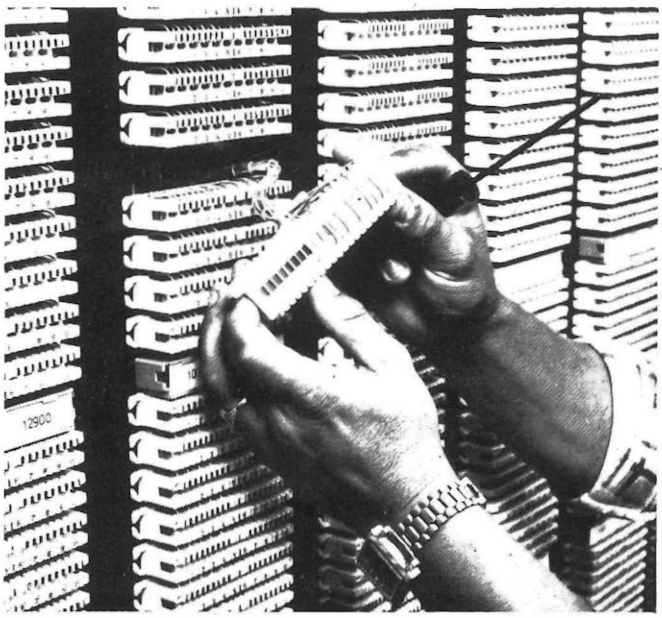
Post Office telecommunications journal

Winter 1979/80 Volume 31 No. 4 Price 18p

KRONE

The Company that has a great capacity for exchanges

(it's called the LSA-PLUS)



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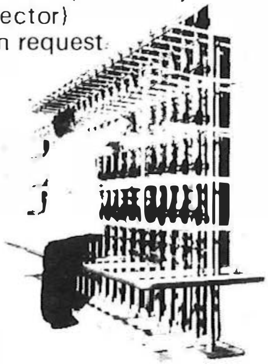

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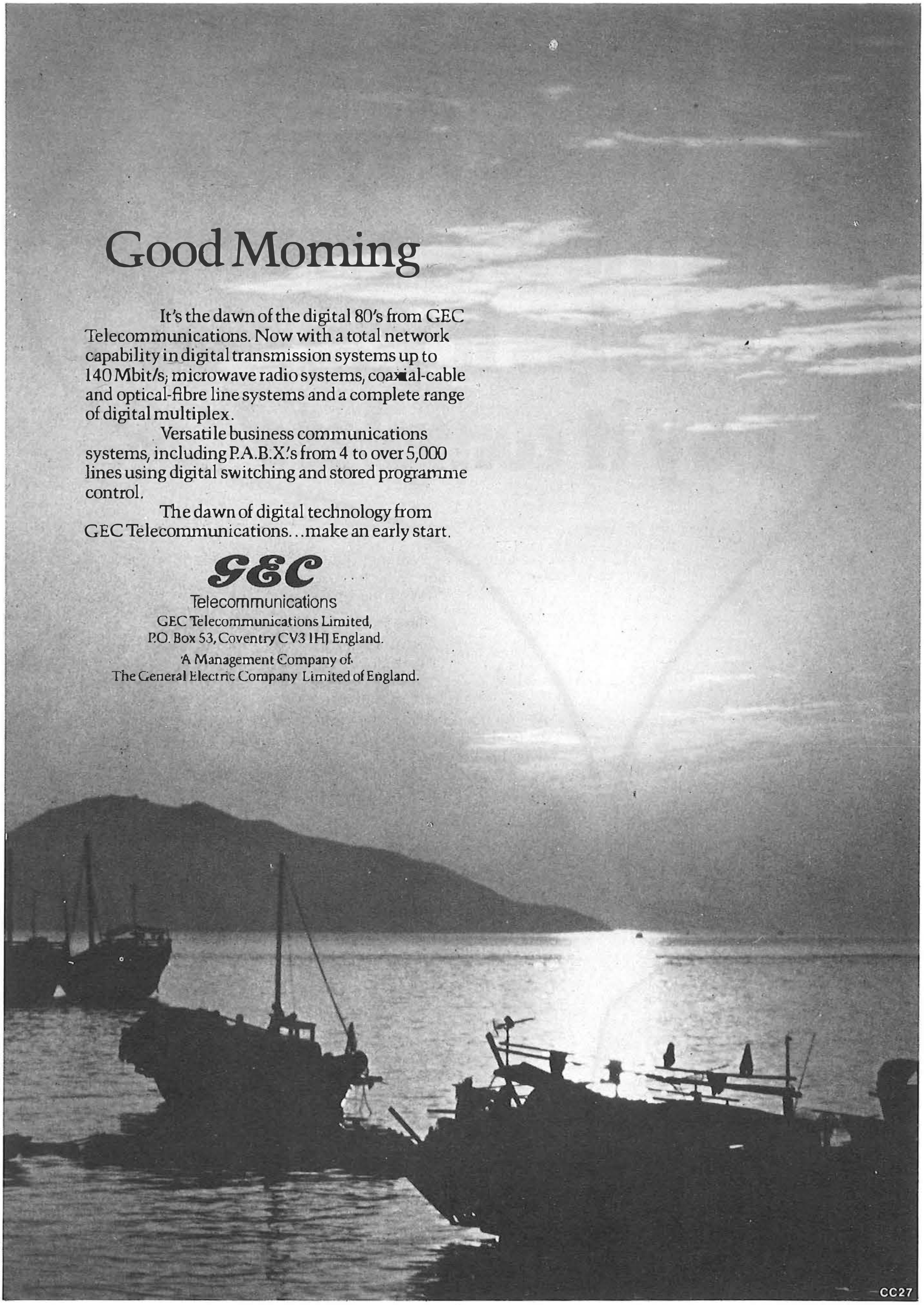
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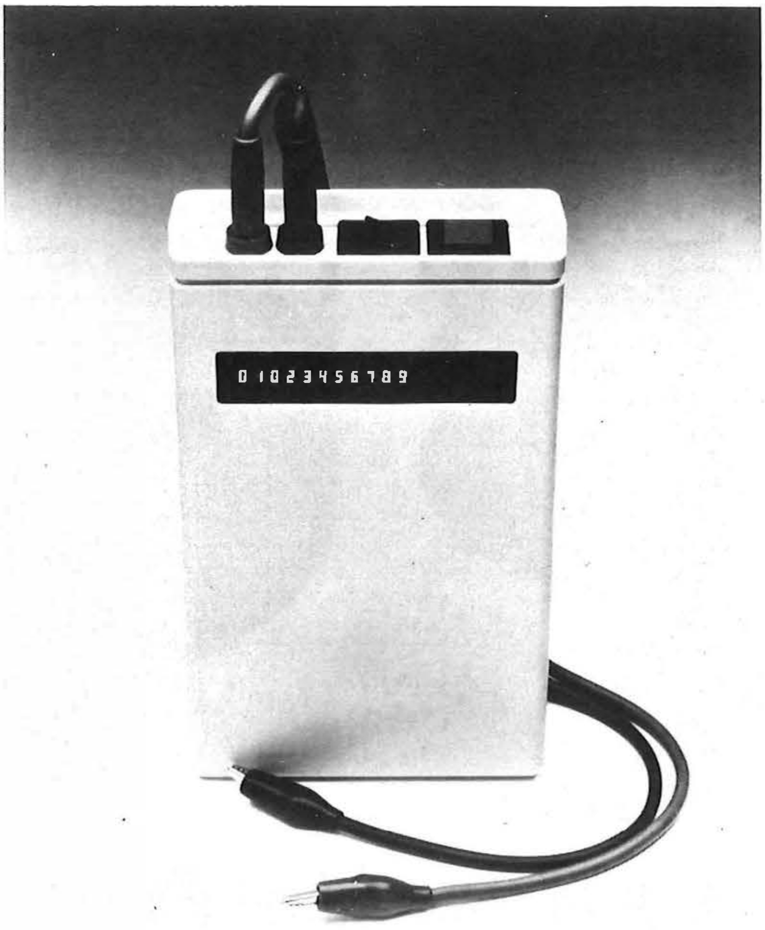
"DIGICOUNT"



"DIGICOUNT" is a compact, hand held, self powered, robust, simple to use unit for counting LOOP DISCONNECT PULSES to POST OFFICE LINES, where the number dialled is displayed on a sixteen digit LED display driven from internal CMOS devices.

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"DIGICOUNT" incorporates an input circuit specifically designed to overcome the problems associated with mechanical type relay derived pulses, coupled to long lines which generate large voltage swings and have inherent contact bounce and drop out. The input impedance exceeds the open loop requirement, which is in excess of 5 MEGOHM, thus there is effectively no loading under test, this is achieved by a combination of Schmitt triggering and integration filtering followed by digit counting and interdigital pause detection by a unique patented counter which allows for large changes in dial speeds, this is then fed to an internal memory which is multiplexed to drive the sixteen digit display reading from left to right.

"DIGICOUNT" is pre-tested and adjusted prior to delivery to work on 10 cycle, 16 cycle and 20 cycle systems without modification where the line voltage is 50 volts and allows for the nominal voltage drop. Variations on this specification are by request.

"DIGICOUNT" is delivered in a black leather case and comes complete with test leads. The unit is powered by 4 x 1.5 volt batteries, type AA size.
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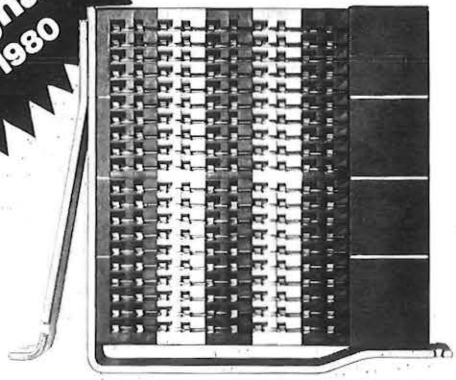
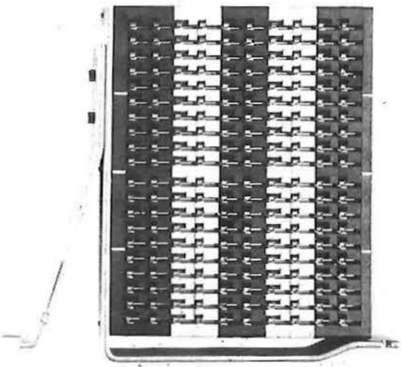


JACK TEST
39/1B



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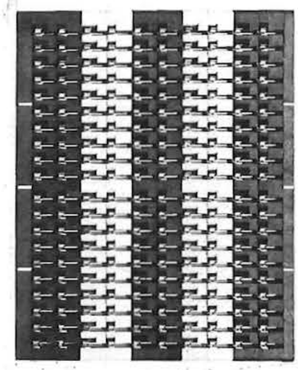

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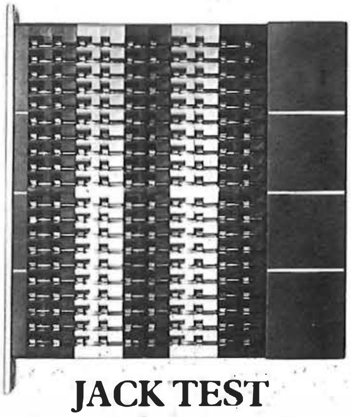
38/1B



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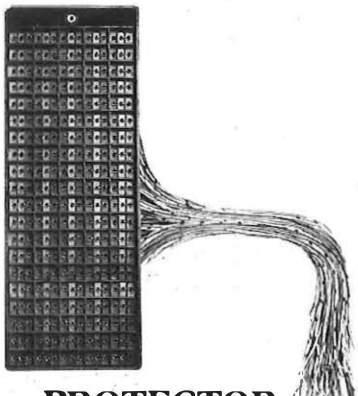
40/1B



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MOUNTING 4A

Jacks Test Nos. 37/38/41A

Jacks Test Nos. 37/38 provide 100 pair termination with test access for the lineside and exchangeside of Main Distribution Frames. Jack Test No. 41A is designed for mounting directly on British Post Office PBX frames.

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100 pair termination units, pre-wired to Protector Mounting No. 4A with socket access for 3 electrode gas discharge tubes (Protectors No. 14A), protect switching equipment from potentially damaging high voltage surges on subscribers' and junction lines.

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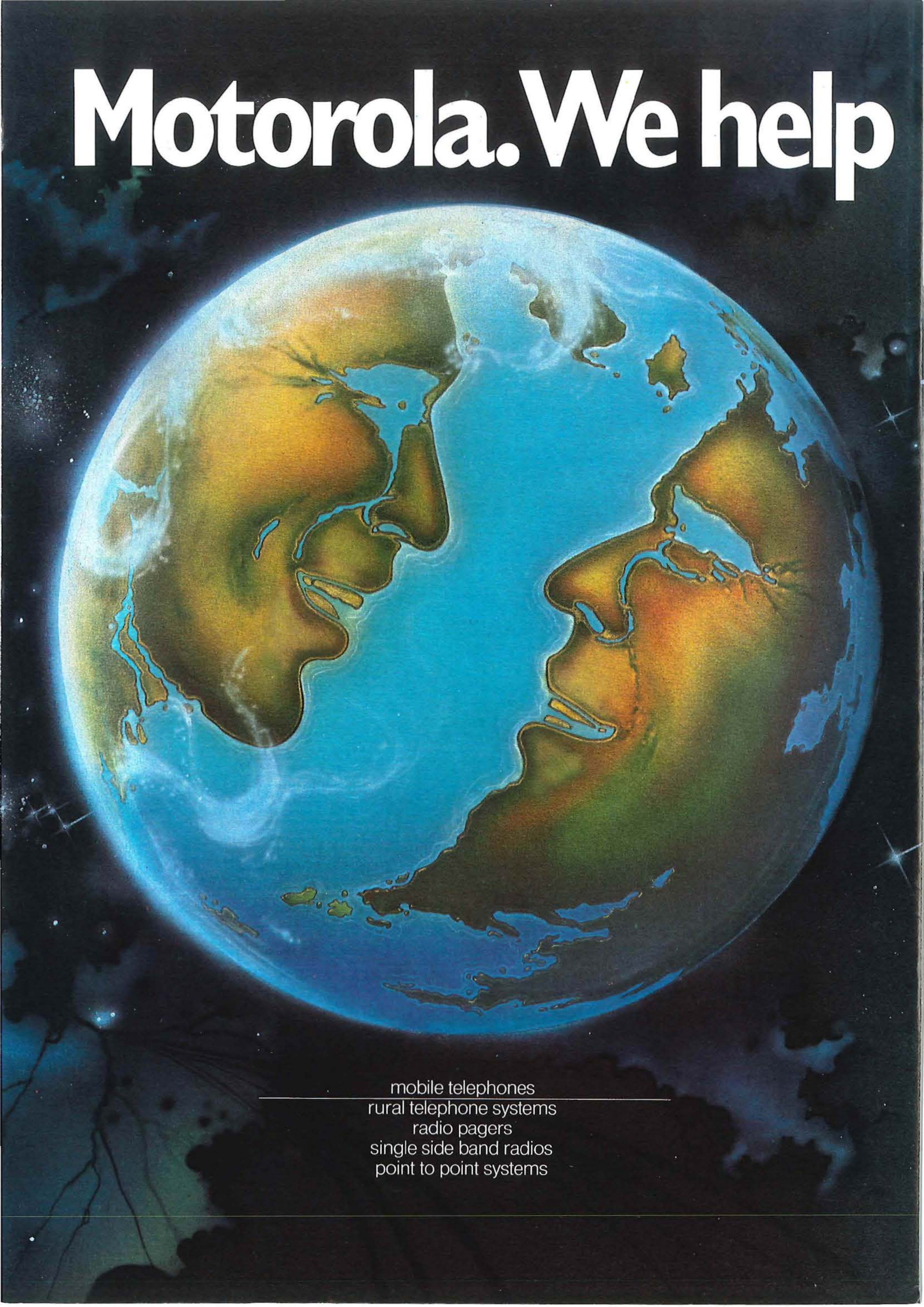
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the world talk.

Because no system is foreign to us.

Motorola provides one of the most efficient and advanced telecommunications systems available anywhere. You know us for our mobile telephones and pagers. But you may not realize that we create total telecommunications systems, compatible with the widest range of telephone networks on earth. Working with your own land telephone specifications, we can design a mobile telecommunications network that focuses upon your standards and is tailored to your specific requirements.

Yours alone.

For these reasons and more, your needs are not foreign to us.

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Most manufacturers recommend one system.

Their own.

Motorola produces a variety of equipment for a wide range of systems on a regular basis. Not just one. Among them, IMTS, Netz B, and Nordic. And we offer products that interface all principal types of land exchanges including Step by Step; Crossbar; and Electronic-SPC (analog or digital).

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EMX 500. The heart of Motorola telecommunications.

This is the first computer controlled mobile telephone exchange that accepts multiple signaling systems. Both land and radio. It is designed to operate within the parameters you set. Forming the basis of the mobile telecommunications network you need. Thus, our system becomes an extention of yours. A totally synergistic concept. And it can be programmed to adapt to your future requirements, as well.

EMX 500 has already been ordered by European and North American countries to provide advanced subscriber features. It will interface different land network environments and systems that feature both tone and digital radio signaling formats. The beauty of EMX 500 is that no major changes in the land networks will be necessary to integrate mobile service.

The single source advantage.

Because Motorola provides a totally integrated telecommunications package, cost efficiency and control can be increased. Every system is tested in our facility *before* installation. And because we are able to design, manufacture and test your system, you don't have to involve a number of suppliers.

Just one source.

Let's communicate.

As your telecommunications must adjust for changing requirements, consider the efficiency, flexibility and compatibility of a Motorola system. Allow us to analyze your present requirements at no charge. And propose solutions to meet your needs. For more information contact our International Telecommunications Marketing Manager.

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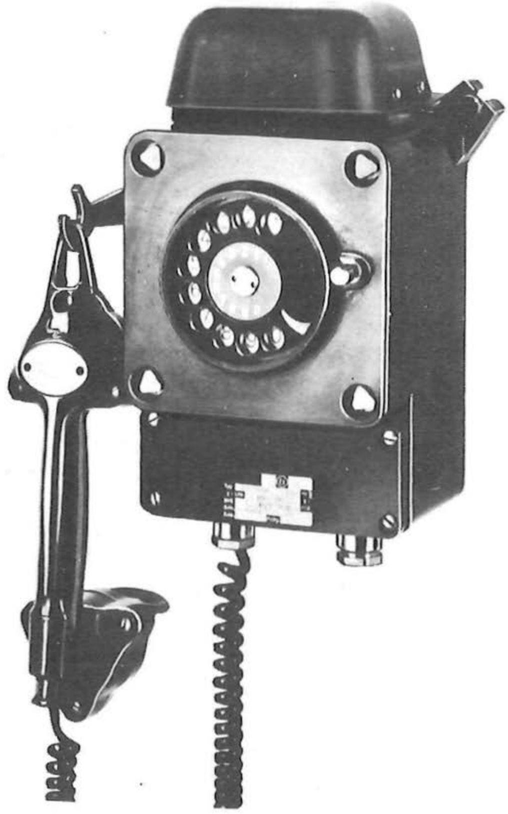

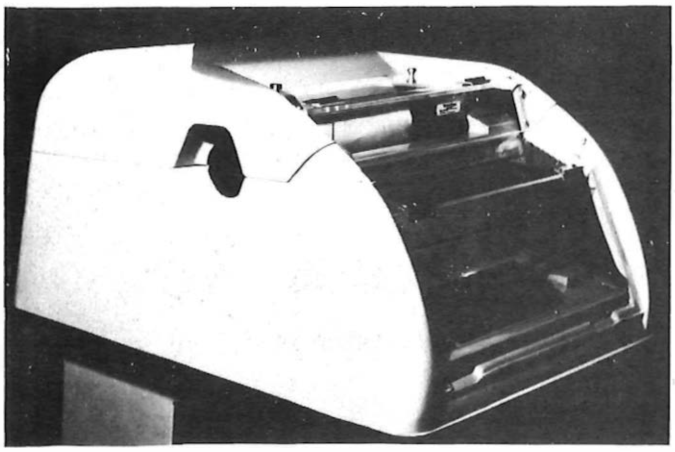

Thinking Cable?

Telspec Limited
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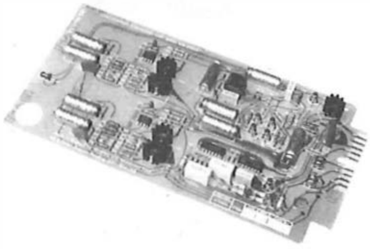
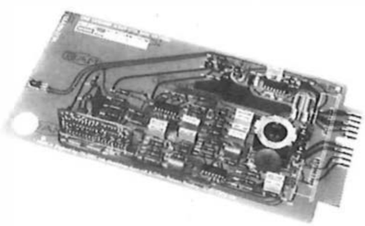
Telspec Limited

manufacture a full range of BPO approved line extenders enabling cost conscious telecoms administrations and private network operators to save on cabling. Moreover, these products allow service to be provided to subscribers otherwise restricted by loop resistance.



