 600 and 2400.

Profit forecast

Despite difficult trading conditions British Telecom, in common with the other business in the Post Office Corporation, expects to make an end-of-year profit in 1981.

British Telecom's trading loss for the half-year to the end of September amounted to £19 million but the effects of recent price rises, together with seasonal factors and other action to improve results, are expected to give an overall substantial surplus. The half-year results reflect a greater degree of estimation than would normally be the case because of the aftermath of industrial action at computer centres in 1979 and 1980.

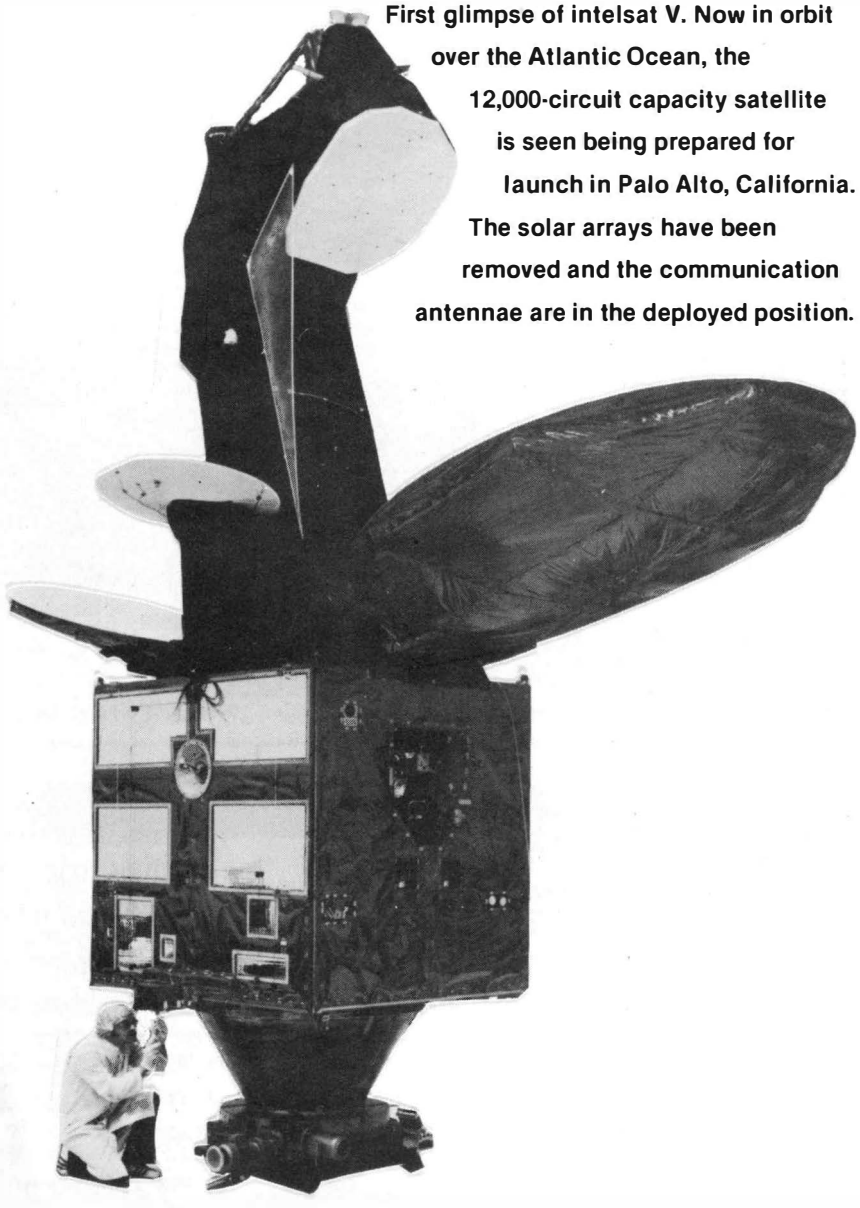
Autotelex boost

Britain's 80,000 telex users can now directly key the British Virgin Islands in the Caribbean. The islands with their sub-tropical climate have tourism as their main industry. They receive about 320 calls from the UK each month and are the 164th in the list of countries to join the expanding autotelex network.