Line Extenders Signalling (LES)



Line Extenders Audio (LEA)

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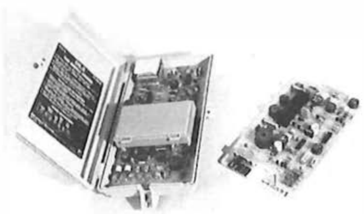
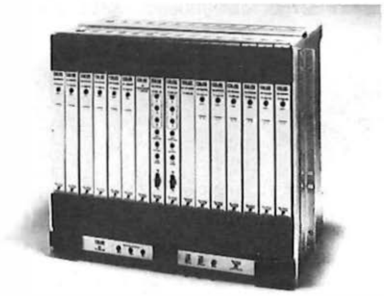
Performance in pair gain



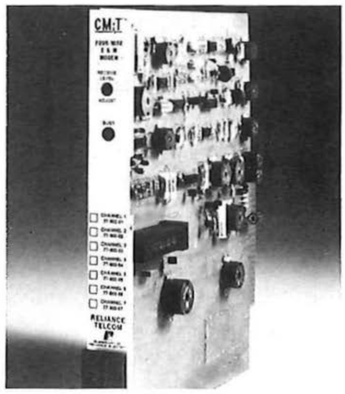
AML II

This is a single channel subscribers carrier system which is compandorised giving greater noise rejection and curing RFI problems.



CM8-X

This system can provide up to 6 8-channel sub-systems serving up to 48 subscribers over 6 cable pairs.



CM-T

This carrier system can provide 7 trunk circuits on one cable pair having a maximum loss of 280 dB.

If you have any telephone line problems or you require further details on the products briefly described above please contact us.

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On the threshold

The 1980s promise to be an exciting time for telecommunications. They follow a decade in which the accelerating rate of scientific and technological achievement gave a new global meaning to keeping in touch and see the Industry poised on the threshold of even more spectacular developments as the 21st century approaches.

The catalogue of achievements during the 1970s is impressive. Satellite communication has become commonplace while undersea cables of increasingly high capacity now span the world's ocean beds. On a more domestic level the UK now has a full 'dial everywhere' network (see page 4) and more than 25 million telephones – almost double the total at the beginning of the decade. And digital transmission is also becoming more and more widely used throughout the country.

The last 10 years have seen the establishment of the new research headquarters at Martlesham, a second earth station at Madley and several other major telecommunications centres both in London and the provinces. Other important developments have included Prestel, Confravision, Radiopaging, optical fibres and many more.

But it is not only science and technology which have generated change. The beginning of the 1970s saw the Post Office facing the challenge of its new Corporation status and by the end of the decade it was preparing for the setting up of British Telecommunications as a separate Corporation. Linked with this is likely to be the implementation of the Government's intention to modify the telecommunications monopoly which in turn has stimulated a radical approach to product and service marketing.

So what do the 1980s hold? Obviously System X will play a vital role in the continuing growth of the telecommunications network and an even more sophisticated range of equipment for both business and residential customers will become available. Thanks largely to the microprocessor the development of new technologies is likely to continue apace and stir the imagination even further in an environment of increasing competition.

A little extra

Despite the ravages of inflation which have sent production costs soaring, the cover price of Telecommunications Journal has remained unchanged for four years. This has recently made it increasingly difficult to maintain the high standards our readers have come to expect and it is with regret, therefore, that the price of the Journal must be increased to 24 pence from the Spring Issue this year. At only two pence per month extra we feel the Journal remains excellent value.

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.

Post Office telecommunications journal

Winter 1979/80 Vol 31 No 4

Published by the Post Office of the United Kingdom to promote and extend knowledge of the operation and management of telecommunications

Cover: In a temperature of more than 100 degrees F, Technician Jim Brogan checks the wiring at the top of a telephone pole near Tripoli. He is a member of the Post Office team working for BPO Telconsult in Libya (See page 15).

Head of the Marketing Executive Finance Division, Brian Rigby heads a round-the-table conference with his team of experts to discuss the strategic financing plan. With Brian Rigby (foreground) are (left to right) Roger Antell, Audrey Foord, Sue Prout, John Twyford and Peter Smith.

Product accounting in the 1980s

B Rigby

AT FIRST sight, marketing and finance do not seem good partners. The popular image of marketing is young men in pink shirts selling exciting products. Finance is more about the dead hand of accountants. But marketing is not an end in itself, and in the case of the Telecommunications Business, it aims to meet a particular objective – usually money. In private industry, marketing is used by a company to make more money than its competitors – for shareholders.

The Telecommunications Business is not in quite the same position because it does not have any shareholders in that sense, but money is still the key. The Business needs revenue to develop new products, to raise standards of service even though this does not of itself generate extra revenue. Thus finance and marketing are inextricably interrelated.

Perhaps it is worth a look at the scale of the Telecommunications Business. Turnover last year was £3,244 million and profit on turnover was just over 10 per cent. That puts the Business ahead of British Leyland with a turnover of £2,606 million, Ford with a turnover of £2,253 million, Thorn, Plessey, and GEC. In terms of the top companies in the UK, the Business ranks about fifth.

The fact that the Business is in the public and not the private sector brings many problems that private industry is generally free from. Most take the form of Government financial requirements, and as with other nationalised industries, the Business is directed, whether formally or otherwise to do various things, some of which conflict. Because of this, the Business has to make a target return of five per cent on its assets, has to reduce unit costs by five per cent a year to earn a real return of eight per cent on new investment, has to avoid cross-subsidisation and discrimination, and has to observe cash limits and constraint on purchasing.

Given all these constraints, it is a wonder new products reach the market at all. It was manageable enough with a market monopoly, when inflation was fairly moderate and when standard products were offered which only changed slightly over time. But most of these circumstances have now changed. Given the will and the products, the Business can compete. What would be a problem, is the sort of regulated pseudo-competition which exists in the United States. And remember that it is not just the market for new products at stake, but the whole of the installed customer equipment base – currently worth something in the region of £855 million.

Regulation is not bad – after all, the Business is really dealing with public money even though for accounting purposes it is convenient to regard this belonging to the Telecommunications Business. Or to look at it another way, every telephone exchange modernised is a hospital not modernised or every pound handed over to the Government under a negative cash limit is something off income tax. So it is only reasonable to be asked to make the most effective use of available resources. What this means is that the marketing function must now accept the financial consequences of its actions. The Business can ill-afford to develop products and just simply hope they sell.

In the past, the Business has developed long-life products which have been priced accordingly. With recent technological advances and the challenge of competition, it will be necessary to accept a much more rapid product turnover. Objectives will be to devise financeable migration strategies to help customers move from the existing range and to price new products in accordance with a shorter-managed life cycle. Customers want new products and services and ways must be found to provide them at an economic price determined by the market.

Customer needs must be identified and in the light of that, attractive and profitable products should be selected, and monitored for popularity and profitability. Given these criteria, a system is needed where winners and losers can be identified – quickly. Cash generates cash, and the revenue from a new product generates the development and marketing of the next before anyone else. And this is the case not only of products but also of services. The Business is not only funding new products to attach to the network, it is marketing and financing the network as well. It is like Fords setting out to pay for the road system as well as manufacturing vehicles.

Having accepted this philosophy, what it really means is individual responsibility for individual people – in this case, product managers. A manager should have complete responsibility to plan the development and marketing of a particular product range, should be directed to achieve a certain financial contribution from the exploitation of that range and should be accountable for the result. But that manager cannot be fully effective without the right tools for the job.

A pre-requisite is obviously a versatile market intelligence system, which means finding the right price and looking at the competition, preparing a forecasting and product management system together with financing packages to attract the customer. The manager must also have a means of monitoring financial performance and profitability so that corrective action such as tariff changes, increased publicity and discount offers can be taken.

The role of finance in marketing therefore is to make these tools available, because without them, marketing success can be measured only in physical terms and not in financial terms. And it is the financial result that is important.

The Telecommunications Business has not had to think like this in the past. Until now it has been service and resource orientated rather than product and cash orientated. So things may have to change. Management will have to make some difficult choices – with a cash limit constraint there cannot be bread and circuses. It would be impossible, for example, to have 100 per cent perfect service and performance *and* finance the new generation telephone.

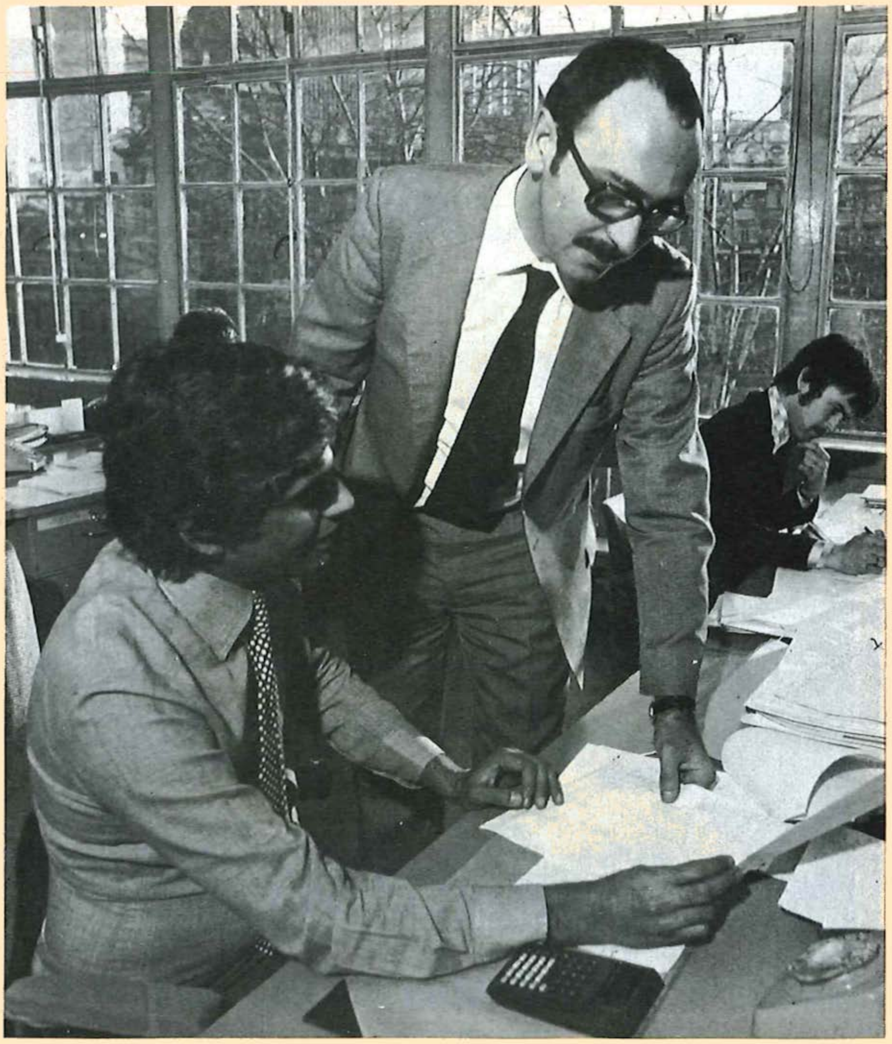
But management is there to set priorities and the root of the cash limit philosophy is that these choices should be explicitly made. Many of the things the Business is doing are experimental and obviously mistakes may happen. What is needed, however, is the right motivation, an appreciation of the role finance can play in this new era and a willingness to learn from mistakes as they arise.

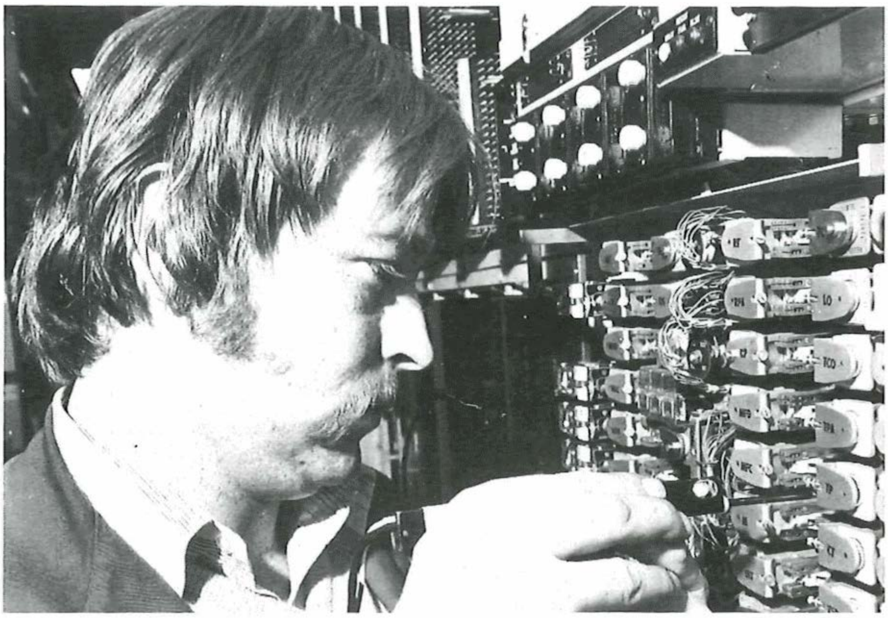
If all these things can be done – and the Business has the people and the skills to do them – then it can be as competitive as any of its rivals. The role of the new Marketing Finance Division, therefore, is to provide the Marketing Executive with a finance arm even stronger than those of its competitors.

Mr B. Rigby is Head of the newly-formed Marketing Executive Finance Division.

PO Telecommunications Journal, Winter 1979/80

Higher executive officer 'Mai' Malik discusses with Brian Rigby the latest product account computer printout.





Bob Newman, a Technical Officer at Reading GSC, traces a fault on a register – vital to the STD network.

The dial everywhere network arrives

C T A Page

How an STD call from Abbey St Bathans – the first exchange listed in the Telephone Dialling Code booklet – would be routed to Zelah, the last booklet entry.

A milestone in Britain's telecommunications history has been reached with the introduction of full Subscriber Trunk Dialling (STD) for UK customers.

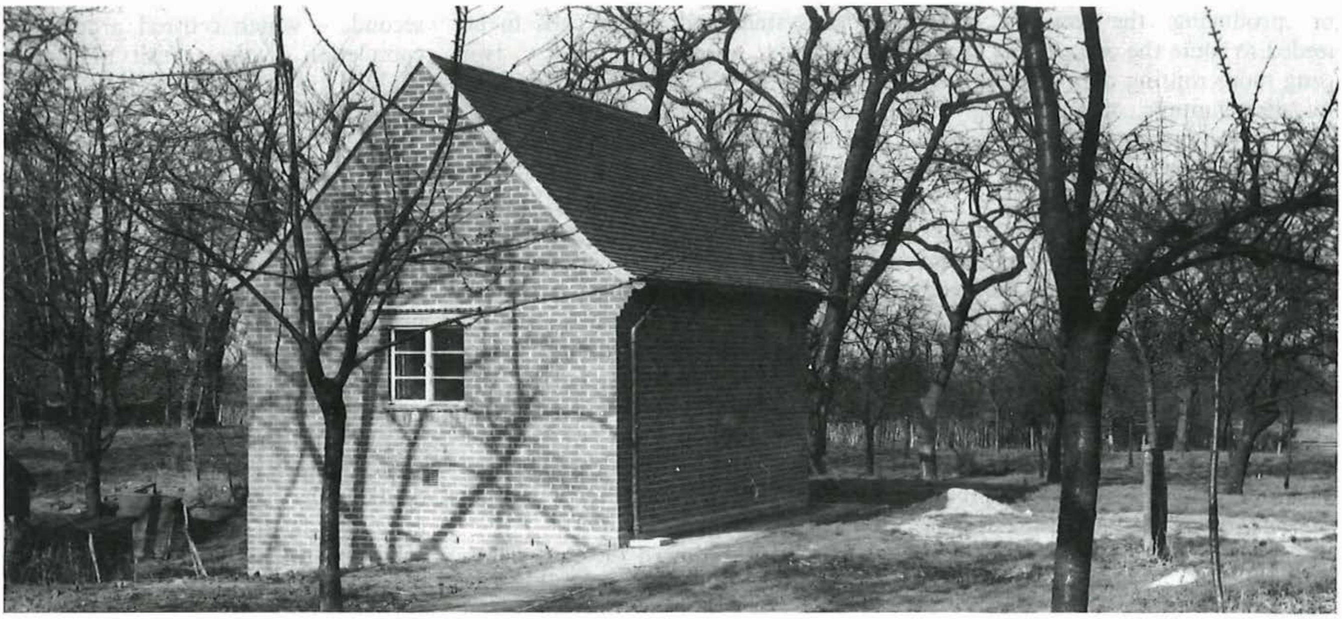
"THE TWO steps ('Simplified Charges' and 'Automation') proposed in this White Paper together constitute the most sweeping and radical reform since the Post Office took over the telephone service from the National Telephone Company in 1912".

So concluded the White Paper which, in 1957, heralded the Post Office's plans to automate fully the telephone system. The first step was really an administrative one. With operators controlling all trunk calls, each of about 6,000 exchanges had its own list of call charges based on straight-line distances to the other exchanges.

The new move introduced fundamental tariff changes which allowed the principles of call charging to be simplified. It enabled exchanges to be grouped into charging groups of which 600 were planned. Although their size and shape varied, they had an average radius of about seven miles. This had the effect of reducing by a factor of ten – down from 5,999 to 599 – the charge list for any given exchange.

These changes paved the way for the next step, which had as its goal the full automation of the telephone system bringing with it the facility for subscribers to dial anywhere within the United Kingdom – now known throughout the land as Subscriber Trunk Dialling (STD). Its realisation meant introducing a system of national telephone numbers and combining the 6,000 exchanges into national numbering groups (NNG).

A new trunk switching and transmission plan was also needed to meet the demands of a system whereby the control of trunk calls would pass from the operator to an electro-mechanical, or electronic device which would route the calls and raise the appropriate charge. At first, in the late 1950s and early 1960s, this equipment was popularly known as GRACE (group routing and charging equipment) but it is now



This small, rural exchange in southern England is one of thousands dotted around the countryside. Each is as essential to the STD network as the major centres.

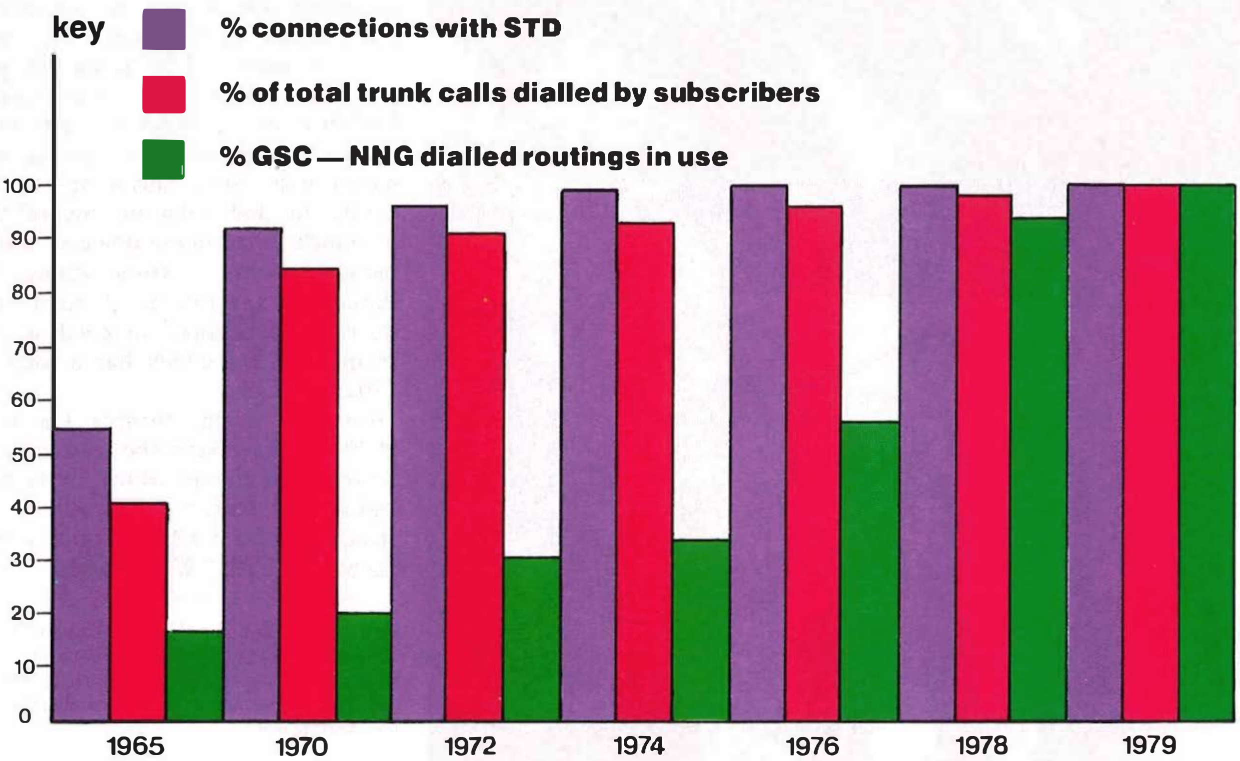
more commonly known by the less glamorous initials RT which stand for register translator.

This new plan had to ensure that the controlling equipment could route the call to its destination quickly enough to be acceptable to the subscriber while still providing a satisfactory transmission standard.

A main feature was the introduction of Group Switching Centres (GSCs). Each GSC collected trunk traffic from local exchanges within its group and housed the controlling register translators. To maintain a satisfactory transmission standard however, not more than two GSC/GSC links in tandem, using two-wire switching techniques at the intermediate GSC, were able to be used on any call.

This condition still exists and a further restriction applies at the originating GSC where the controlling equipment has only limited capability

The dial everywhere network achievement



for producing the routing digits needed to route the call. In any event, using more routing digits would have the disadvantage of increasing the average post-dialling delay – the time between completion of dialling and receipt of ringing or other tones.

To provide full subscriber-to-subscriber dialling, the limitations of the GSC/GSC network needed to be overcome. To ensure this, a transit network which used fast signalling techniques supplemented by a fast-switching exchange system was introduced. This enabled transmission standards to be met by switching all calls routed via the network on a four-wire basis. The fast signalling system also ensured that the post-dialling delay for the subscriber was not excessive, even on calls connected over five links. The transit network forms the basic network of the Post Office telephone system and allows calls to be connected between any two exchanges. (See Telecommunications Journal, Winter 1972/73).

Full direct dialling means there has to be a routing between every GSC and every national numbering group (NNGs). With about 378 GSCs and around 700 NNGs, this created a need for 265,000 such routings. A feature of trunk call distribution is that in practice, about 95 per cent of the total dialled trunk traffic is carried on about 108,000 routings, with the remainder carried on the other 157,000 routings, which cater for the occasional call between places with no normal community of interest.

This feature allowed the Post Office to plan the introduction of full STD in two phases. The first provided for the development of a system to cater for the great majority of calls, and the second, – which centred around the completion of the transit network – enabled the task to be completed.

HM the Queen makes the inaugural STD call from Bristol in 1958.

When Her Majesty the Queen dialled the inaugural STD call at Bristol in December 1958, the aim, as set out in the White Paper, was that by 1970, 75 per cent of all trunk calls would be dialled by subscribers. This was achieved. Also by 1970, the detailed planning of the transit network had been completed and a target date of 1978 set for completion.

Progress towards that target date may be measured in terms of percentage of connections with STD facilities, trunk calls dialled and exchanges available through direct dialling. The achievement is shown on the graph on page 5 and reflects the Post Office's planning philosophy.

By 1974, 98 per cent of subscribers had STD facilities, and 86 per cent of trunk calls were dialled. But there was only 33 per cent STD access. As the transit network grew, however, access increased rapidly, and within five years the remaining 66 per cent was introduced.

During 1979 the transition to fully automatic connection of trunk calls was completed and appropriately by the 21st anniversary of its introduction, STD had reached maturity with full direct dialling between all subscribers in the UK.

The improvements in service, and cost reductions as a result of STD have long been accepted by the subscriber, but many still do not fully appreciate the number of exchanges they can dial, has increased by about 200 per cent over the last four to five years. Evidence shows, however, that residential subscribers in particular are increasingly taking advantage of the ability to dial calls to any of the exchanges listed in dialling code information books – from Abbey St Bathans in the Edinburgh Area with some 35 connections to Zelah in the Plymouth Area which has a total of 150 connections.

But what of the future? The year 2000 will have seen the transition to System X, a change which, in technological and service terms will be as radical and far reaching as that introduced by the 1957 White Paper.

Mr C. T. A. Page is a Head of Group in the Network Executive Exchange Systems Department and has been responsible for the development and management of the transit network.

Labels by the million

D A Pinwell

Each year about 27 million labels are produced for customers in the Telecommunications and Postal Businesses by Post Office Factories Division's Label Centre at Cwmcarn in South Wales. Recent changes have been designed to improve service to customers, provide shorter turn round times and give greater flexibility in allocating priority to urgent work.

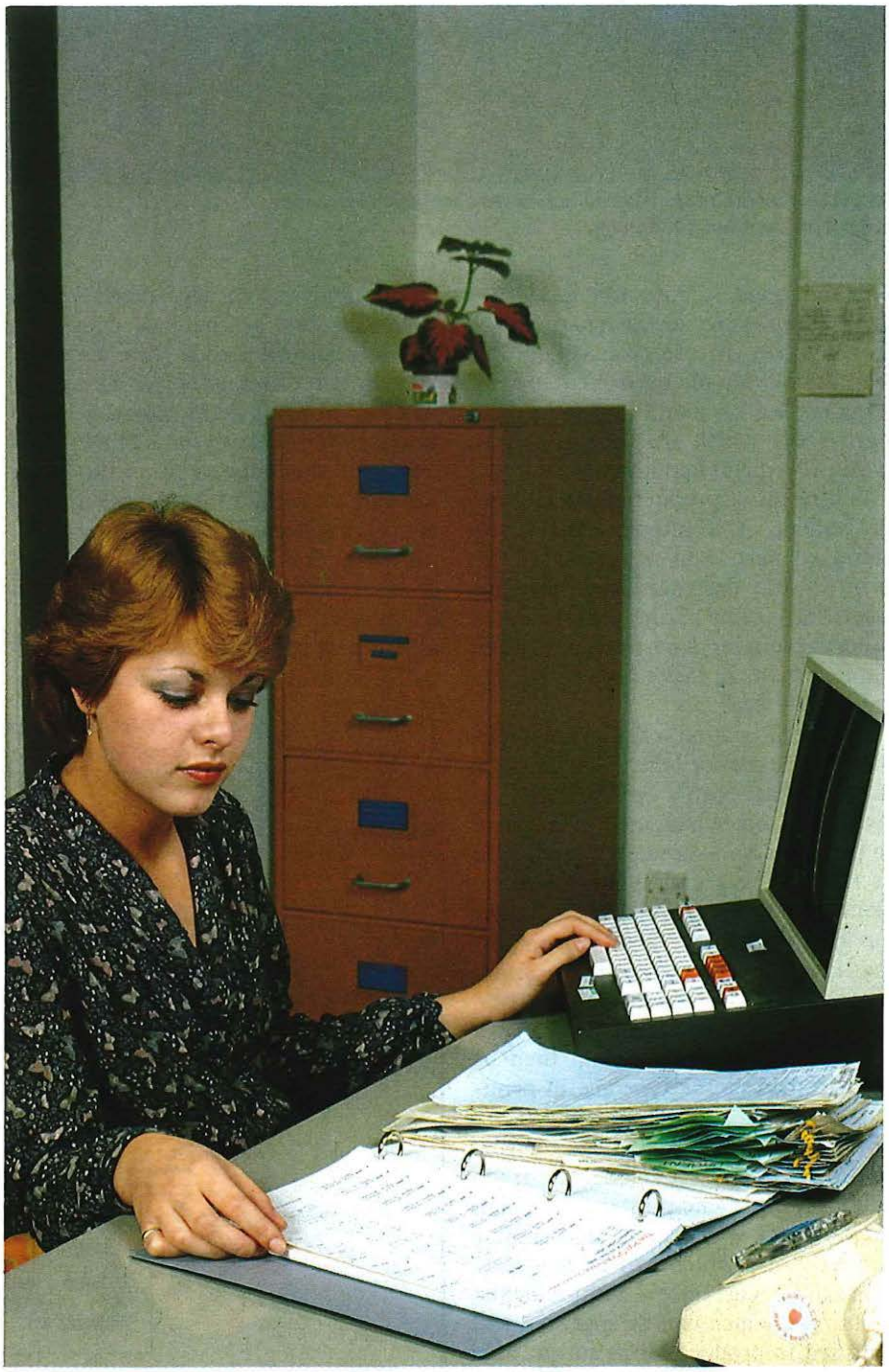
EVERY DAY about 300 orders for labels varying from bold, colourful publicity material to plain, simple warning notices are received at Cwmcarn. As their mean turn round time is six weeks, this results in about 9,000 orders being handled at any time by the Centre's 60 hot press printing and engraving machines.

An innovation being introduced is the compilation of a new catalogue, for national distribution. This will describe and illustrate all types of labels produced and supplied by the Label Centre. To help with updating, the catalogue is designed with loose leaf pages held in a ring binder printed by the factory with each section distinguished by an identifying colour.

Issue of the catalogue has given the opportunity to achieve some degree of standardisation of labels by identifying 'common requirements'. This has enabled the first part of the catalogue to be devoted to the new range of pre-printed labels, covering many accommodation, marketing and safety warning needs, which will now be available from stock held at Cwmcarn on an 'off the shelf service'.

The second part of the catalogue lists those parts and materials which are stocked in blank form at Cwmcarn and can be printed to order. Part standardisation has been achieved here also and stock of blank materials has been rationalised by specifying ranges of sizes and colours which are available for both rigid PVC sheet and self adhesive vinyl film.

Once printing requirements are specified on an order, the thermoplastic parts or materials are hot press printed, the process used for most of the printing work carried out at the Label Centre. It involves the use of heated type face set in a press, to transfer ink pigment from a carrier



Jane Thomas enters details of new label orders into a VDU during trials of the new production control system.

Assistant Factory Technician Julie Allaway changes the type face in a hot press printing machine.

foil and bond it onto the label surfaces. Engraving, an alternative process involves the use of a pantograph technique with motor driven cutters. This is used on metal and some rigid PVC labels which may be subject to wear or frequent handling.

As a result of production control improvement, it is intended that these standard parts and materials will be printed and despatched within four weeks of receipt of the order. Urgent orders specifying a particular required date can, where necessary, be printed within one week.

The final section of the catalogue outlines some of the non-standard labels that can be printed at Cwmcarn, but which may take longer to produce. Non-standard shapes such as shields, bells and stars present no printing problem once a special cutter has been made but those jobs requiring line drawings and symbols cannot be processed using standard type and must wait for a die to be etched by a sub-contractor. This die will then be used instead of the typeface in printing the labels.

Examples of materials used for special application are Velbex, the trade name for the clear plastic film which sticks to car windscreens and similar surfaces, and which can be hot press printed to customer's requirements; and brass, which can be engraved and polished to produce labels for prestige displays or special presentations.

Until now a variety of forms, have been used to order labels from Cwmcarn but as the new catalogue provides an order code for each label and the details required by the factory in order to print them, a new requisition form has been designed and introduced at the same time as the catalogue. This will now be the sole means of ordering from the Label Centre.

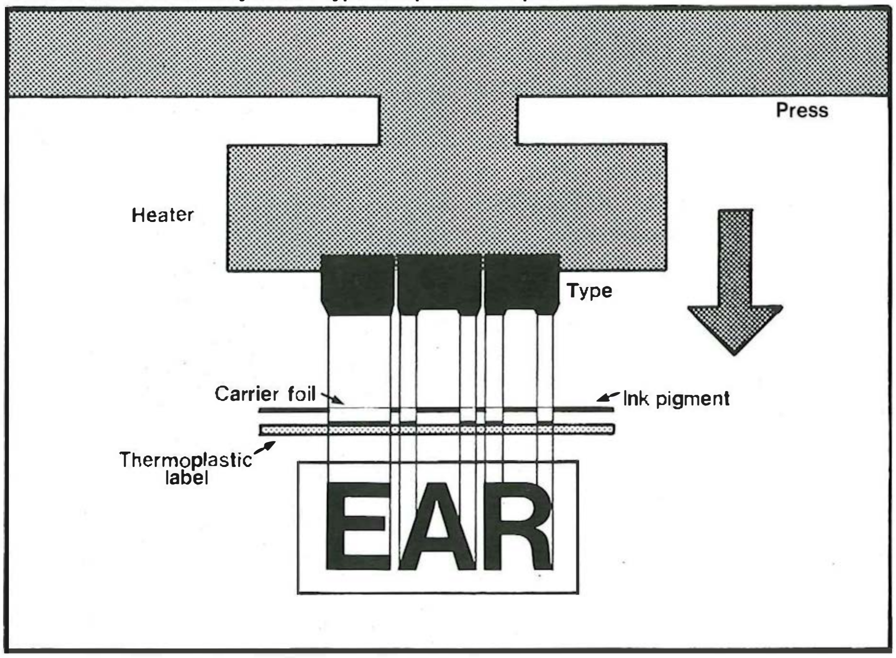
Introduction of the Label Catalogue and the new order form has enabled Cwmcarn Factory to adopt a system of automated production control and machine loading. Four visual display units (VDU) terminals and a print out facility have already been installed and system trials are currently in progress under the direction of the Data Processing Executive, which is responsible for the development of the programs. It is anticipated that the new system will be fully operational during spring this year, when details of all orders received will be recorded through the VDUs and on to the system files.

There are 20 machines groups on the production shop floor, each group being suitable for printing a particular range of sizes and materials. The computer will allocate jobs provisionally to a particular machine group, but will simultaneously note on its record of orders any other machine groups to which the order can be later transferred if required. The 'required by' date is also noted, and where no date is specified, a date one month from receipt of order is automatically assumed.

A daily production loading program will be run to provide work schedules for the machine groups, giving priority to work which has an imminent 'required by' date and, where necessary, transferring work to alternative groups to prevent late production. This program will then list jobs to be produced in the next batch by each particular group of machines. The system holds the job records in another file until it is confirmed that they have been produced and despatched.

To maintain the standard of service by controlling the average turn-round time, it is necessary to match produc-

The hot press printing process: Ink is transferred from the carrier foil and bonded on to the label by heated type on a pneumatic press.



tion capacity against demand to prevent an additional backlog of work. In order to achieve this and also to assist general management decision making, regular print-out reports will provide information on work-in-hand, production totals, delivery performance and machine use.

The new computer system will also include a materials control program. This will maintain ledgers for stock parts and materials held for printing-to-order and all the pre-printed labels stocked for 'off-the-shelf' delivery. When details of a job are recorded into the system, an immediate automatic check will be made to ensure that the required parts, labels or materials are available in stock. The quantity required will then be 'earmarked' for that particular order.

A minimum stock level for each item has been determined and this allows sufficient time for re-ordering before stocks run out. The system provides an automatic warning when quantity of items 'not ear-marked for particular jobs' falls below that minimum level. Effective monitoring of stock is particularly essential at the Label Centre due to the considerable variety of items which need to be available at any one time for printing and also because of turn round times which are much shorter than the period required to re-order and replenish stocks.

It is envisaged that the new system will be a valuable tool when customer groups make enquiries concerning orders which are awaiting production. Previously it has been a slow process to locate the job and difficult to predict a despatch date but the VDU will now provide an immediate report on the current prospects for any order and give the opportunity to change any of the job details, including the 'required by' date.

These developments will enable the Label Centre to provide a more comprehensive and efficient service to customer groups. At the same time it will allow the support staff to direct their attention to the technical requirements of special jobs and provide an advice service on labelling application not covered within the catalogue. The routine work will then continue to be processed quickly and effectively by the computerised system.

Mr D. A. Pinwell is an Executive Engineer in Factories Division at Cwmcarn and is responsible for the Label Centre production control project.

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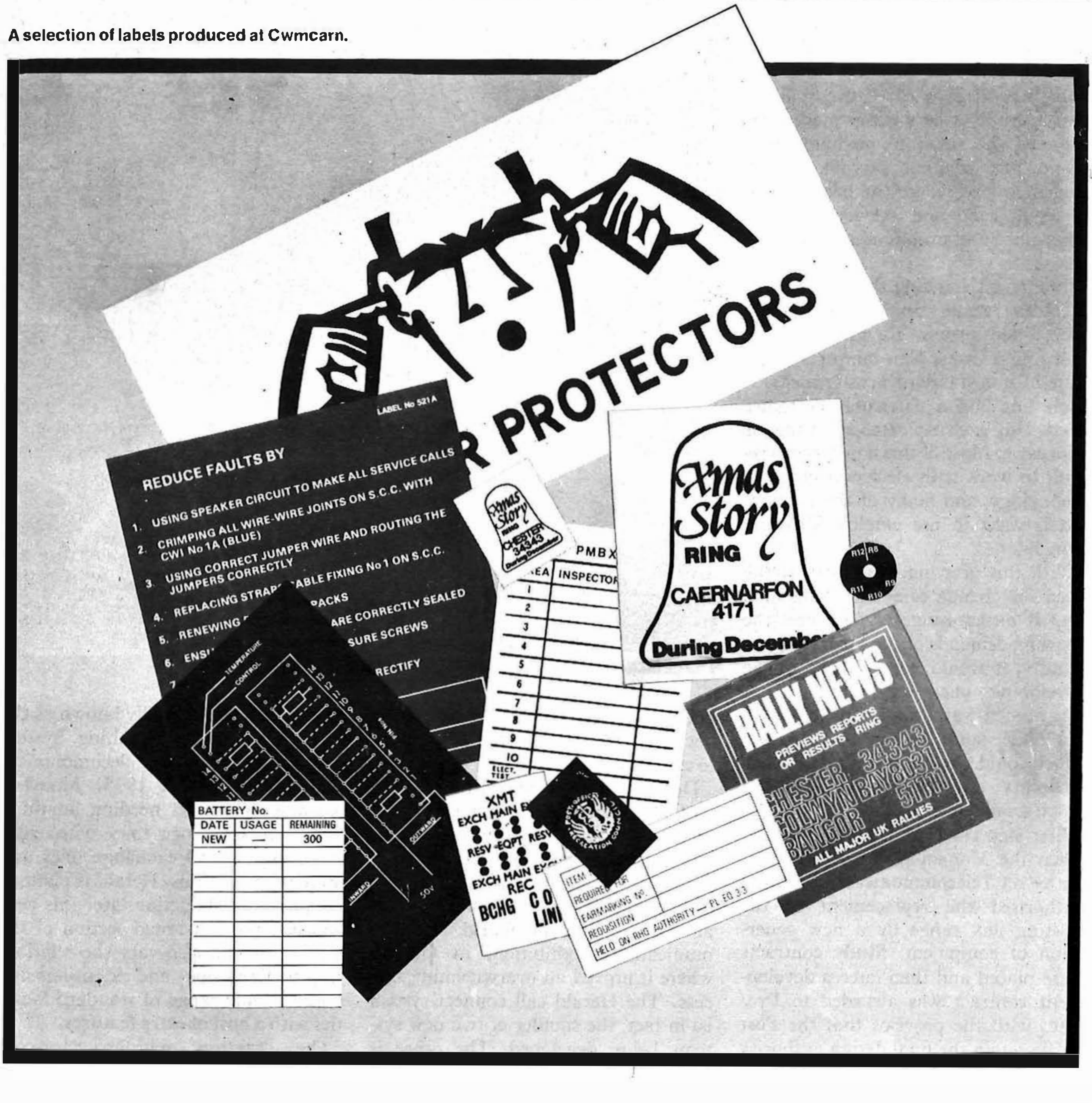
A selection of labels produced at Cwmcarn.



Heralding a new era

N Hall and F E Wright

The Herald call connect system, designed to meet the needs of the small business customer, is planned for public introduction later this year.

SINCE the early 1970s, senior managers and marketing executives in the Telecommunications Business, have been acutely aware that the existing range of business customer apparatus is in need of eventual replacement. Nowhere is this more valid than in the small to medium automatic and manual private branch exchange field where the basic design of equipment and services offered, have not substantially changed in 20 years.

Equipment standing this test of time includes small and medium-sized PABXS and PMBXS, Keymasters, Key and Lamp Units, plan mixtures and a host of non-standard arrangements – each fulfilling a particular customer need. But such an extensive range is expensive. Most of this equipment was built to work with electro-mechanical technology, and many of the medium sized PABXS in use employ Strowger principles.

With this growing awareness of the need for change came the realisation that if a new range was to meet the growing demands of the business community, it would have to rely on the developing micro-technology. What was needed was a system which could not only stand the test of time, but which could also provide much greater flexibility and modularity inside a much smaller package.

First step came in September 1973, when the Managing Director's Committee on Telecommunications (MDCT) authorised the replacement of the existing PBX range by a new generation of equipment. Study contracts were placed and then later a development contract was awarded to Pye/TMC, with the provisos that the Post Office retain the final design authority and reserve the right to modify it as necessary. Pye/TMC would be allowed to export the system.

The de luxe version of Herald in a typical open plan office.

The first production contract valued at £10 million for the Small Business System – later to be given the marketing name Herald – was placed in January last year, and the first public appearance of a working system was at TELECOM 79, the World Telecommunications Exhibition, in Geneva where it proved an overwhelming success. The Herald call connect system is, in fact, the smaller of two new systems being developed. The other is Monarch 120, originally known as the Customer Digital Switching System No 1 (CDSS1), (See Telecommunications Journal Spring 1978). Aimed at business customers needing anything from two exchange lines with eight extensions, to 10 exchange lines and up to 36 extensions, Herald is planned for public introduction later this year and can serve a broad section of the market. It can also vary the relationship between lines and extensions and offers a wide range of standard facilities with a host of extra features.

The desk-top microprocessor-controlled key system compares well with the existing range of small systems such as keymasters, key and lamp units, and small PBXs.

Standard features include push button intercom, direct button or dial 9 access to exchange lines, visual indications of line status, enquiries and call transfer hold, internal conference and discriminatory call barring. Herald can also be adapted to incorporate repertory dialling, repeat last number, a headset, an integral loudspeaker and interruption of an established internal call.