Plenary Assembly

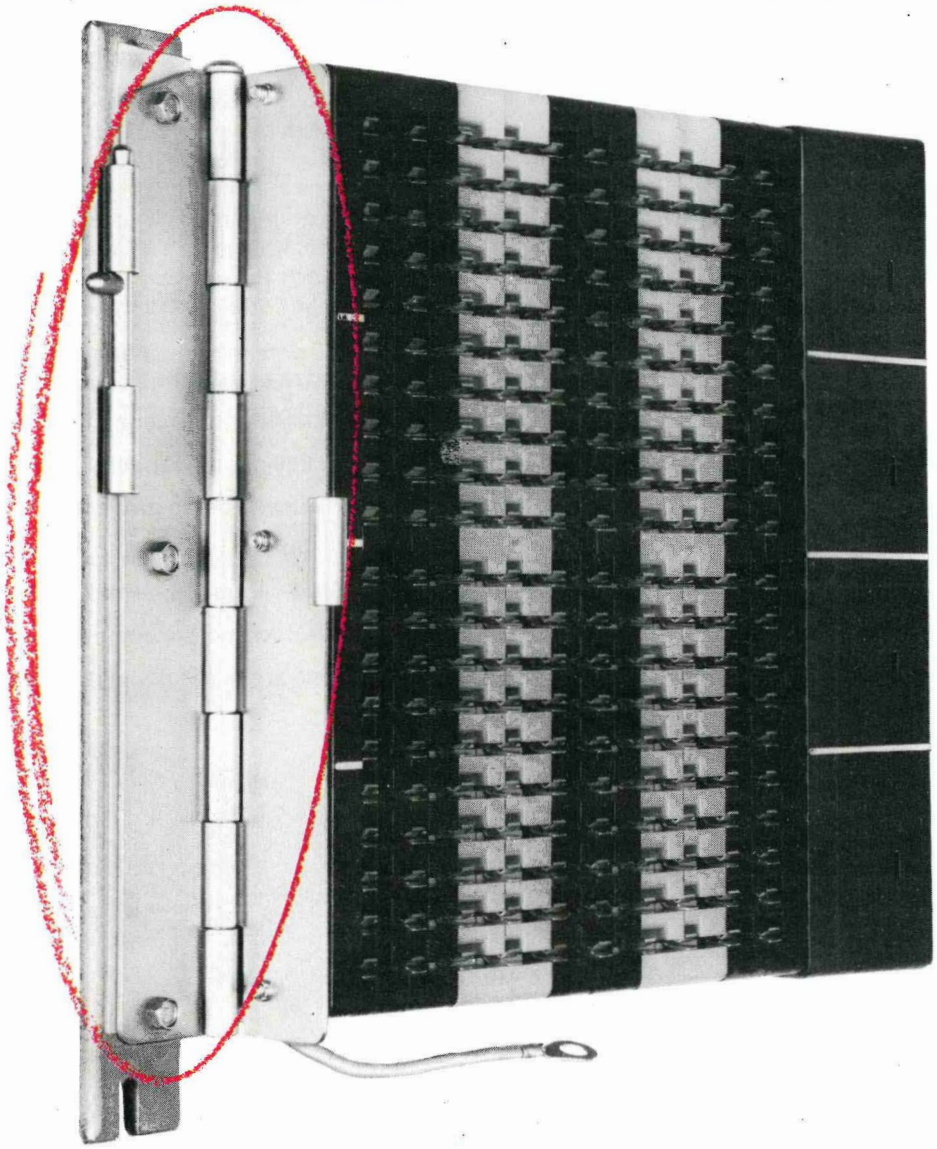
Various recommendations concerning Teletex (see page 29) and Videotex were among those approved by the VIIth Plenary Assembly of the International Telegraph and Telephone Consultative Committee (CCITT) which took place recently in Geneva.

In all, the assembly examined and



First glimpse of intelsat V. Now in orbit over the Atlantic Ocean, the 12,000-circuit capacity satellite is seen being prepared for launch in Palo Alto, California. The solar arrays have been removed and the communication antennae are in the deployed position.

Jacks Test with Hinges



Jacks Test 39/2A 39/2B 40/2A 40/2B 42B.

Hinged versions of the existing range of protected Jacks Test have been introduced to provide improved access for jumper wiring. The hinge is fitted between mounting bracket and fanning strip, with a secure latching facility.

An insulator foil protects wiring – fed through the fanning strip – from chafing against the hinge.

Hinge Kits 381A 381B

Available for retrospective modification of any protected Jacks Test.

Birkbys Plastics
a member of the **PLESSEY GROUP**

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Telex: 55332

NAME _____

TITLE _____

ADDRESS _____

_____

_____

Please send me further details of the hinged version of the Jack Test range.

Birkbys Plastics Limited, PO Box 2, Liversedge,
West Yorkshire, United Kingdom WF15 6QA

approved some 200 new recommendations and the revision of more than 150 existing recommendations. The assembly also agreed upon a list of 380 questions to be studied during the next study period which will culminate in the VIIIth Plenary Assembly to be held in 1984.

The VIIth Plenary Assembly came at the end of a particularly busy study period during which more than 6,000 technical contributions were examined by the different study groups – a 70 per cent increase over the previous study period.

The CCITT carries out technical, operational and tariff studies relating to telegraphy, telephony, telex, data transmission and other communications services mainly to draw up recommendations in these fields.

Contracts

The Plessey Company Limited – £1,850,000 for 70,000 telephones incorporating a new keypad with fewer parts and a longer life than existing designs.

Siemens Limited – for the manufacture, installation and testing of two high power amplifiers for Goonhilly earth station's Aerial 2.

GEC Telecommunications Limited – £11 million for new digital and analogue line transmission systems and associated multiplex equipment. Equipment will be made at Coventry and is due for delivery in 1982.

Bowthorpe Holdings Limited – More than £1 million for a new multi-entry closure system for underground cable jointing. The contract was awarded to Bowthorpe subsidiary Hellerman Electric following a joint development programme.

New network takes off

The Royal Air Force recently introduced its general purpose telephone network (GPTN) which has been gradually covering the country for the past year. The network consists of private automatic branch exchanges interconnected through switching centres based on ten geographical areas.

Through special gateway routes, the network, which serves more than 160 units, will be connected to other armed service nets, and this will extend the system to cover over 800 military units.

Extensions in the system can be reached by dialling up to nine digits, and this covers most extensions in RAF and Ministry of Defence locations in the UK and Germany.

Sixth-formers from three schools have been awarded microcomputers as extra prizes by British Telecom in the national schools computing competition organised by the Department of Industry. The lucky few – from schools in Ipswich, Felixstowe and Colchester – collected their bonus from the Research Laboratories director, Charles May, during a visit to the Martlesham centre.

Prestel international

Following a successful one-year market trial involving more than 300 companies in seven countries, British Telecom is to launch Prestel International – the first international viewdata service – from July this year.

The service is expected to provide information to specific business sectors including shipping, finance houses and 'closed user groups', where organisations have exclusive use of a part of the information bank to meet intra-company needs. It will have a single database quite separate from that used in the UK. Access to public information on the international database will be available to users usually for the cost of a call on their own country's domestic telephone network, while closed user group access will be available at the national or international call rate to the nearest computer.

Like the trial, the full international service will run on a GEC 4080 computer.

● Italy has just become the seventh country to buy Prestel expertise. This latest export success was sealed in January when SIP (Societa Italiana Per L'Eservizio Telefonica PA) agreed to carry out market research into viewdata systems for Italy.

Already, West Germany, The Netherlands, Hong Kong, Switzerland, Austria and Belgium have bought British Telecom's viewdata expertise.

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The price to staff at their point of work is 30p a copy.
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Telephone: 021-742 6717.
Advertising copy should be addressed to Eric Gardener, Alabaster Passmore and Sons Ltd., Tovil Printing Works, Maidstone, Kent ME15 6XA.
No official responsibility is accepted for any of the private or trade advertisements included in this publication.