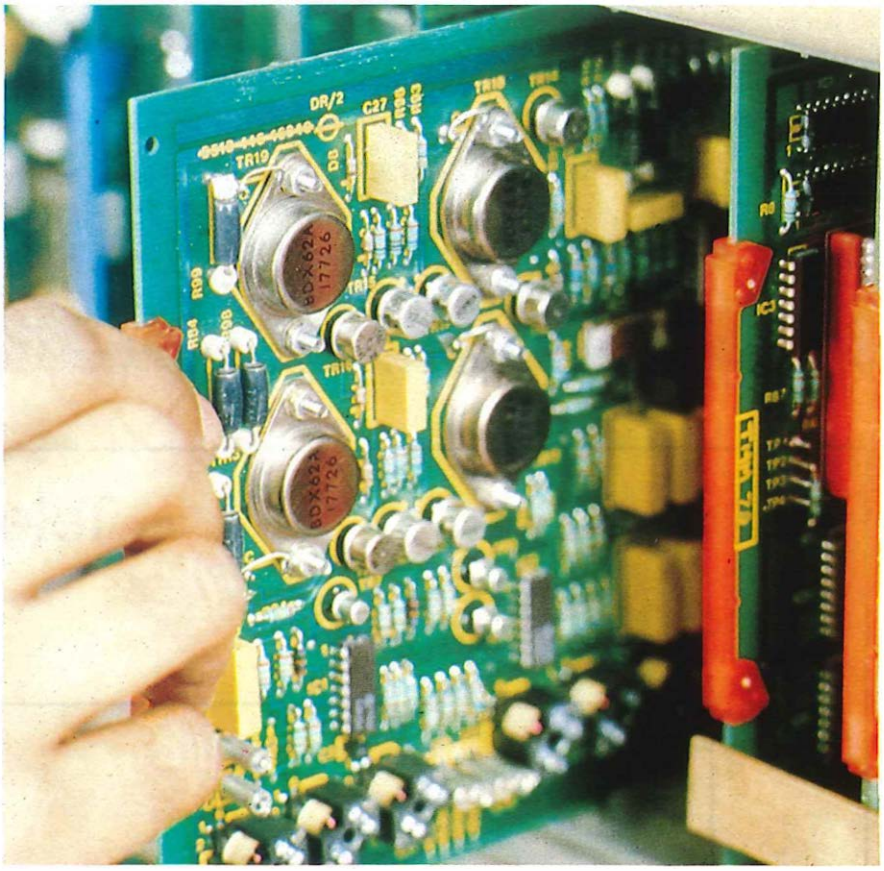
Thanks to micro-technology, all of this can be built into a central unit not much larger than an attaché case. Attractively styled to stand on a desk or cabinet, the unit obviates the need for dedicated accommodation previously required to house the large cabinets associated with the medium-sized PABXs. The unit houses the printed circuit boards (PCBs) containing the common control circuitry and the integral power supply, and has space for up to five more line or terminal PCBs.

Each line PCB caters for either two exchange lines or private circuits; and each terminal PCB for up to four terminals. The basic unit, therefore, caters for a system up to four exchange lines and 12 extensions. There is however an extension unit, the same external size as the control unit, which fits below and can increase the system's capacity so that it can take 10 exchange lines and a total of 36 extensions.

The Herald call connect system has two types of terminals – a de-luxe version and a standard version. Both come in either two-tone brown, or light grey with a grey, brown or orange fascia. The attractively-styled terminals contain a 16–button keypad, 10 of which are for making exchange line calls, keyed intercom calls and some repertory calling. Four are used for hold, recall, transmit and programme facilities while the remaining two buttons provide access to a repertory dialling facility. Two further push-buttons below the keypad and the remaining six on the smaller standard terminal (24 on the larger de-luxe terminal) can be programmed to perform a variety of functions.

A light-emitting diode and its associated label provide a visual indication with each function button, and there is even a switchable tone-sounder incorporated with each instrument. Another useful feature is that both dial and keypad telephones can be used with the system at stations where only limited facilities are required by the user.

With much customer interest already shown as a result of Herald's appearance at both TELECOM 79 and the International Business exhibition at Birmingham its future is secured. The Business can thus look forward to a winning product for the 1980s and the years beyond.



One of the plug-in units which make up the Herald control unit.

The Herald Standard.

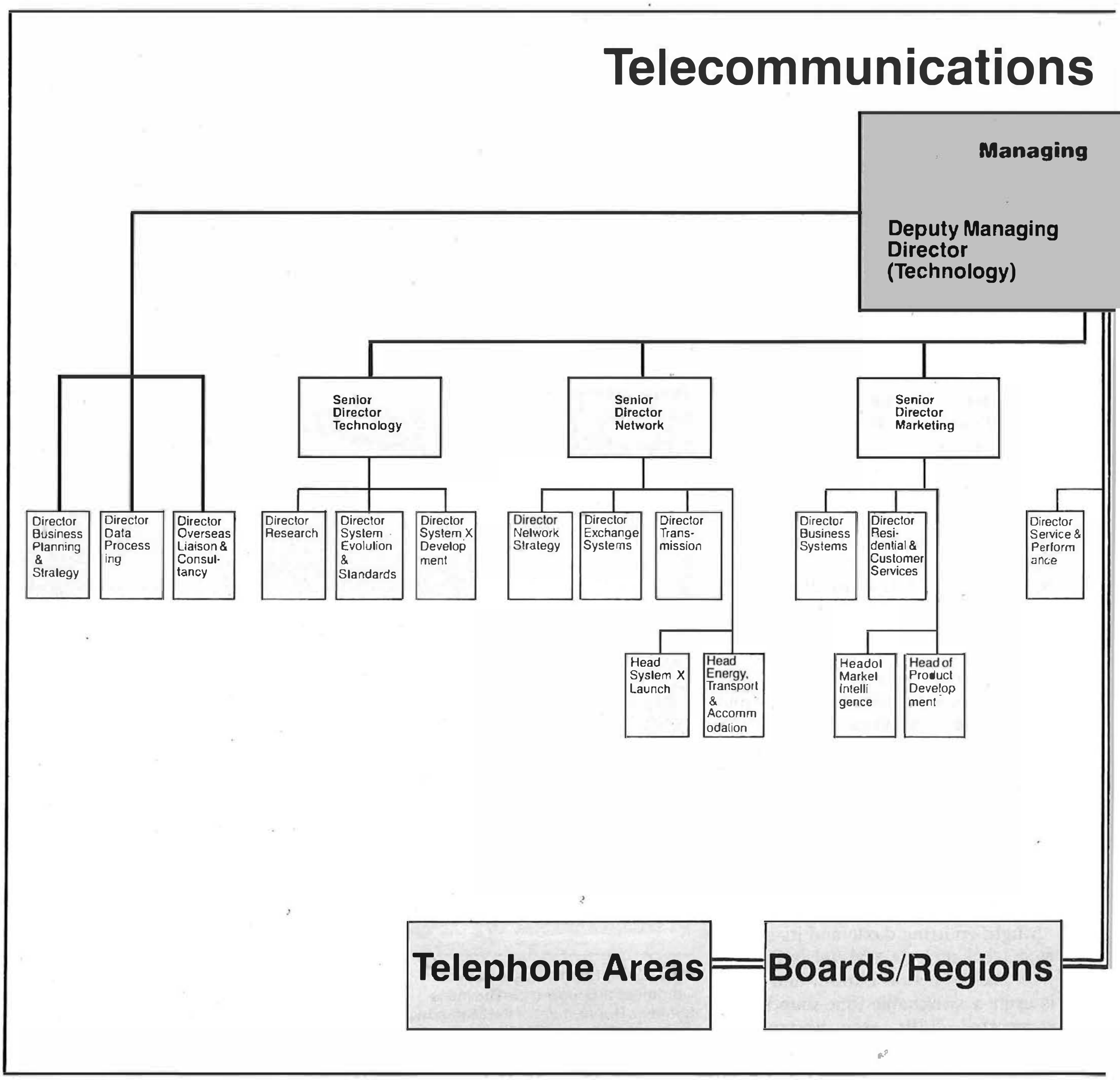
Mr N. Hall is Head of the Herald Commercial Group in the Business Systems Department of the Marketing Executive, part of the Monarch/Herald Launch Task Force.

Mr F. E. Wright is also a member of the Launch Task Force and heads the Monarch/Herald Engineering Group.

The new-look THQ

C L Crump

After 18 months of planning and gradual implementation, the restructuring of Telecommunications Headquarters has now been completed.



THE PHILOSOPHY of the old THQ was based on specialisms such as development, service, planning, personnel and so on. The main disadvantage was that when any new task or project arose, many different people became involved which led, inevitably, to much discussion and consultation. There were few people who could understand, manage and take over responsibility for carrying out a complete task. This led to delay in reaching decisions and implementing them. Results and progress were therefore not being matched by the effort put in.

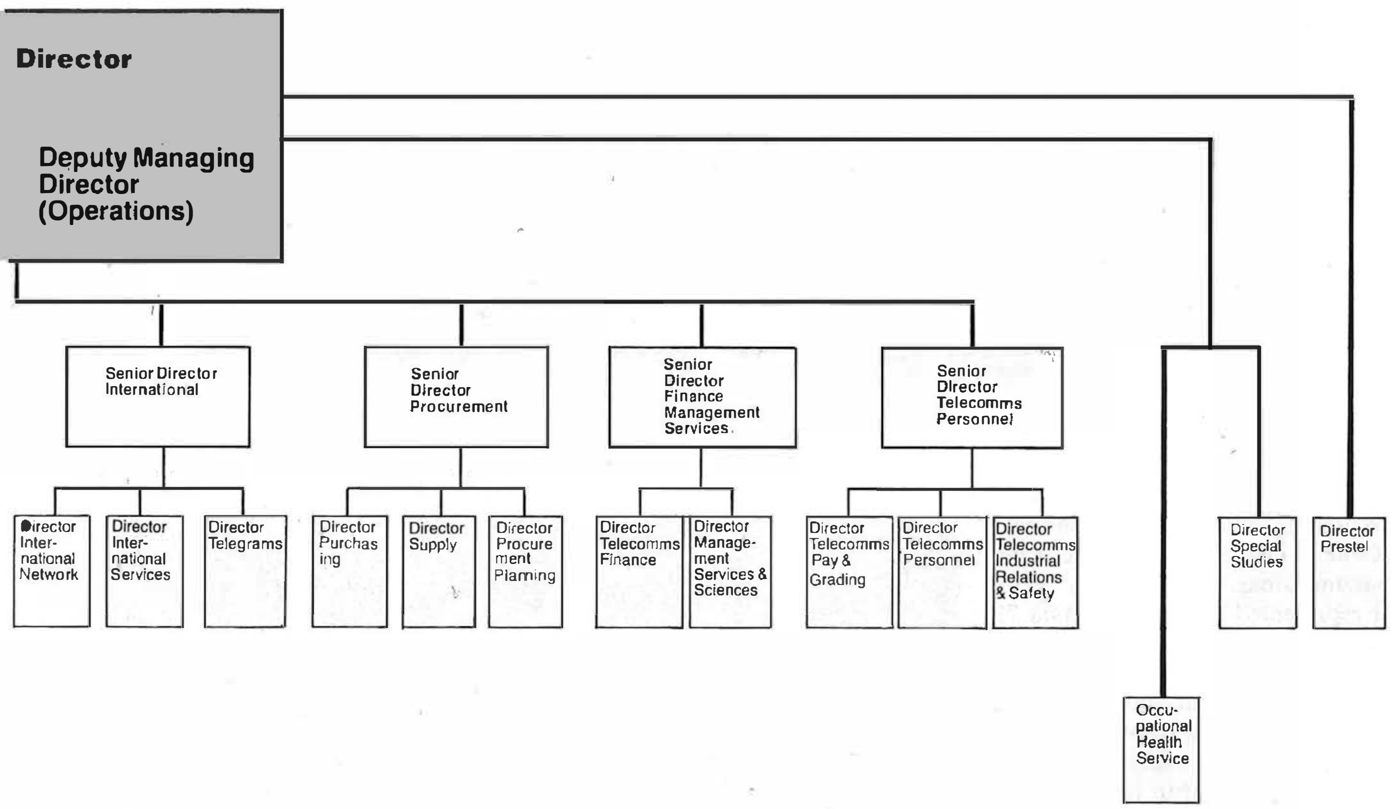
In designing the new organisation, the first step was to identify the main THQ tasks. The chart below shows the main structure based on them. At top level, four areas have been defined. First there is the need to research into, identify and exploit major new openings in technology. This becomes the job of the Technology Executive. Then there is the need to provide a national telecommunications network using the best technology and skills to ensure the job is done better than by any competitor. This becomes the responsibility of the Network Executive.

Next it is vital to exploit the potential of all forms of telecommunications for the customer; to sell the services the network has to offer, and to hold a strong market position as competition develops. This is the job of the Marketing Executive. Finally there is THQ's role in the field operations of the Business – a task for the Deputy Managing Director concerned with Operations, and for the new Service and Performance Department.

This logic is carried through into the new structure. Within the new Executives, each Director and his Department and each Division and its Head have their own roles clearly related to that of the Executive. These tasks are formed along the natural boundaries of the work, which, of course, differs between the Executives. The principle, however, is the same.

The new Executives will have the responsibility and the authority for carrying out their main tasks. It will be up to the Senior Directors and Directors to make their own decisions on matters within their scope. Their staff who are dealing with the specialist

Headquarters Organisation



Main organisation at December 1979

issues will advise them and the senior managers will, where there is a conflict of priorities and interests, decide for themselves what are the most important factors, take the decisions needed and ensure that these are implemented effectively and promptly on all occasions.

The three new Executives and the operations grouping lead by the Deputy Managing Director, Telecommunications (DMDT (O)) including Service and Performance Department are central to the new organisation. The Deputy Managing Director with responsibility for Technology (DMDT(T)) has a special personal responsibility for technological matters within the Business, and the Director, Data Processing Executive (DDPE) reports to him.

There are two staff departments which will report directly to the Managing Director and his two Deputies – Business Planning and Strategy (BPSD) and Overseas Liaison and Consultancy (OLCD). BPSD is responsible for the Business Plan which sets the overall strategy. The role of OLCD is to be responsible, jointly with industry, for the ever-increasing overseas liaison and consultancy work. (See page 15.)

At the same time, the new International Executive (IE), which includes the old ETE, the Procurement Executive (PE) and the Data Processing Executive (DPE) have been structured to ensure that they can operate well with the new THQ.

The Personnel Department and the Finance and Management Services Department will continue to be managed as functional units under their Senior Directors because much of their work must span the whole business. For example, Telecommunications Finance Department (TFD) will continue to be responsible for producing the financial accounts for the Business as a whole and Telecommunications Pay and Grading Department (TPGD) will continue to deal with all matters about pay and conditions of service for all staff.

The new Executives will have considerable independence and, because their responsibilities and aims will be different and more clearly defined, they are expected to develop in their own way, taking advantage of their particular strengths and specialisms. Senior Directors and Directors will be responsible for results produced by their Executives and for the underlying decisions taken which lead to them.

The new THQ is designed to meet the challenges of the 1980s and the new decade should bring even more changes than occurred in the 1970s. Technology is changing rapidly, presenting exciting opportunities for launching new services and facilities, and continued expansion. But the Government's intention to modify the scope and reduce the protection of the monopoly will mean that the Business has to face the realities of competition in ways that it never has had to do before. It must not only provide the services and facilities that customers demand and deserve but do so at prices and to a quality that match anything that any other supplier or operator may offer.

The launching of the new British Telecommunications authority, independent of the old Post Office in which the Business has its roots, should further strengthen the role and organisation of THQ.

Miss C. L. Crump is Director of Special Studies at THQ and had been working on the reorganisation programme.

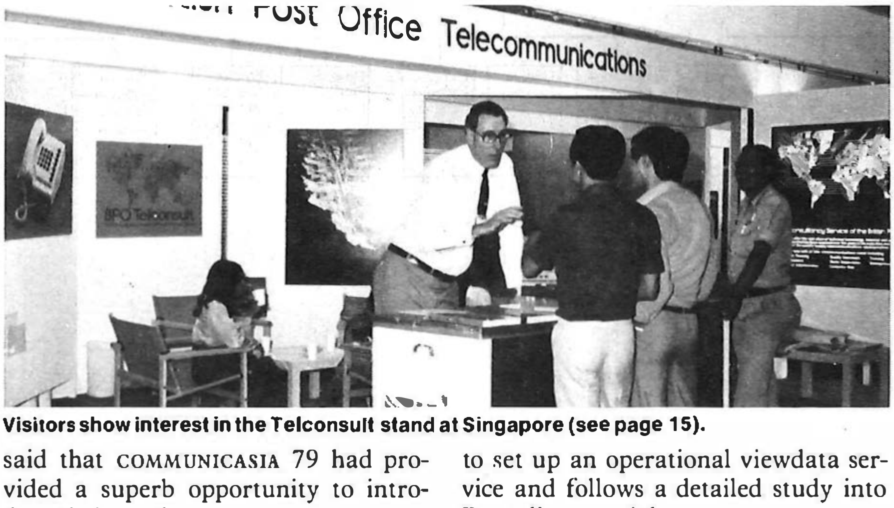
PO Telecommunications Journal, Winter 1979/80

Singapore success

FOLLOWING its highly successful presence at TELECOM 79, the World Telecommunications Exhibition held in Geneva last September, the Telecommunications Business was again well represented at COMMUNICASIA 79 in Singapore.

As well as promoting Britain as a focal point for world telecommunications, the aim was to help Asian countries modernise their existing networks. Prominent in the shop window were Prestel, leased circuits, Radiopaging, Alarms by Carrier and, of course, System X, the all British digital telecommunications system of the future.

Mr Frank Thomas, Senior Director, Network Executive and leader of the team in Singapore, was pleased that Britain proved it could contribute to telecommunications progress in south east Asia. And Mr John Sharpley, Managing Director, British Telecommunications Systems – the company set up to promote and sell System X – said that COMMUNICASIA 79 had provided a superb opportunity to introduce their product.



Visitors show interest in the Telconsult stand at Singapore (see page 15).

During the first day of the show it was announced by Mr Michael Ford, Deputy Director, Prestel that a contract for the purchase of Prestel software had just been signed by the Hong Kong telephone administration. The advanced computer programs will allow the colony's telephone company to set up an operational viewdata service and follows a detailed study into Prestel's potential.

The Telecommunications Business now hopes that Prestel will contribute to a series of compatible viewdata services in the Asian and Pacific Ocean areas to aid economic development.

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A world of opportunities

J F Boag

MANY developing countries have come to realise that an efficient telecommunications system is vital for economic growth. Some have already begun major expansion programmes of their existing networks, and have found a need for staff skilled in planning, commissioning and maintaining the sophisticated equipment so essential in modern communications.

Traditionally, the Post Office has always offered help and advice to overseas administrations, but last year, during the World Telecommunications Exhibition – TELECOM 79 – held in Geneva during September, it announced the launch of a new formal service to co-ordinate and promote this type of work.

Known as Telconsult, it has grown from its humble beginnings of four years ago into an organisation well equipped to offer advice on the latest technologies associated with intergrated digital switching and transmission networks. As part of the Telecommunications Headquarters organisation, it can draw on many years of experience in planning and operating a variety of digital transmission systems and stored program control exchanges.

Since 1975, Post Office consultancy work has in fact earned some £20 million in fees negotiated with telecommunications administrations from the Middle East, North Africa, and South and Central America. Work ranges from building open-wire carrier routes, to work method studies and local line planning. By the end of 1979, more than 100 Post Office engineers were in every continent, bringing their expertise to bear on telecommunication problems in a host of different lands.

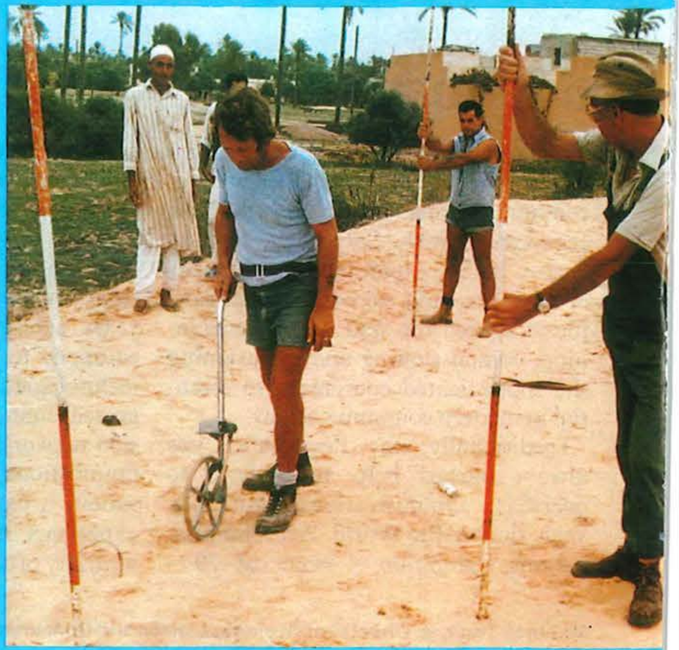
And the new service's back-up is formidable. The Post Office has the largest telephone administration in Europe and the third largest in the world. There are more than 3,500 research and development staff for example, and from this storehouse of experience and knowledge, the Post Office is clearly in an excellent position to help other administrations.