Advertising rates:
Rates: black and white full page £494; half-page (horizontal) £288, ¼ page (horizontal) £171. Extra charges for full colour, prominent position, and bleed advertisements. There is a discount for series bookings (four issues).

Contributions:
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 the contributors are not necessarily those of the Board.

Correspondence:
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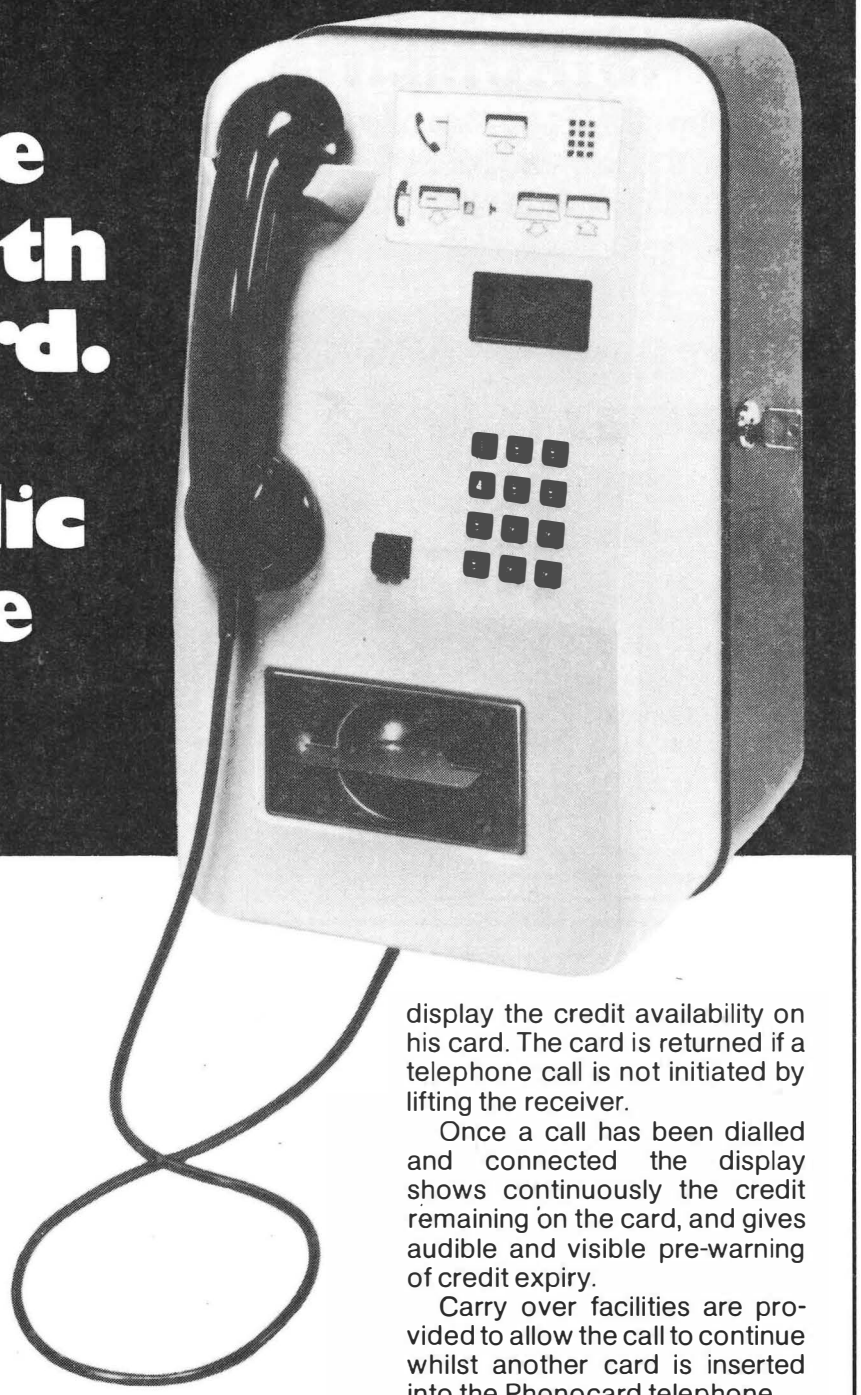