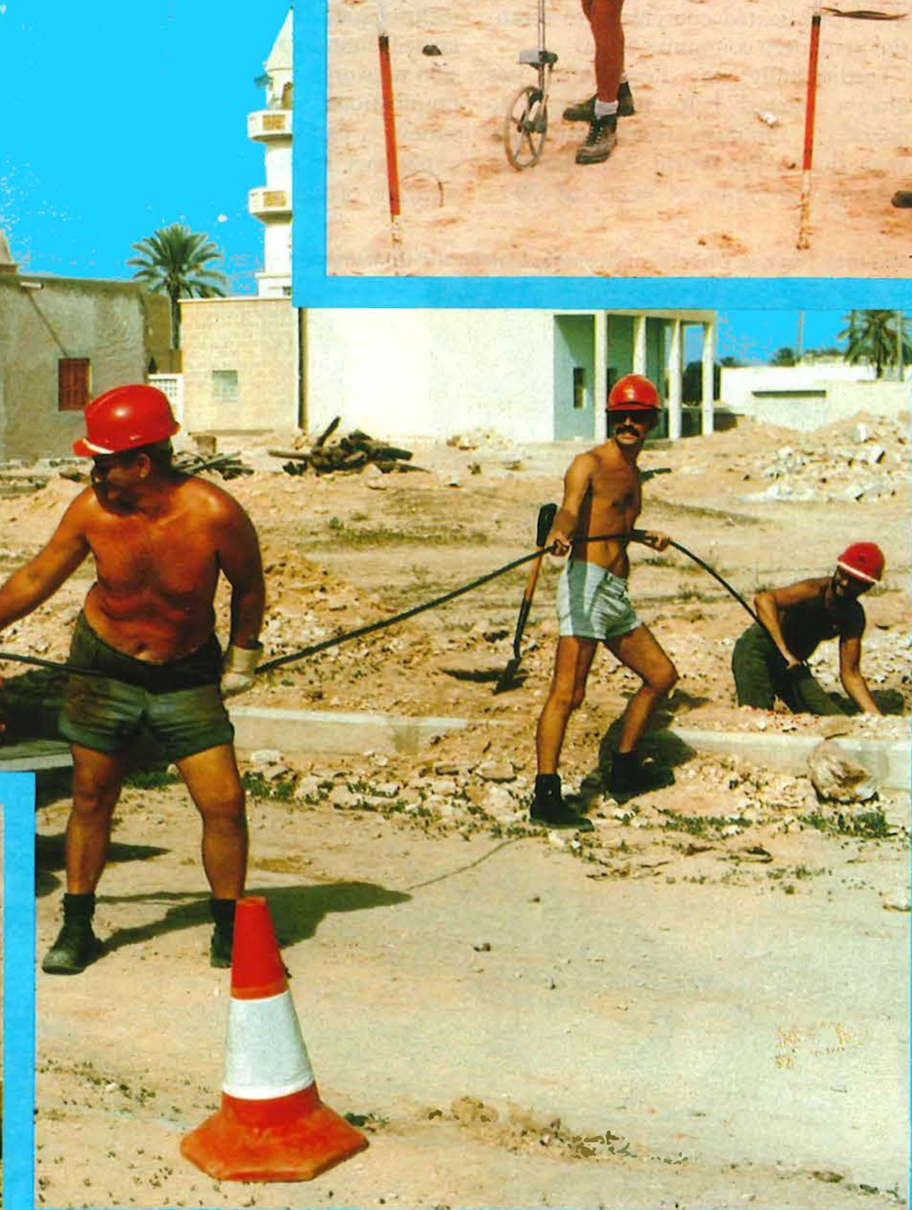
BPO Telconsult is headed by a

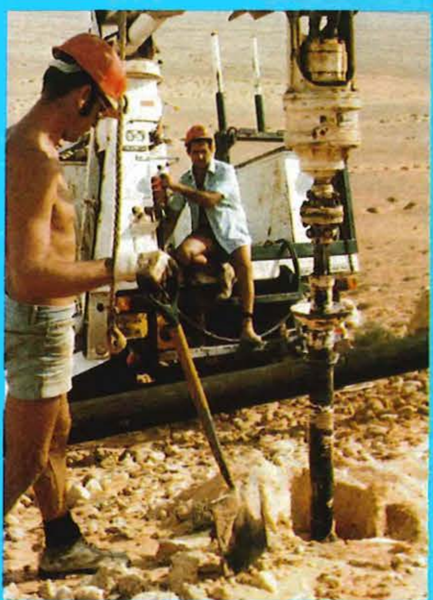
Mr Frank Thomas, Director of Overseas Liaison and Consultancy, gives advice to a representative from an overseas administration.

... at work in Libya

One of Telconsult's biggest contracts so far has been to plan, specify and construct an extensive new telephone cable network in Libya. These pictures show Post Office staff in various aspects of the work involved.



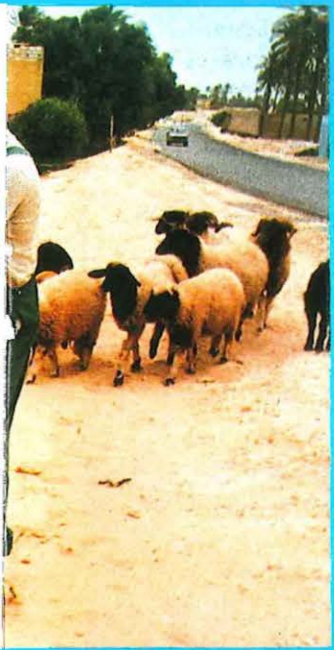


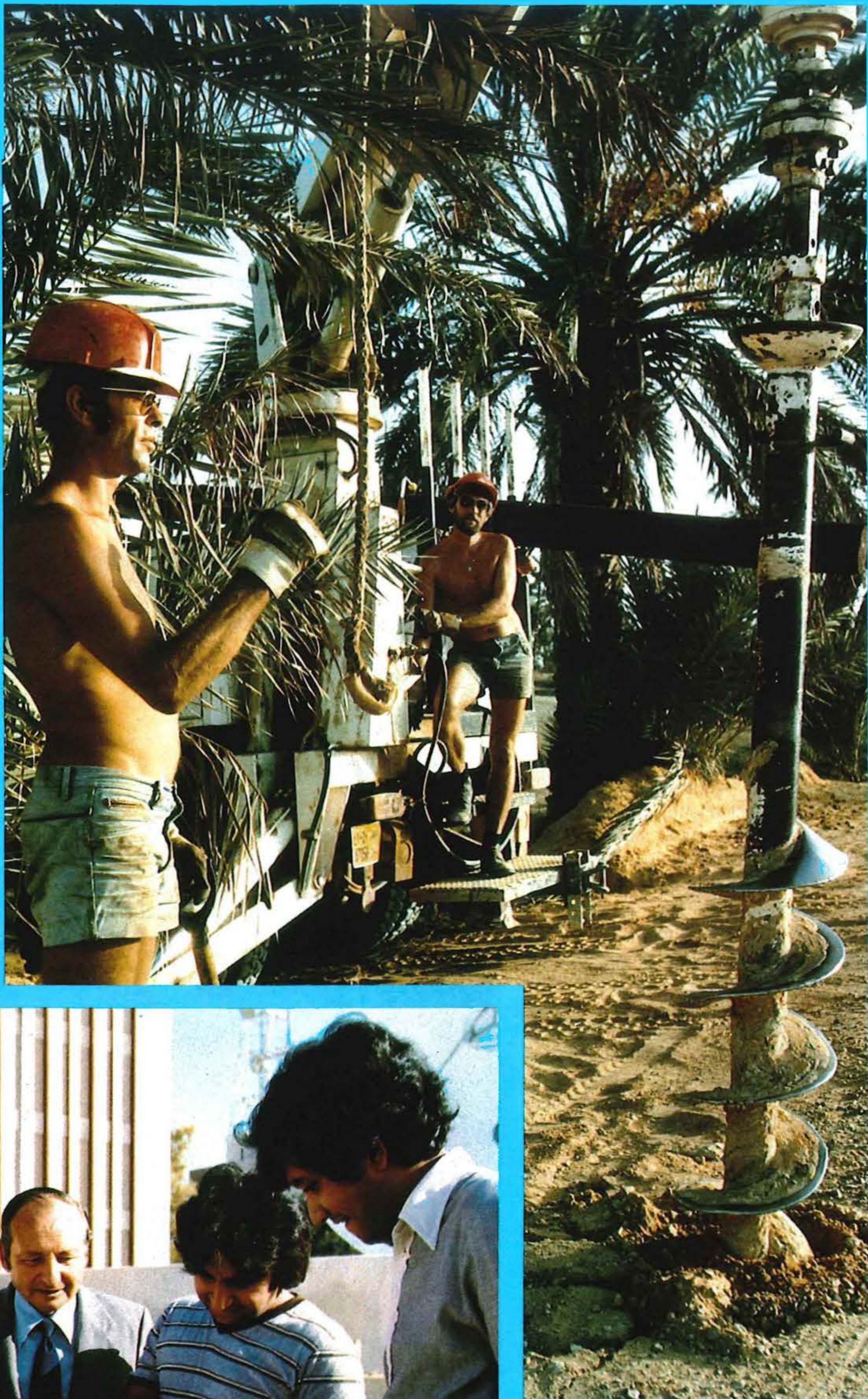


Top: Before any construction work can begin route surveying has to be carefully undertaken.

Above: Laying underground cable at the edge of the desert provee hot work for this team.

Left: With temperatures well over 100 degrees F, drilling in the desert is very demanding work.





Above: Beneath the Libyan sand are layers of rock which provide a severe test for the drilling equipment used by Post Office staff boring holes for telephone poles.

Left: Post Office consultants Roy Hollands and Bob Marchant from IE and Teddy Fudge from THQ discuss Libya's new international switching centre at Tripoli with local engineers.

general manager reporting to the Director of a new Telecommunications Headquarters Department – Overseas Liaison and Consultancy. Responsible to the general manager, are two divisional managers who each cover a particular area of the world – one for Africa and Europe and the other for the Americas. A third divisional manager for the Far East will soon be appointed. These managers negotiate consultancy contracts and are supported by a small staff of experts who ensure that agreed conditions, timetables and budgets are carried out. When fully operational, the consultancy unit will employ a total of about 25 staff.

The Post Office is up against strong competition and members of the consultancy team must have a high degree of negotiating skill. They aim to achieve agreements which will allow assignments to be carried out effectively and efficiently – and at fees which will ensure an adequate return. As well as technical factors, account is taken of local conditions – physical and economic. All this means that a great deal of technical and business research has to be carried out before negotiations can even begin.

Against this background, it can be seen that a Telconsult negotiator has to be a highly-competent businessman. The work demands a high degree of personal effort and stamina, and perhaps most importantly, an inherent desire to succeed. And as far as rewards are concerned, to see Britain lead in such a highly-competitive field, gives perhaps the greatest satisfaction.

But there is another side to the story. Telconsult staff quickly became aware of British products and British attitudes – and what is wrong with them. Once a problem has been established, it is part of the consultancy service's role to try to correct any weaknesses that may exist.

Although BPO Telconsult has a strong nucleus of permanent staff, much of the work is left to the experts drawn from THQ who are seconded on a temporary basis from Regions and Areas. Already, nearly 300 have served BPO Telconsult for periods varying from just a few weeks to several years, depending on the nature of the task. Almost every skill is needed – whether as driver, motor mechanic, pole tester or explosive expert – and staff have to work under difficult circumstances, often in unfamiliar weather conditions. Imagine for example, erecting pole routes in a hot desert country which has a total ban on beer!

But all Telconsult experts take a pride in their work and are willing to demonstrate in a practical way that British really is best. The consistently high standard of workmanship and knowledge is frequently commented on by clients.

It is a fact that throughout telecommunications history, telephone administrations have been willing to co-operate with one another. Post Office Telecommunications, through its vast resources and long experience, is playing an increasing part in sharing its know-how with its fellow administrations through Telconsult.

In the next two years, the number of assignments is expected to double as the service becomes more widely known throughout the world. The state of the telecommunications art is rapidly changing as digital techniques are applied to all forms of telecommunications services and BPO Telconsult is determined to maintain the lead and reputation it has built.

Mr J. F. Boag is General Manager of BPO Telconsult.

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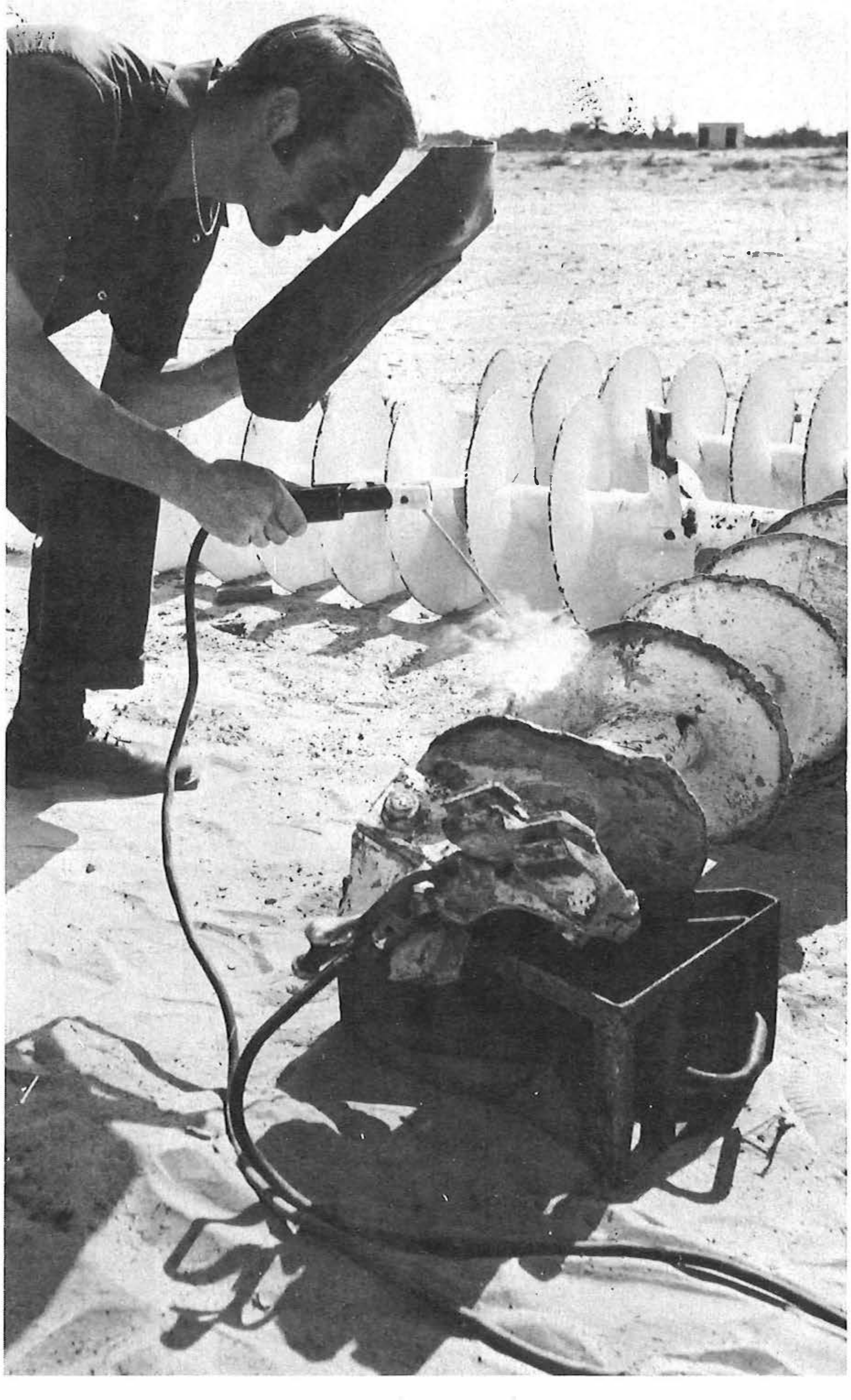
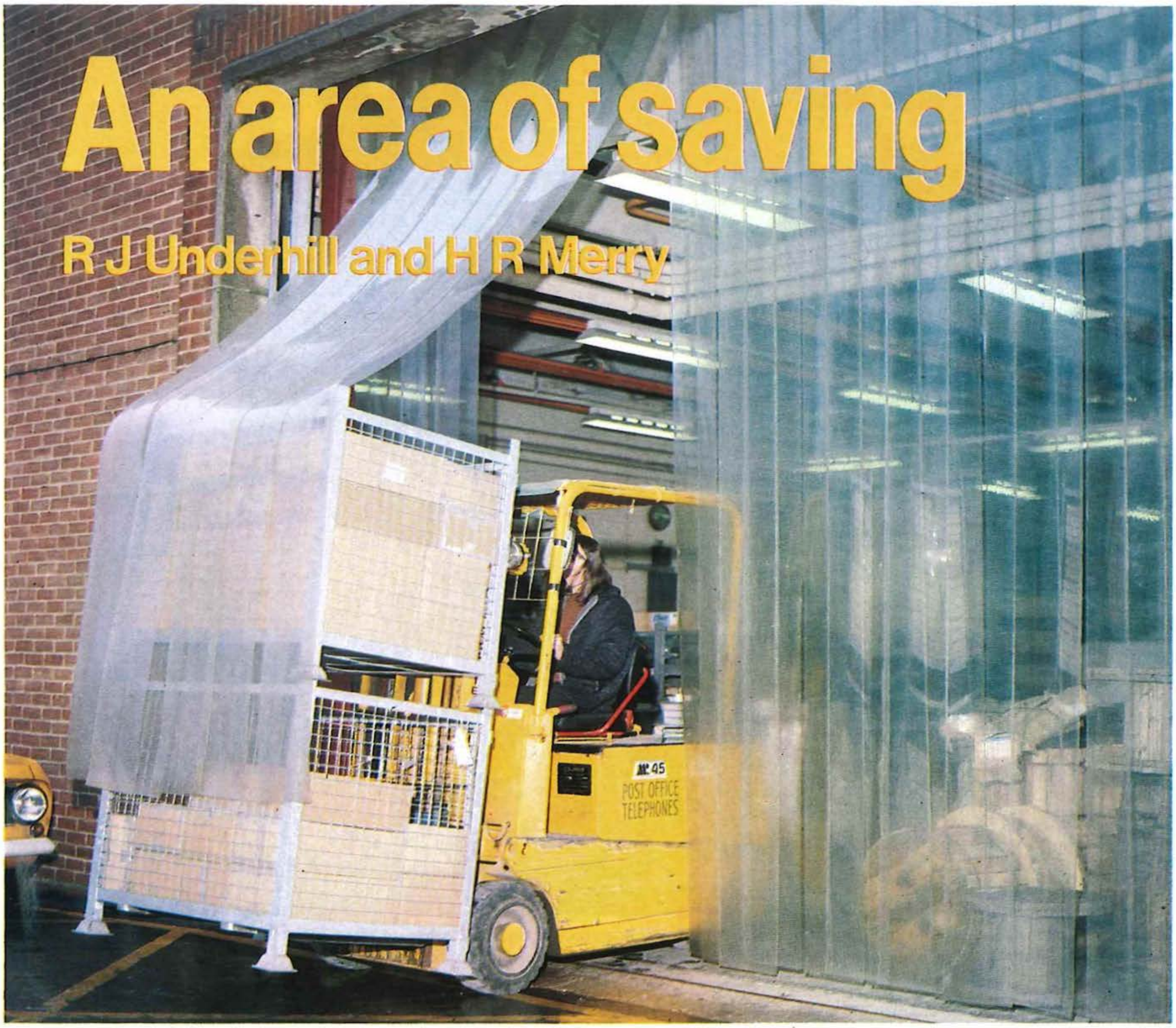
Repair work is carried out on a damaged auger from one of the pole erection units engaged in drilling work.



An area of saving

R J Underhill and H R Merry



Storeman Kieran Collins manoeuvres a fork lift truck through plastic strip curtains which have helped raise the temperature in the stores at Reading West TEC by more than two degrees.

Three years ago Reading Telephone Area became the first in the country to appoint a fuel economy officer to deal specifically with energy conservation. Since then, progress has been encouraging.

THE INTERNATIONAL effort to save energy is based on one simple fact – world resources of gas and oil are fast running out. And logically, as they become scarcer, their price will continue to increase.

The only viable alternative source at present is nuclear energy. But before this can be made universally available, another 100 years of development work is needed. Predictions are that oil and gas will run out in 50 years if the current increase in consumption is maintained. This means that the world can expect to rely on coal only for 50 years before efficient nuclear energy becomes readily available.

Thus it becomes clear why the Telecommunications Business is anxious to conserve fuel. Obviously, the Business is a major fuel consumer. Electricity is used to operate its services and gas, oil and electricity is used to heat and light offices, telephone exchanges, and a host of other buildings.

Fuel can, of course, only be saved where it is being used – and the point where most fuel is consumed is at Area level. During 1978/79, Reading Telephone Area used 1,800,000 litres of central heating oil, 15,000,000 kilowatt hours of electricity and 140,000 therms of gas. This cost the Area £465,000 for heating, lighting and providing telecommunication services – and that does not include the Area's consumption of 240,800 gallons of petrol and diesel oil for the same year.

Reading made the first tentative steps to organise fuel economy and conservation in 1976 with the appointment of a Fuel Economy Officer (FEO). Tentative, because duties were at first only a part load and there was no expertise or experience on which to base decisions.

But as the FEO gained experience, it became clear that if the job was to be done successfully fuel saving would demand more than part-time attention. In 1979, the FEO post was

Energy 'troubleshooter' Trevor Woodyer checks motorised diverting valves used to heat a new apparatus room at Ascot Exchange using testers he designed and built himself.

A rubber dustbin lid with a hole cut in it and placed over a boiler flue stack at Henley Exchange proved that the flue diameter was too large – thus leading to inefficient boiler firing.

upgraded to Executive Engineer level (EE), supported by an Assistant Executive Engineer (AEE), who became Fuel Economy Officer (Accommodation) FEO (A). Responsibility for other aspects of energy savings, especially fuel economy, were given to the Area Transport Officer.

There are four main objectives of the fuel economy duty on accommodation: to monitor energy consumptions; to introduce energy-saving measures; to inspect and test all central heating plant to bring it to peak efficiency, and through publicity, to involve all staff in fuel conservation and economy.

After meetings with staff, staff associations and Area Board members, it was decided to set up an area fuel economy working party – whose meetings are attended by the Regional FEO, and where a valuable forum to exchange ideas and to establish liaison links is provided.

But before all this, a monitoring scheme had been introduced in early 1977. This had a two-fold purpose. It would not only show where fuel was being used and provide an early warning of a central heating plant malfunction but by comparing consumptions, would also show where energy inefficiencies existed.

The situation now is that the last working day of each month, staff in charge of the 98 buildings in the Reading Area must telephone the FEO (A) with readings of gas and electricity meters together with central heating oil holdings and receipts. These are translated into a consumption index for each building using a calculation which involves climatic conditions and heated floor area. If the value differs from normal for a building, an investigation is needed. Already there have been several instances of the system proving itself.

The first major step undertaken was to install optimum start controls – or optimisers – at six sites in the Area. The optimiser senses both external and internal temperatures, then calculates when it should switch on the heating system to have the building up to temperature by the time staff arrive for work. At night and at weekends, the system can be switched off so saving the energy previously used by the 'night set back' system (NSB).

The three automatic telephone exchanges showed savings of up to 30 per cent but the three telecommunications engineering centres were less satisfactory mainly because motor transport workshops work longer hours.

Next, with Area co-operation, the Regional Fuel Economy Group installed a microprocessor-based computer to control ventilation plant at Reading Main Switching Centre (MSC), the biggest energy consumer in South East Telecommunications Region. The system was installed to program the ventilation units throughout the site to reduce the peak demand of electricity. Used mainly as an economy measure rather than conservation (although it conserves too) the cost of the installation (£12,000) was recovered in less than 12 months.

A second and yet more sophisticated system will shortly be installed at Slough to control ventilation at larger sites in the eastern half of the Reading Area. The sites will be connected to Slough by land lines and will eventually control heating and alarms.

Fuel economy and conservation is playing an increasing part at Reading. More optimisers are being installed at oil and gas fired boiler sites and a similar device called the ITT Thermo Timer which does the same thing for underfloor and night storage electrically-heated buildings is being tried out in nine exchanges. Again first results show considerable savings.

Last summer saw the introduction of perhaps the most important exercise so far, a critical examination of all heating and lighting systems in the Area. Already, some interesting discoveries have been made. A strip plastic curtain across the large sliding doors of a busy store for instance, has prevented large heat losses when the fork lift truck is working in and out. This has resulted in greater comfort for stores staff.

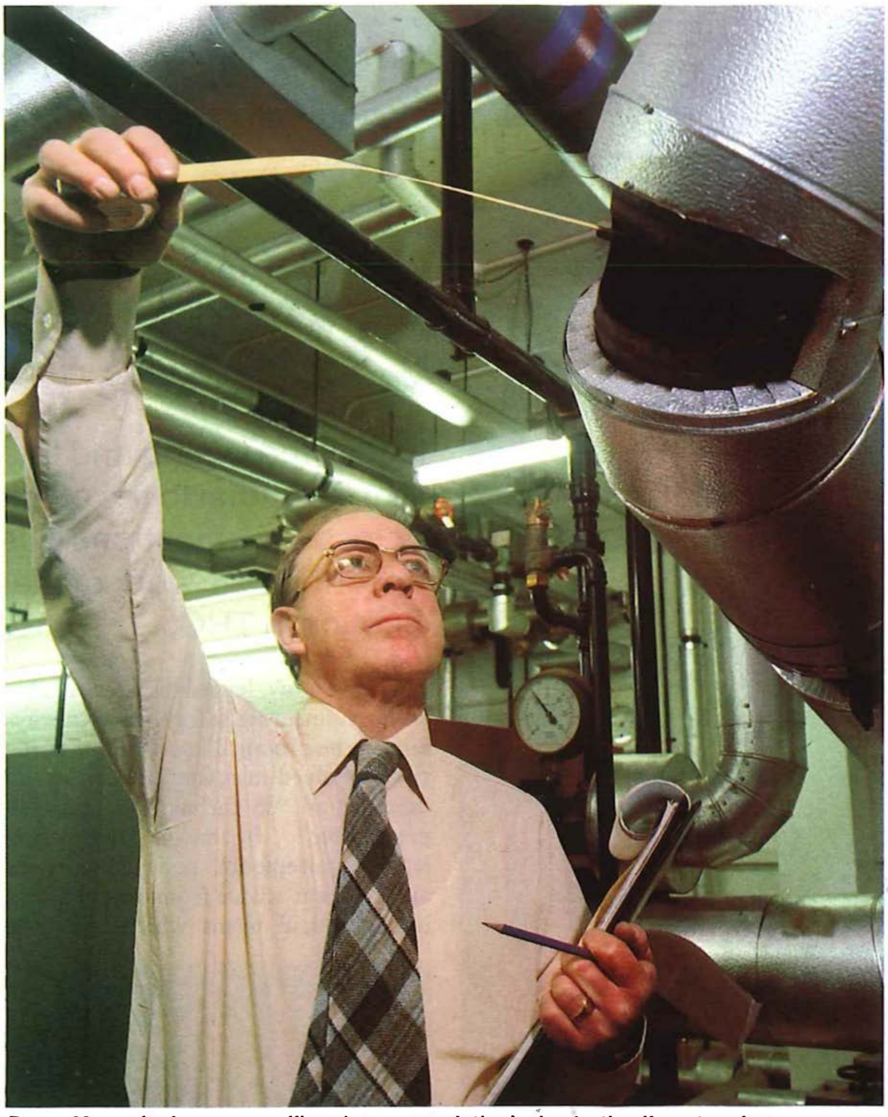
Complaints of over or underheating were investigated using temperature recorders and in most cases irregularities have been corrected, simply by adjusting controls. Maladjusted controls which result in the excessive use of energy are in fact often the result of attempts to correct the effect of a faulty piece of equipment. And although before the fuel crisis of the mid-1970s, it was often cheaper to burn more fuel than to install expensive piping and control equipment, this is no longer the case.

No-one would doubt that fuel economy and conservation has important consequences for everybody, whether at work or at home, and to this end publicity is vital. In Reading, staff receive regular circulars, posters and stickers, see films and exhibitions while managers are invited to seminars. The Department of Energy help by providing free publicity material, and films may be borrowed free from a number of sources.

Fuel economy and conservation in Reading Area is fast becoming a way of life, a style which everyone will, sooner or later, have to accept as a matter of course.

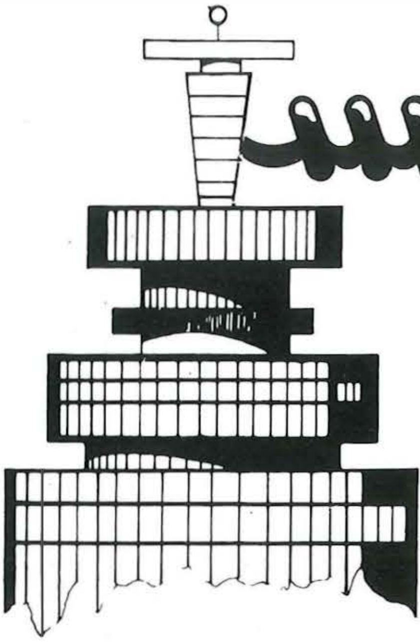
Mr R. J. Underhill is an Executive Engineer in Reading Telephone Area and is local fuel economy officer.

Mr H. R. Merry is an Assistant Executive Engineer in the same Area and is primarily responsible for fuel economy in accommodation.



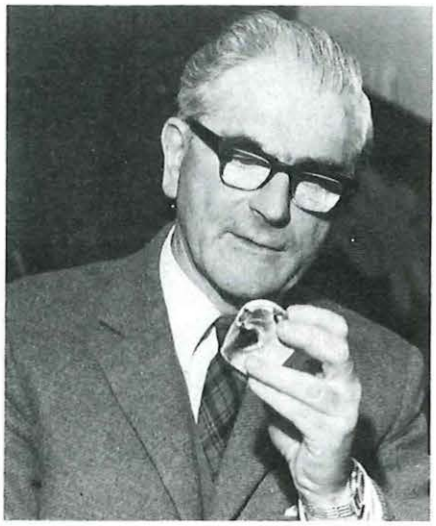
Roger Merry, fuel economy officer (accommodation), checks the diameter of an undersized outlet/flue on the main boiler at Ascot Exchange. The undersizing caused seals leading from the boiler to the flue to suffer pressure damage.

Fuel economy officer Roger Underhill and Ascot Acting Chief Supervisor Mrs Lillian Farmer check the temperature in the switchroom. The thermograph can also be used to monitor the effect of any economy measures.




Safety first

In this, the twelfth and final look at some of the many jobs essential to the efficient operation of the Telecommunications Business, Alastair Campbell describes the work of the Engineering Safety Section in THQ.



Engineering Safety Officer, Alastair Campbell examines a heat-damaged electrical plug used daily at a telephone exchange.

SIMPLE KNOTS, prototype System X racks, Polychlorinated Bi-Phenyls, a film set and a couple of technicians struggling to clear filters while almost up to their chest in freezing river water, do not at first glance seem to have much in common. A closer study however, reveals that all are matters which recently occupied the attention of the Engineering Safety Section at THQ. It can truthfully be said that at one time or another a helping hand is extended to almost every branch of telecommunications engineering operational activity.

Our role is largely advisory and we may be broadly described as engineering safety consultants to the Telecommunications Business with an eye to plant and equipment design, work methods, instructions and training. We aim to engineer things to make them safe in spite of he who at times can prove a two-legged disaster area.

Our engineering safety advice always aims to be practical and to counter the risks involved in a way the law would describe as "so far as is reasonably practicable". It means translating legal requirements, policy, principles and relevant advice from other experts into practical terms which meet the situation concerned. In practice we too, have to turn to specialist advice – people like medical officers, hygienists, chemists, physicists, and solicitors.

Often, a telephone call or mail arriving can herald the start of a whole

Incorrect safety belt drill can result in injury or even death. Here a stunt man shows what can happen when things go wrong.

It's our business

new adventure. We may end up standing over the reactor at Dounreay Nuclear Power Station, find ourselves down ICI's salt mines in Cheshire, be on the spot at a serious accident, face a barrage of questions from an Area Safety Committee, contemplate the scene of a battery explosion, or perform contortions in a safety belt up a pole. Our job may take us wherever engineering plant, equipment or activities create new safety problems or resurrect old ones.

Scarcely a day passes for instance without some reference to asbestos. Despite the efforts of a joint staff/management working party and the latest comprehensive set of Telecommunications Instructions the subject remains emotive to many staff and the same is true of a number of other hazardous substances, often with unpronounceable names and usually referred to by cryptic initials.

Safety legislation is, surprisingly enough, another sphere where things tend to get out of perspective and raise issues which clog the safety machine. Some well-meaning managers for instance cite liabilities under the Health and Safety at Work Etc Act as a big stick to impress their legal responsibilities on staff. This is fine if it works but often it results in someone spending time in abortive efforts to shed these liabilities – or on the other hand in some well-meaning worriers throwing up a smoke screen of alleged risks, real and imaginary, in feverish attempts to discharge those liabilities.

We in Engineering Safety see new safety legislation as 'consultative documents' open for comment. Technical detail is more often than not based on the old Factories Law with which the legislators are familiar, and in Post Office circumstances, is sometimes a sledgehammer to crack a nut. For instance, recent legislative proposals for precautions when working with lead were quite unrealistic in telecommunications engineering work.

We have increasing contact with Health and Safety Executive Inspectors, not so much in their role of safety policemen at local level but more as backroom boys at Health and Safety Executive Headquarters. We have exchanged much information with them, for example, on a proposed Code of Practice for safety in battery charging, and we are able to draw freely on their advice in setting Post Office domestic standards for electrical workshops, for example where we want to be sure to be in step with the rest of the country and with legislative requirements.

A very progressive area of engineering safety activity has been in working with works study teams. Productivity procedures invariably have safety built-in, which gives the lie to the excuse that there is not time for safety measures in the face of demands for productivity. Obviously we also try to persuade plant and equipment designers to consider safety aspects from the outset, and with less and less prompting from us, relevant safety stipulations are being given their rightful place in working instructions and during technical training courses.

In short, staff are rapidly being deprived of the alibi of not knowing safety rules when a mishap occurs. But, human failings still loom large. We still have to rely on the wearing of personal protection equipment at least to prevent, or reduce the severity of, injuries and it is we who set the criteria for safety helmet standards, and for eyeshields, respirators, ear protectors, and so on.

An interesting and less usual activity with which we are involved is the safety film. An eight minute safety film involves something like two man/weeks for a safety engineer and we act as technical advisers for these films which means seeing that all staged accidents are carried out safely, that technical and safety procedures are correct and that plant, equipment and dress are appropriate.

What is probably our best-known effort is really a sideline – the Engineering Safety newspaper. This publication which is circulated free of charge, remains a popular plank in safety communications.

Quite simply our philosophy remains constant that 'there is a safe way to do every job' and who in this enlightened age can dispute that?

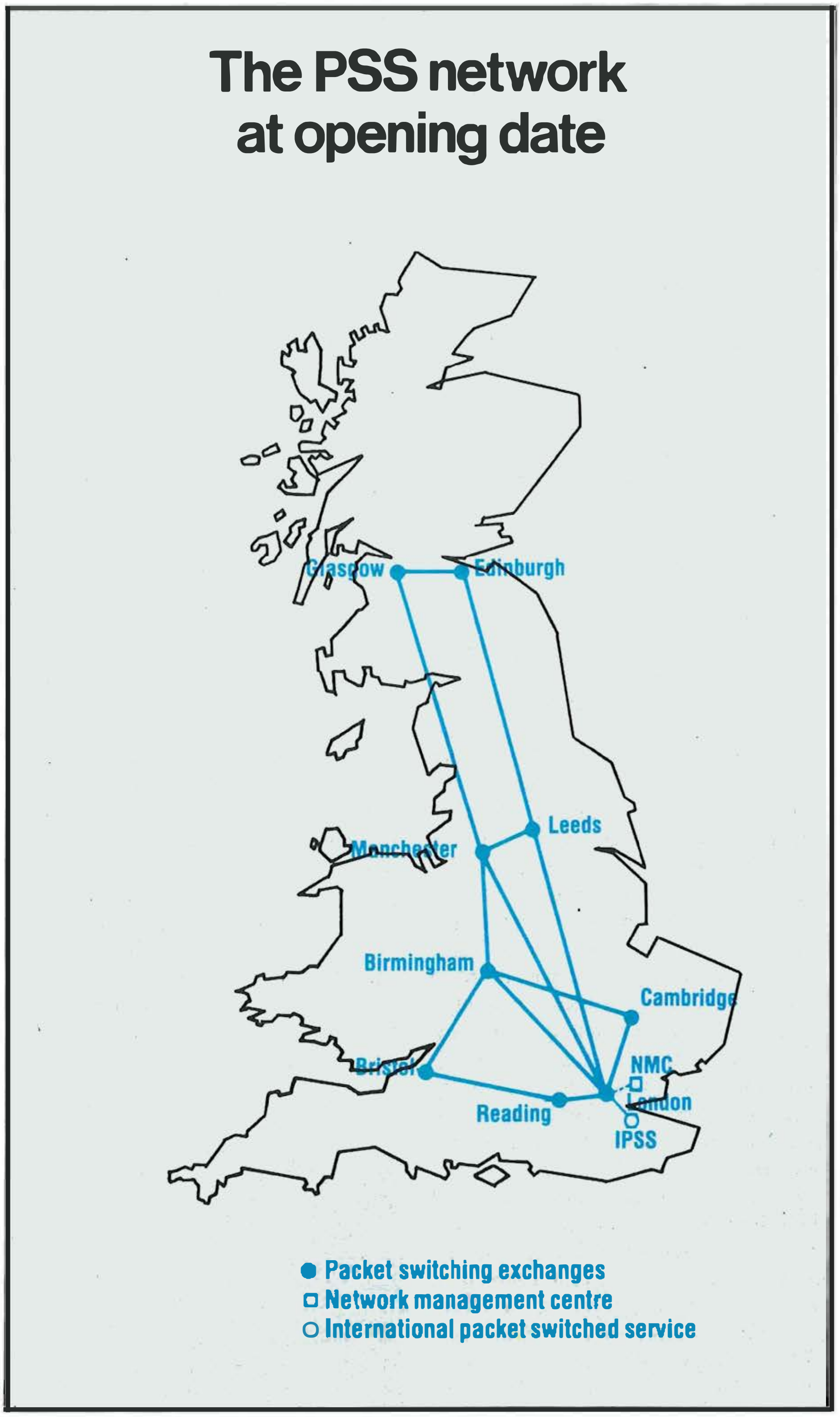
PO Telecommunications Journal, Winter 1979/80

First-line supervisors take part in practical safety refresher training advocated by the Engineering Safety Section.

Packet switching boost for data

L Holland

A nationwide packet switched service for data users is soon to be introduced by the Telecommunications Business and will complement the existing range of data communications services.



TODAY, computers and the data they generate are no longer exclusively the preserve of specialists. They control bank accounts, arrange payment of bills, help buy a new car, book a holiday or provide a weather forecast. And from a High Street terminal, it is possible to 'talk' with a computer to establish a bank balance or to withdraw cash. Indeed, the day will soon be here when it will be possible, at the touch of a few buttons, to access the vast stores of information held on databases in universities, libraries and museums. And that is not all. Computers are used by design engineers on development work, printers use them for typesetting, and the electronic office is fast becoming a reality.

Inevitably, the advent of mini-computers and microprocessors has played a major part in the spread of such services. More importantly for the Post Office is the fact that these new innovations, and their new applications, can seldom work in isolation. They need to intercommunicate. Data can be transferred from one machine to another by producing printout or hard copy, and then by manually reconverting the information into electronic form for the new machine. But it makes more sense – being quicker and cheaper – for the two machines to 'talk' to each other directly.

This demand for intercommunication is an area of enormous potential growth, but the present telephone network is ill-suited to cope with data communications. System X, the new telecommunications concept for the 1980s and beyond which can cope with data communications as easily as with speech, is of course not yet ready.

The Post Office has been aware of the need for a dedicated public data service for many years, and has gained valuable experience with the 'packet switching' technique. The concept is, in fact, quite simple. As with the telephone system, there is a network of exchanges and line plant enabling customers to share the use of Post Office resources. In packet switching however, a customer does not make a call, but a 'virtual call'. This means that when contact between two customers is established, it appears that they have the continuous use of one circuit like a telephone call.

What is happening, in fact, is that the local packet exchange is switching repeatedly throughout the call whenever it has something to send. In between times, it can deal with other calls, thus making efficient use of both the exchange's and the network's resources.

It can do this because each message has previously been broken up into portions, called 'packets', either by another part of the exchange, called the PAD (packet assembler/disassembler) or by the customer's own equipment. Each packet is clearly identified as belonging to a particular virtual call, and the network despatches them to their destination by the best route. The exchange can send and receive simultaneously for a customer during the same call and even enables terminals working at different data speeds to talk to each other.

The network operates more quickly than most terminals, and consequently does not keep them waiting. Even the high-speed terminals will be satisfied by the network's capability to handle many virtual calls simultaneously, and the exchange memory gives the packet switched service the flexibility to come down to the slow acceptance speeds of simple terminals without losing packets. If something does go wrong – for instance, if a packet is missing, or if one is distorted during transmission – there is an automatic retransmission facility from the point in the sequence where the problem occurred.

Product identity is all-important. Discussing the new logotype for the service with Senior Sales Superintendent Des Mills is Tony Ansell, a Clerical Officer with the Product Management Group.

On the left is the TP4000, the basic switching equipment at each packet switching exchange. The rest of the equipment is used in London's Network Management Centre and can monitor continuously the performance of all the PSEs in the network.

The first Post Office use of packet switching was with the experimental packet switched service (EPSS), introduced in 1979. Although it provided only a limited service, it served to test the technique before the Post Office committed itself to introducing a full national network. Its main advantage is that it is compatible both with analogue transmission familiar to Datel customers, and with digital transmission which will be used by System X.

The future public data service will be based on digital transmission, and will make use of the plant used for the public telephone service. Work on digital data services (DDS), which embraces the whole concept, has already made significant progress and eventually DDS will carry the packet switched service.

Initially, nine packet switching exchanges, known as PSEs, have been installed in the cities shown on the map on page 24. The entire network will be controlled from a network management centre (NMC) in London. Sites were selected because they are at the centre of clusters of potential customers, because space was available, and because high-speed links could be easily installed. But the network opens as a fully national service with customers connected from any part of the UK, and the PSS tariffs for both access

User Forums are held regularly to keep customers and staff in touch with developments. Here product marketing manager Pat Morrison and Des Mills, a Senior Sales Superintendent on the group put the finishing touches to arrangements for the next forum.

and use are independent of distance.

Customers are connected to the nearest PSE by a 'Dateline', which comprises a modulator/demodulator (modem) line, and port. The Dataline tariff concept is similar to telephone policy and carries a fixed rental – irrespective of the customer's distance from the exchange. PSS hopes to attract customers from all over the country, and as demand for the service grows, it will be possible to add further exchanges.

The new PSS symbol.

Once connected to the service, the customer will be charged for usage – a new policy in data communications. There is a charge for call duration, but unlike telephone calls, that is not the major element because the virtual call does not involve the constant holding of a circuit, but rather the repeated functioning of the switch when data is being sent or received. Most of the charge is, in fact, based on the quantity of data carried.

Special facilities include reverse charging, Closed User Groups – which provide further privacy and protection – and a variety of other options, which are all intended to improve the standard of performance.

It is not only the United Kingdom which is interested in packet switching. The United States, Canada, and more recently, France, already have packet switched networks. The Post Office's new data service will not only allow computers and terminals within the UK to intercommunicate, but will link up with IPSS, the international packet switched data service, (see Telecommunications Journal, Summer 1979) and will eventually allow intercommunication with customers throughout the world.