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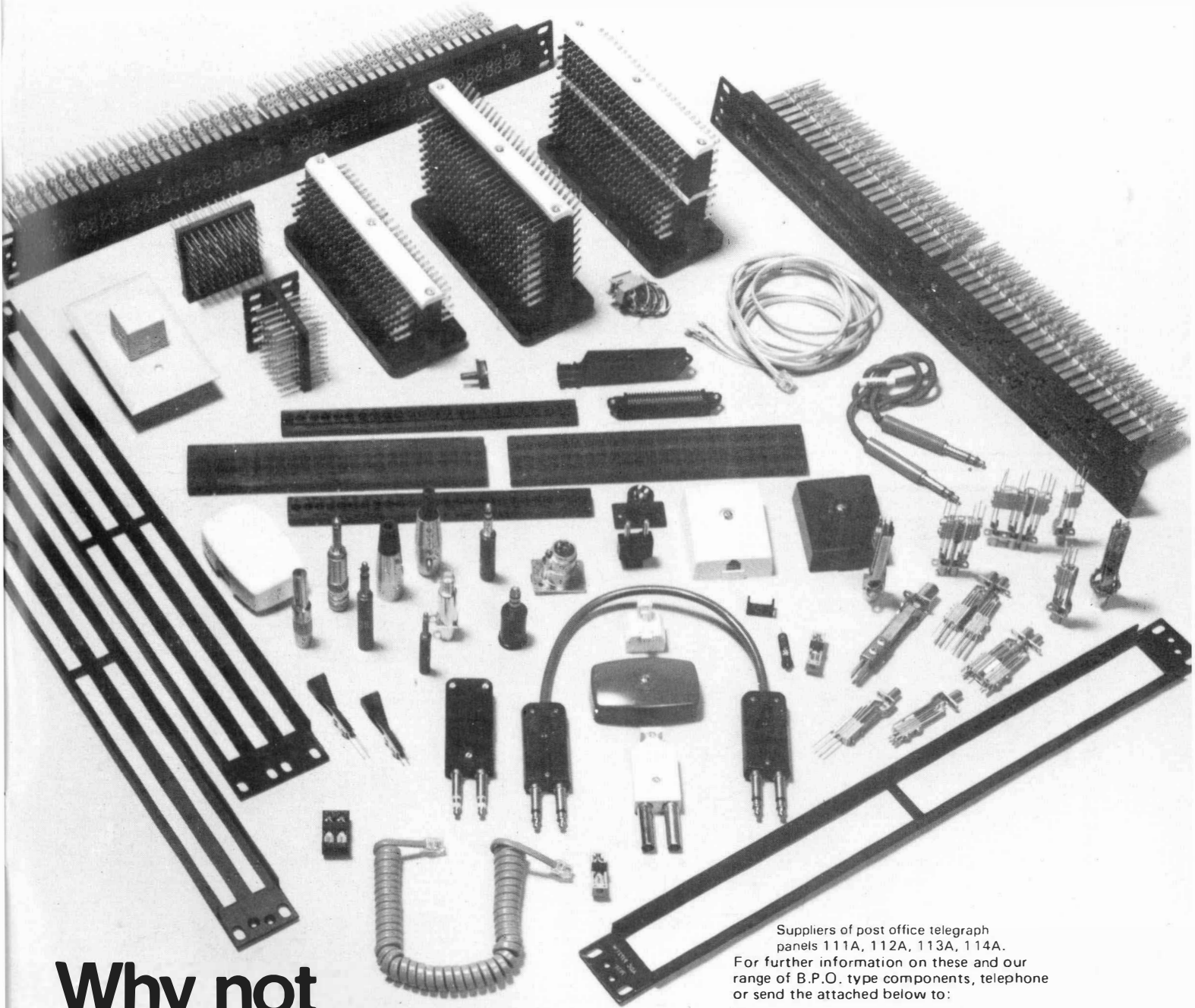

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