Ms L. Holland, until 1979 a Telecommunications Traffic Superintendent is a Telecommunications Management Entrant with the Packet Switched Service Product Marketing Group in the Marketing Executive of THQ.

PO Telecommunications Journal, Winter 1979/80

Prospects for all in the 'family firm'

This article, prepared by the Employment and Manpower Supply Policy Division of Telecommunications Personnel Department, looks at the wide range of opportunities open to youngsters joining the Business.

An example of the 'family firm' principle: Mr John Booth (seated) is an EO in Central Headquarters; his wife Olwen is a CO in the International Executive. Standing at the back are nephew George, a CO in the Procurement Executive; son Peter, a young postman; daughter Denise, a catering assistant of CHQ and son John, a CA in THQ.

NOWADAYS with every sector of society demanding better, quicker and cheaper communications it is clear that the telecommunications industry faces a bright, healthy future. Indeed, with developments like System X and Prestel helping to fire the imagination of young and active minds, and stimulating an interest in communications from a very early age, the Post Office is in a good position to attract university and school leavers when the time comes for them to embark on a career.

But apart from an exciting range of jobs in network planning, research and development and other technologically-based activities, there are also scores of opportunities for youngsters with other aptitudes. The Post Office is, after all, an enormous commercial undertaking. There are, for instance, jobs ranging from accountant to welfare officer, from clerical assistant to chef.

And it is perhaps surprising to see the extent to which the Telecommunications Business is a 'family firm'. Sons, daughters, nieces, nephews and even 'in-laws' abound and it is not unusual for whole families to work for the Post Office. Certainly the Business offers some of the best training around – engineering scholarships for school leavers, opportunities to study for GCEs, professional qualifications and even further degrees. And, given the ability and the will, it is quite possible to rise from the bottom to the very top – witness former Chairman, Sir William Ryland.

To start, take a closer look at some of the jobs involved starting with the 'ambassadors' of the service – the telephonists. To a large extent, it is they who personify the Business. They deal directly with customers, helping them with a whole range of problems. Telephonists do not need academic qualifications, but must have a clear speaking voice and lots of patience and tact.

Then there are the technicians whose job it is to keep the telephone system working smoothly. Some join at 16 and serve a three-year apprenticeship, others join at 18 as trainee technician improvers, and a third group come in as adult technicians, with or without qualifications and experience. As they gain in knowledge and experience, opportunities arise for promotion to Technical Officer, or perhaps into management engineering. Technicians normally work as part of a small team, installing equipment and repairing faults.

For those with the right qualities, management engineering provides an interesting and rewarding career. An engineering or science graduate may join as an Executive Engineer (EE) or Assistant Executive Engineer (AEE). A potential EE must hold a first or second class honours degree, but for either grade, applicants, whether straight from university, from another firm or from within the organisation, must be highly motivated and must show initiative and skill in their ability to communicate.

Post Office studentships are offered to A-level school leavers who intend to go on to university to study engineering or science. With only a few places

awarded each year, competition is fierce and applicants must expect to get very good A-level passes. Before sending them to university – with a salary much larger than the normal grant – the Business will train these people for a year. When they complete their university course, most are regraded to EE – providing their results are good enough!

Traffic staff have two discrete roles to perform. One is to forecast the number of calls expected to flow through the telephone and telex systems at any given time. With this information, traffic planners can then determine the quantity and type of exchange equipment needed, as well as the numbers of lines and operators required to meet future demand. Traffic staff are also responsible for managing operator services by ensuring that there are enough operators on duty at any given time to meet the demand from customers.

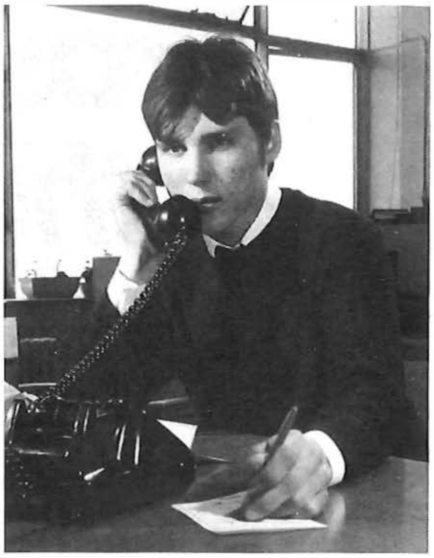
It is this second group of traffic staff which is also responsible for dealing with customers needs and complaints. Most start as Telecommunications Traffic Officers (TTOs), either through open entry with two A-levels, or by selection from other grades in the Post Office. Promotion is to Telecommunications Traffic Superintendent (TTS), a management grade. Degree holders from outside the Post Office may also apply for TTS posts. (see Telecommunications Journal, Autumn 1979).

Successful administration is essential to the smooth running of any large organisation. The Telecommunications Business is no exception, and there are many jobs handled by Clerical Assistants and Clerical Officers – accounts, personnel, and sales are just three examples. With experience, Clerical Officers can be promoted to Executive Officer at management level.

Executive Officers are also recruited direct with two A-levels or a degree. They are employed in such areas as finance, personnel, procurement, marketing and computing, as well as in general administrative jobs. EOs are encouraged to study for relevant professional qualifications.

There are also many opportunities for typists in the Post Office. Whether copy, audio or shorthand, all are encouraged to improve their speeds,

Some young telecommunications staff at work. Below: Telephonists being trained by programmed learning techniques; right: A CO at his desk and left, young Technicians testing TXE4 exchange equipment.



for which proficiency allowances are paid. Potential Post Office typists must satisfy a minimum speed entry requirement, and when they are good enough, can be promoted to Personal Secretary – a position of great trust. Personal Secretaries also have prospects of promotion to clerical and executive posts.

A school leaver with O-levels in English and mathematics, and who can draw neatly, can join as a drawing office assistant or junior drawing office assistant. These jobs include preparing final copy of drawings prepared by a Senior Drawing Office Assistant or a Draughtsman. Drawing offices provide building plans and drawings of mechanical and electrical equipment. Draughtsmen (and women) work with engineers, and in some cases do design work. They need to have an ONC or equivalent plus several years experience.

With 574 transport workshops employing more than 6,000 people throughout the UK, and 63,000 vehicles covering about 500,000,000 miles a year, the Post Office can boast one of the biggest civilian fleets in the world, and certainly the biggest in the UK. As well as apprenticeships for girls and boys between 16 and 18, there are many opportunities for both semi and fully qualified mechanics. The Post Office provides its mechanics with tools and protective clothing, and offers regular training courses.

The Post Office also has a large catering organisation to help meet the insatiable appetites of its workforce, and employs cooks, catering assistants, storekeepers, catering clerks and porters. Catering staff also have good chances of promotion, and on-the-job training is given as well as local courses and day release for staff under 18. Other opportunities exist in specialist fields such as welfare, public relations and nursing.

From even this brief resumé it can be seen that the Telecommunications Business is not content to rest on past achievements. But it can only go forward providing it has the right staff, with the right talents.

An Eastbourne operator keys in the details of a call. Inset: How it used to be done.

Operating with ACRE

W M A Cantillon and M A Pashley

A field trial to test automatic call recording equipment for accounting purposes is currently underway at Eastbourne telephone exchange. Its main purpose is to record call details on magnetic tape for subsequent data processing, thus eliminating the need to prepare a telephone ticket.

THE PROCESS of bringing operator-controlled telephone calls to account has increasingly been directed towards automation. Until the mid-1950s call details were recorded on tickets in longhand after which came the present simplified marking system.

But it was some 27 years ago in Canterbury Telephone Area that a trial of the first 'automated' system took place. This was the forerunner of Mechanised Accounting and Ticket Sorting (MATS), which was replaced in 1974 by the present Input System for Operator Controlled Calls (ISOCC). These systems automated the billing process to a considerable extent but did nothing to reduce the need for the switchboard operator to record the all essential call details on tickets.

Automatic Call Recording Equipment (ACRE) is seen as the next stage in the automation process and its use of cost-effective techniques has only been made possible by the introduction of the microprocessor.

At present, a significant proportion of the operator's time is taken up by establishing and recording necessary details to enable operator-controlled calls to be billed. These details included the telephone number of the customer to be charged; the tariff period in which the call is connected – peak, standard or cheap; the charge step according to radial distance and the duration of the call.

As well as establishing the customer's requirements, the operator has also to be aware of the time to record the tariff period, must refer to a printed list of exchanges to obtain and record the charge step, and on completion of a call, needs to record the duration as shown on a clock on her position. The ticket on which the charging information has been manually recorded is then sent to a centre where it is read by machine and, after being checked, is transferred onto magnetic tape for input to one of the billing computers.

With ACRE, the operator keys the customer's number and the required number into the equipment. The tariff period, charge step and duration of the call are recorded automatically. Subsequently all this information is automatically transferred onto a magnetic tape cartridge after checks have been carried out for completeness and accuracy.

ACRE has also brought other benefits. Call details need be keyed once only and are used for both accounting and routing purposes. On call completion, ACRE will release, automatically, both connections from the switchboard and on checking, should any errors or omissions be found in the call details, ACRE automatically draws the operator's attention to them. It also checks the validity of credit card numbers and consults those ceased or stopped.

Reliability, security and ease of repair have been prime considerations in the design of the automatic call recording equipment system. For these reasons, a distributed control technique has been adopted using the Intel 8080 microprocessor. Excluding system performance monitoring and maintenance facilities, the system can be split into three main parts. There is the operator's position equipment (switchboards), the operator's control equipment, and the common equipment. Each operator's control equipment normally serves eight positions, but may handle up to 16 in the event of a fault. The common equipment is duplicated for security and can handle up to a dozen operator-controlled equipments.

The operator's position equipment includes keypads, an alpha-numeric display panel, interface circuitry and logic. To accommodate this, it is necessary to recover the existing keys and the electro-mechanical, chargeable time clocks.

The data display panel is located in the space where the electro-mechanical chargeable time clocks used to be and uses an electro-luminescent display panel fitted with an anti-reflective filter. The display provides four rows of 20 characters per row although for the ACRE project three rows of 16 characters only are used. The display area is divided into 15 fields identified by signwriting on the anti-reflective filter.

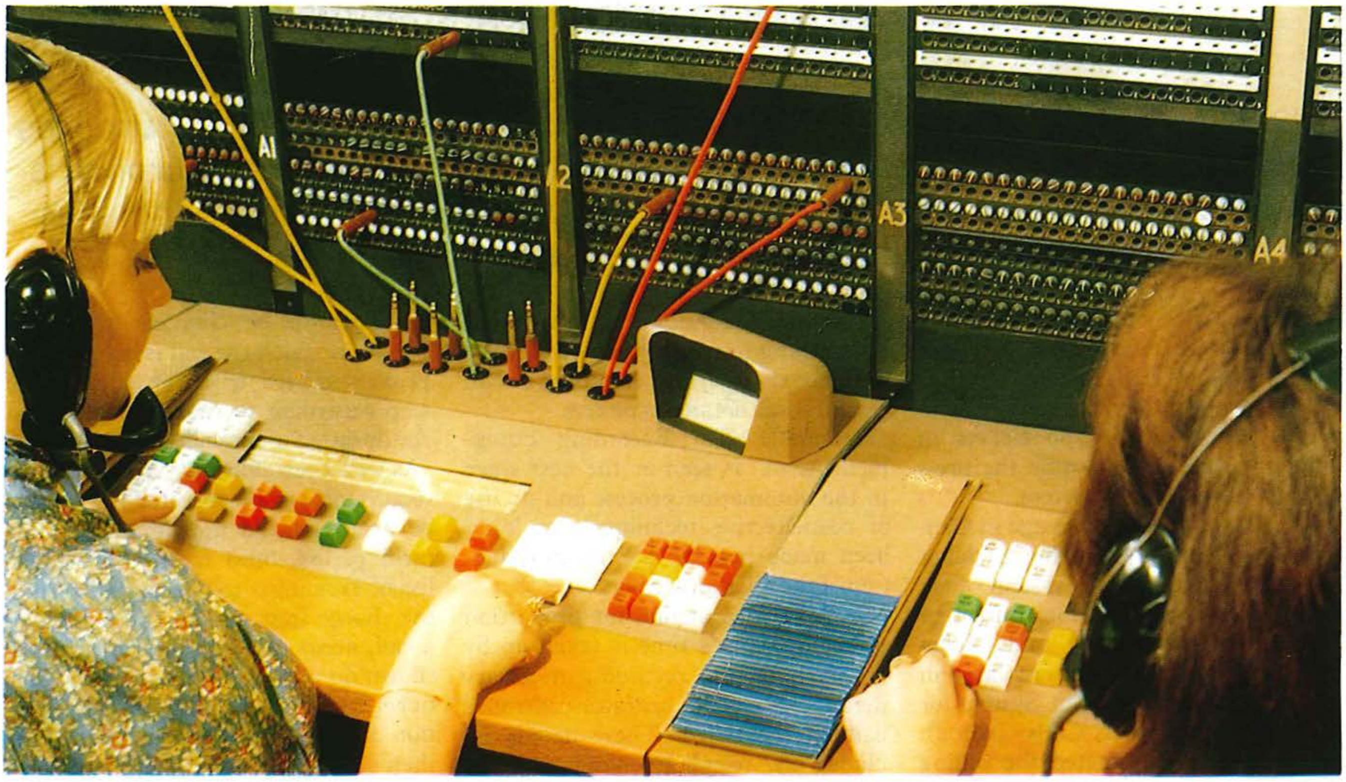
To connect the operator's position equipment with its associated rack mounted control equipment, digital multiplexing techniques have been applied enabling a large number of signals to be sent over a single pair of wires. Each operator's control equipment is designed to serve normally eight positions and provides the control instructions and processing power to handle a broad range of operational facilities. Each operator's control equipment is controlled by its own microprocessor, which occupies an area of less than two square inches. The operator position equipment is protected against failure by an automatic changeover to adjacent control equipment.

Like the operator's control equipment, the common equipment is controlled by a number of microprocessors. A pair of microprocessors, built into modules, is allocated for each major activity and up to eight such pairs can be accommodated. Currently ACRE is fitted with two pairs of microprocessor modules.

One pair interfaces with the magnetic tape cartridge drive units and is responsible for validating call information and recording it on the magnetic tape; the other pair, known as the operator's information service equipment, provides a range of facilities including a check of credit card numbers, generation of the tariff period and charge step, and translation of the customer's number for routing.

Security of the magnetic tape equipment is further improved by provision of two magnetic tape cartridge drive units per zone and an inter-processor channel between zones. The inter-processor channel allows each zone to check the other and they normally operate in macro synchronism. When they disagree, they run asynchronously and a fault report is made out to the ACRE monitor equipment where a

ACRE in use on a sleeve-control switchboard at Bedford telephone exchange.



printout is given. The engineer may then check the printout and determine which zone is faulty and which magnetic tape unit is suspect.

The basic ACRE system is supported by three other microprocessor-based units. These are monitor, engineer's control and engineer's standby equipment. They do not have the same security as the rest of the system because their failure cannot affect the operational performance of ACRE.

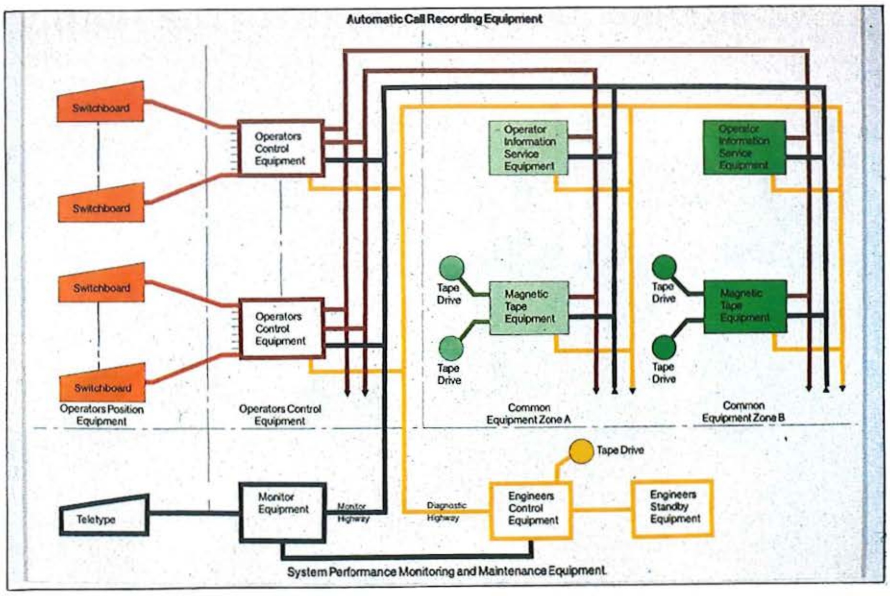
The monitor equipment constantly checks the performance of the system and where necessary, a fault summary indicating the suspected cause of the fault is reported to the engineer by a teleprinter. When the monitor equipment does not precisely identify the faulty equipment, the engineer has recourse to a powerful maintenance aid designed for the rapid diagnosis and location of faults. This unit – the engineer's control equipment – also uses a microprocessor and has a large repertoire of diagnostic instructions. It is designed to diagnose and localise faults in the rack-mounted equipment and may be used by both specialists and non-specialists.

The engineer's control equipment, however, cannot assist in locating a fault in the position equipment. Normally, the nature of the position equipment fault will indicate the faulty unit. But where this is not possible, the engineer may use a purpose-built tester. Fault finding in the switchroom can usually be avoided since maintenance of the equipment is undertaken on a replacement basis. Each keypad, the data display panel and all electronic circuit boards fitted in the operator's position or on the rack are equipped with plugs and sockets to help with easy replacement when necessary.

When the engineer's control equipment is not being used for actual fault diagnosis, it automatically routine tests a range of spare printed circuit boards which are housed in the engineer's standby equipment. Faults detected are reported to the engineer's control equipment in the normal way. This technique ensures that spare fully operational printed circuit boards are available to the maintenance engineer at all times should they be required.

ACRE is one of the first and largest telecommunications systems in the Post Office to use microprocessors. The full potential has been exploited by distributing the real time load in a number of functionally independent processing modules built to a common design. The system's exceptional degree of evolutionary flexibility has already been demonstrated by its application to other developments such as mobile radiophone switchboards, tariff equipment, message switching equipment, traffic recording equipment and routine test equipment.

As well as applying ACRE to cord-type switchboards currently under development, possible further facilities for telephone operator switchboards are the provision of direct access to a data store containing information about each telephone connection; application to cord-type switchboards; an operator-controlled answering service with data retrieval and a booked call facility which would automatically represent call details to an operator at a pre-set time.

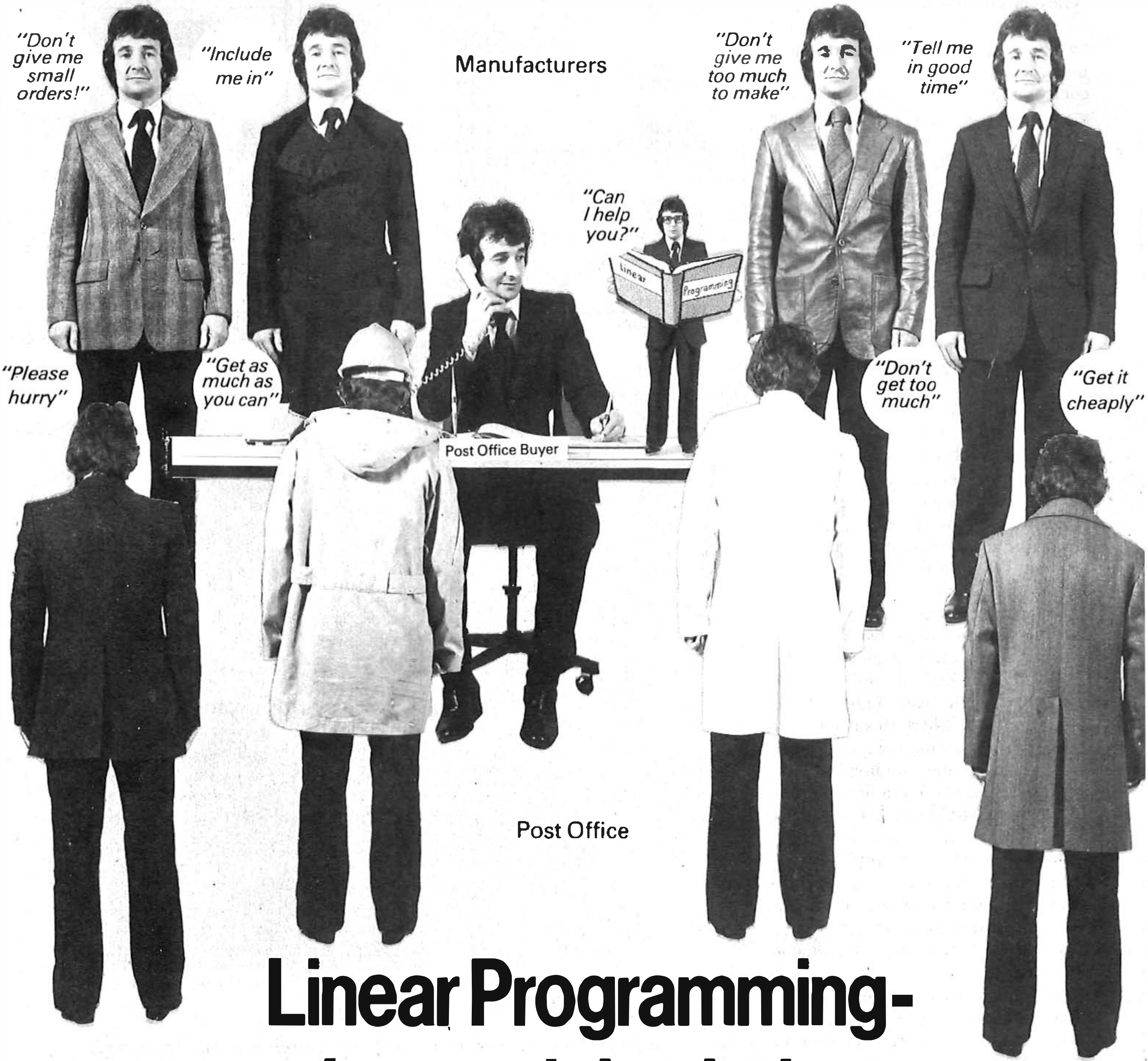


Technical Officer Tony Ravenhill uses the ACRE-associated teleprinter to request a printout of the latest difficulties encountered by customers.

Mr W. M. A. Cantillon is a Senior Telecommunications Superintendent responsible for co-ordinating the ACRE service. He works in the Operator and Exchange-based Services Division of the Marketing Executive.

Mr M. A. Pashley is an Executive Engineer in the Development and Technical Support Division of the Network Executive and has special responsibility for the technical aspects of ACRE.

A light hearted look at how Linear Programming can be applied to the adjudication of tenders for the supply of equipment.



Linear Programming- the model solution

A W Matz

THE USE OF mathematical principles to help solve management problems is becoming increasingly widespread throughout the Telecommunications Business. They are used where a given situation can be represented by a mathematical model which quantifies the significant factors to be considered and their relationships.

Although there are many possible applications and a wide variety of techniques available, one method proving particularly useful is Linear Programming (LP). This can be applied to easily-formulated models where the objective is to maximise or minimise an algebraic expression containing the variables of interest subject to the various constraints on them.

Often the variables represent 'allocations'. Consider, for instance, the following problems:

* Several warehouses are available to supply a number of outlets with a

Case Study A

Demand requisitions from field points for certain external-cable items are met by issue from drum stock at depot. Clearly, for any given stock length, there are numerous ways in which a batch of demands can be chosen to be allocated against it (Jointing of cut lengths to make up a demand length is not allowed). The objective is to determine that combination of demand lengths which will enable the drum to be cleared with minimum scrap.
The cost per drum of such cables ranges from about £700 to £4,000.

In practice, a drum is considered cleared if the sum of demands allocated against it leaves a residual length less than 15 metres. In the first instance, only if a batch of demands can be found which satisfies this clearance condition is allocation allowed.

The computer very quickly finds the combination of demands to clear drums with minimum scrap, if it exists. It is only when available drums have been considered for clearance and outstanding demand still remains, that cutting and return to stock of residual lengths is permitted.

At present, the scheme is applied weekly to 60 cable items and has resulted in substantial savings of scrap, reduced drum handling and lower depot holdings. Every week, the computer takes a total CPU time of only about two minutes to allocate all demands, for each of three depots for all these items.

Case Study B

Many engineering stores occur in groups consisting of items with similar function but ranked according to size. Often the contract will refer only to an overall capacity to supply for each contractor.

At regular intervals within the contract period, therefore, orders are placed with contractors which specify the required mix of items within the group. The amount that Supplies Division wishes to order of a particular item varies from interval to interval and will depend on a re-order level calculated from short term forecast demand less stock-in-hand and on order.

An adjustment is then made which gives a target replenishment order for each item in accordance with the total capacity of all contractors. Certain other constraints may also be imposed which ensure that orders for both small and large sizes are balanced between contractors.

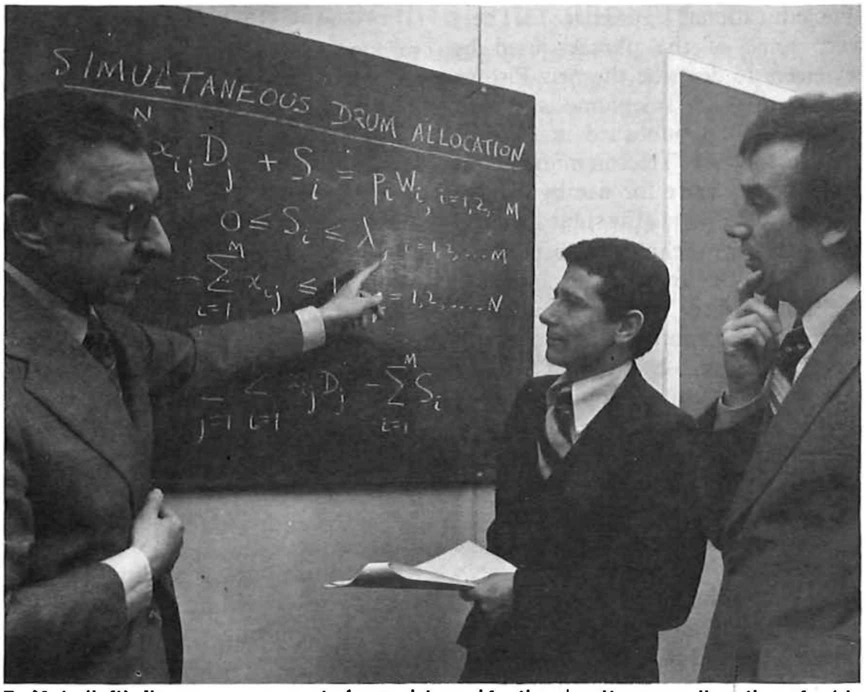
The objective is to allocate orders of items to contractors so as to get as close as possible to these target orders and at the same time meet the commitments to all contractors.

The solution is found by means of LP and in this way the items are balanced as far as stock level is concerned. This means that no items are brought to their desired stock levels at the expense of heavily under or overstocking others in the group.

certain commodity. The stock at each warehouse, the demand at each outlet and the unit distribution cost between each warehouse and outlet are known. Determine which geographical routes should be used, and how much of the commodity sent along each, so as to minimise overall distribution cost. (This is the classical transportation problem.)

* Design an electrical power-system network, to provide the service required at minimum cost, subject to circuit capacity and switchgear limitations.
* Adjudicate tenders for contracts from manufacturers so as to minimise overall cost, subject to forecast requirements of demand and production capacity limitations of the manufacturers.

On the other hand, objectives other than minimum cost are often appropriate. Study for instance, the following situations:



Dr Matz (left) discusses an aspect of a model used for the simultaneous allocation of cable with statistician colleagues Pat Henson and John Simpson.

* Allocate staff resources to competing projects for maximum effectiveness, for a given overall budget. Within this, assign staff to duties for maximum effectiveness of overall performance.
* Determine the portfolio selection of stocks and shares which minimises variability of return on investment, for a given capital budget.
* In marketing, schedule advertisements to media, for a given overall

budget so as to maximise advertising effectiveness.

* Allocate cable demands to be cut from given stock lengths so as to minimise scrap.
* Allocate supply orders to contractors so as to get as close as possible to desired stock levels of items, subject to, for example, production capacity limitations.

All these problems are candidates for solution by LP methods, and the last two are in regular use as an aid to decision making within the Post Office supplies field. (See the case studies A and B on page 33.)

One misconception should first be cleared up. The name programming in the title has nothing directly to do with computer programming but refers instead to the model formulation process already described. Once the model is formulated, however, a computer package is usually invoked to obtain the best solution.

There is generally no need for the user to understand the complex algebra involved within the LP although he will naturally be concerned with the efficiency of the package.

In practice, the time taken to find a solution by LP is very short, and packages are well equipped to deal with models involving hundreds of constraints and, correspondingly, thousands of variables, very quickly. Such packages are available on the Post Office in-house scientific computers. Another advantage is that potential users may not appreciate the vast number of possible alternative allocations contained within their problem. The speed with which LP finds the best allocation in practice is in fact quite remarkable.

Some managers may have already considered LP and will have rejected it as a technique not suitable for their application because "although the computer can handle a very large number of variables, I could not possibly comprehend the results". This is not a valid objection to the method, however, because a property of LP is that the great majority of possible allocations will stand at zero level in the best solution. Indeed, any feasible solution obtained without LP may be expected to be somewhat more difficult to interpret and cannot be guaranteed to be the best.

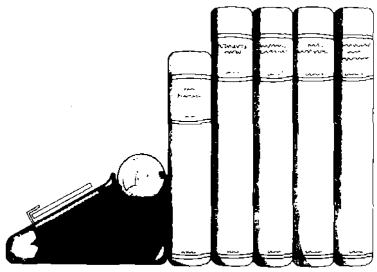
Other managers may have been worried that, although their large volume of data must be collected anyway, presenting it in the precise format demanded by the computer may be time-consuming. But this is no longer a problem, since built-in computer routines have been specially designed to enable the user to input his data in a substantially reduced format.

Having established that it is usually straightforward to formulate a model for LP, there is nevertheless an art in doing so, and management judgement is required as much as ever in setting up the correct constraints.

In practice, it has been found that when managers have become accustomed to using LP as a regular tool in their decision-making armoury, they begin to turn their attention towards sensitivity-analysis. This particular branch of LP is concerned with investigating the effect of possible changes in the imposed constraints on the best solution. And often, this information is of greater interest to the manager than the solution itself.

Dr A. W. Matz is a Head of Section in Management Services and Sciences Department responsible for mathematical programming consultancy.

PO Telecommunications Journal, Winter 1979/80



Step by step guide

Bookshelf

"REAL AUTHORITY" ... "Valuable educational experience". These were some of the phrases used by reviewers to describe the new Pitman edition of The Telephone and The Exchange, first published in 1974 by the Post Office Telecommunications Education Service for use by schools as an introduction to the subject.

Written by Technical Officer Peter Povey BEM, the founder and curator of the Post Office Telecommunications Museum in Taunton, the book takes the reader step-by-step (if Almon Strowger will excuse the pun) through the telecommunications jungle. Although principally aimed at schoolchildren, The Telephone and The Exchange takes a look at telephone principles and their application to apparatus in use today. Mr Povey's style is clear and crisp, and any 'jargon' used is clearly explained. A charming example of Mr Povey's method can be seen in his chapter on the Strowger exchange, where he takes a demanding and keen schoolboy called John round a non-director exchange building. All John's questions are answered in a way which is both interesting and informative.

Particularly fascinating is the chapter on relays, in which the reader is invited to construct an electromagnetic relay consisting of a nail and some wire. And further on Mr Povey describes how to make a working reed relay using a laboratory test tube and two strips of metal cut from a tin can to act as reeds.

From these basic educational experiments, we are led on to a description of the high-technology equivalent used in today's crossbar exchanges. Finally, we are given a brief look into the future to see System X, its technology and its implications. Perhaps Mr Povey's last comments highlight the far-reaching changes we have seen in telecommunications over the past 100 years or so.

"Developments (in telecommunications) will depend on ideas as yet unthought of, techniques as yet untried, and equipment which as yet, does not exist. But of one fact we can be sure: the telephone and the exchange will play a role of ever-increasing importance in the world in which we live'.

Perhaps, through this excellent publication, Mr Povey will be of some help to his young readers in understanding that role, and, more importantly, may help them to be the better customers of the future.

Available through most booksellers, The Telephone and The Exchange, by P. J. Povey BEM, is published by Pitman, 39 Parker Street, London WC2B 5PB and costs £3.60.

RCB

Major Data Communications Seminars in March

Two seminars have been organised for current and prospective users of data networks. The speakers will be leading experts in the UK together with invited speakers from North America. The Seminars will concentrate mainly on packet-switching networks and are aimed at users wishing to install networks this year or in 1981/82.

March 5th **The Economics of data networks**
Bowater Conference Centre, Knightsbridge, London, SW1.

This seminar will look at the costs of data networks, the tariffs for use of public networks, the performance and availability of private exchanges, and the start-up costs in special software, etc.

March 19th **Terminals and terminals in data networks**
Bowater Conference Centre, Knightsbridge, London, SW1

This seminar will first look at the considerable range of terminals currently on the market, and attempt to establish criteria whereby companies can arrive at policy on terminal selection and purchasing over a wide range of applications. The seminar will then continue to look at driving terminals in data networks. The approach is sometimes very different from established practice and the main aspects of software design will be considered.

Major speakers arranged for these seminars include Dr Solomonides — National Physical Laboratory, Dr Peter Linington — Data Communications Protocol Unit, Peter Higginson — University College, London, Richard Grew — Plessey, Terry Knowles — GEC, and a speaker from Bell-Northern Research, Ottawa, Canada.

The seminars are priced at £90 + VAT (includes lunch) and applications should be made to Newnham Conferences, 277 Gray's Inn Road, London WC1. A brochure is also available at this address. Telephone enquiries can be made to Mrs Cox on 01-278-0281.

STOP PRESS A residential seminar giving a broad survey and tutorial of data networks is currently being arranged. Details from Newnham Conferences.

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Automatic carphones

The Telecommunications Business is to introduce an automatic carphone service for London, enabling 1,500 local Radiophone users to make direct calls to any of 425 million phones throughout the world.

For the first time, users will be able to pick up the phone in the car and call the required number – using push buttons – and the call will be automatically switched through to its destination. The new service eliminates the need to call a Radiophone operator and waiting while she searches for a free radio channel.

The automatic service will use 'new' radio frequencies created by making more intensive use of its existing allocation of radio space. With 3,500 existing customers, the present London Radiophone service in operation since 1963, is full and cannot be extended further. To overcome this problem, the Telecommunications Business will increase the number of channels by reducing the bandwidth of each existing channel, and will use this new-found capacity for the automatic service.

Equipment recently ordered from Pye Telecommunications at a cost of £1.75 million will be installed in London's Radiophone radio stations to provide the service and will allow London customers, equipped for automatic operation, to use the service in other Radiophone areas throughout the country.

Loan for Wales

The European Investment Bank (EIB) has lent the Telecommunications Business £60 million to help improve and expand telephone service in Wales. The loan is part of £150 million to be used on increasing the UK's telephone network by 25 per cent, improving trunk and telex routes. The money will go towards building or extending 55 telephone exchanges throughout Wales. The loan – obtained at just 11.6 per cent interest – is the fifth to be made by the EIB to the Post Office and will be repaid over ten years.

Prices rise

Prices of many telecommunications services were increased in January and are expected to boost income this financial year by £88 million, and by £495 million in the full year 1980/81. Equivalent to $12\frac{1}{2}$ per cent of revenue at current prices, the rises compare with an increase in the retail price index (RPI) of more than 60 per cent since October 1975, when prices for main services were last increased.

Announcing the increases, Mr Peter Benton, Managing Director, Telecommunications, said that no other major industry could match the record of price stability achieved by the Business since 1975. Over £1,000 million a year was needed to invest in new equipment and plant to meet the unprecedented levels of demand.

Increases have been spread as fairly as possible, taking into account the costs incurred in providing and maintaining service.

More autotelex

The number of countries available to autotelex users continues to grow. Direct dialling facilities to Guadeloupe, Martinique, Benin, Congo, Togo, the Oman Republic, the New Hebrides, the Solomon Islands, Upper Volta, Barbados, Madagascar, Réunion French Guiana, Mali, Andorra and Rhodesia bring to 149 the number of countries Britain's 80,000 autotelex users can now reach.

One recent addition, Rhodesia, was discussed with telecommunications authorities in the capital, Salisbury, following the completion of the Lancaster House talks.

Industrial democracy

The Post Office Board is still committed to the concept of industrial democracy despite the Industry Secretary's recent announcement that the Government would not be extending the two-year appointments of the seven union-nominated members beyond the end of 1979.

In a specially-prepared statement, the Post Office said that although the full Board structure was not effective, it did not mean the end of industrial democracy. Discussions with the unions are being held this year to look at the lessons learned from the experiment. Any new arrangements agreed as a result of these talks would be in

Public telephone kiosks continue to play a vital role in rural life. Mrs Dorothy Nicholls has for 30 years been giving that home-from-home look to the box in the village of Porthallow, Cornwall. Of the 77,000 kiosks in the UK, 30,000 are in rural areas and on average cost £1,000 a year to maintain.

addition to the wide range of existing consultative procedures.

The Government decision did not affect the local and regional experiments which had still not run its full two years.

Radio star

The Telecommunications Business is among many of Britain's electronics, telecommunications and space industries to lend financial support to a scientific project which aims to provide Britain's first amateur spacecraft.

The National Aeronautics and Space Administration has formally agreed to launch UOSAT – a satellite being built at the University of Surrey in Guildford – in 1981 to investigate radio propagation phenomena and to contribute to space science education.

Contracts

ATS Telemetry Ltd – £200,000 for 880 specially-designed 1200-baud modems for use with the planned national Radiopaging network. The contract also provides for the supply of microprocessor encoders.

Ferranti Computer Systems Ltd – £2.3 million for a computer-based message switching system for the International Leased Circuit Control Centre based in London. To be built around eight Ferranti Argus 700E computers, the completed system will form a vital part of the International Leased Telegraph Message Switching Service.

Ferranti Electronics Ltd – £45,000 for sound sub-carrier modems for use in satellite communication terminals. Believed to be the first British manufacturer to provide equipment for this system, Ferranti will use the latest method of sound separation from the video signal while transmission is taking place.

Frank Wilson (Filing) Ltd – £500,000 for Railex fiche filing systems to be used by directory enquiry operators.

Plessey Communications and Data Systems Ltd – £2.5 million for 2,000 key-and-lamp units and 850,000 dials for desk and wall telephones.

Plessey Telecommunications Ltd – £7 million for a TXE2 exchange and 25 transportable TXE2 systems. The TXE2 exchange is for Stowmarket in Suffolk and with a capacity of 9,500 lines, is the largest of its kind ever to be supplied by Plessey. The 25 transportable cabins containing TXE2 equipment will be used to provide temporary extensions to existing exchanges. Seven cabins will contain control equipment and the remaining 18 will have switching equipment, each with a capacity of 975 lines.

GEC Telecommunications Ltd – £7.9 million for 30-channel pulse code modulation (PCM) equipment. The total value of Post Office orders for PCM equipment from GEC is now over £14 million.

Pye Telecommunications Ltd – £1.75 million for control and base station equipment for the new London automatic Radiophone service, due to start in May this year. The equipment will provide a fully-automatic duplex direct-dial service between vehicles and the switching network.

Redifon Telecommunications Ltd – To supply communications receivers for general communications and telex use aboard three cable ships. Installed as part of the ships' existing radio installation, the new R1000M can be programmed to listen unattended for broadcasts by coast stations with telex traffic on hand.

Standard Telephone and Cables Ltd – Over £2 million for supplying and installing 12 fibre-optic transmission systems, four operating at 140 Mbit/s and the others at 8 Mbit/s. The 140 Mbit/s systems will operate on the London-to-Basildon and Basildon-to-Colchester routes. Altogether, STC will supply 160 km of optical fibre cable, 34 intermediate repeaters and equipment for 24 terminals. STC's submarine systems division has also been awarded a contract worth £30 million to manufacture 2,800 nautical miles (5195 km) of submarine cable and terminations. The cable will be used for the TAT-7 undersea telecommunications cable system to be installed between Europe and the USA.

Rallying call

Two very different information services were provided for customers towards the end of last year. In November, as in previous years, callers were able to keep in touch with the Lombard RAC International Rally. They were able to follow the progress of top drivers during the event, and, before the start, could listen to many of the competitors talking about their hopes and prospects for the rally.

Nearer Christmas, children around the country were able to hear Buzby telling some of his favourite stories. Lasting on average about three minutes, each tale recounted his adventures with a snowman, a lion, Martians and even Santa Claus.

Every bit as fast

A new high-speed data service – Datel 4800 – for use over both the public telephone network and on private circuits was introduced by the Telecommunications Business in January.

The service sends data at speeds up to 4,800 bit/s and is based on a new modem (modulator/demodulator) specially developed for the Business. It offers transmission at data rates of 4,800 or 2,400 bit/s and customers can check their own equipment or circuits or modems before calling out an engineer.

Prestel inventor Sam Fedida was presented with Britain's most prestigious engineering honour – the £25,000 MacRobert Award – during a special ceremony at Buckingham Palace in December. With Mr Fedida (right) who conceived Prestel while working for the Post Office at Martlesham, was Mr Peter Benton, Managing Director, Telecommunications, who accepted the MacRobert gold medal on behalf of the Post Office.

'Blue' payphones arrive

Electronic pushbutton payphones went on trial in December (see Telecommunications Journal, Autumn 1979). Fitted at busy sites in railway stations, ports and airports, the new payphones use microprocessor technology to work out the cost of a call and return unused coins. Known as the AZ33, the new payphones are being supplied by Agitelco, a Croydon, Surrey, company and are to be fully assessed during the trial, by means of customer research, and by asking user's opinions.

Customers are helped by the use of blue pictorial instructions fixed to the equipment's stainless steel case. At many of the trial sites, customers will need to make long-distance calls, so the new phones are able to take three denominations of coins, including 50p pieces.

Technology top job

The former Chief Scientist of the Royal Air Force has joined Telecommunications Headquarters as Senior Director, Technology. Mr John Alvey, 54, previously combined his job as chief scientist with that of deputy controller, air side research and development in the Procurement Executive of the Defence Ministry. In his new job, Mr Alvey will be responsible for the Business's massive research and development programme.

Educated at Reeds School and Northampton Engineering College, Mr Alvey, who now lives in Guildford, has had a distinguished career in the Ministry of Defence. In the recent new year honours, he was made a Commander of the Bath.

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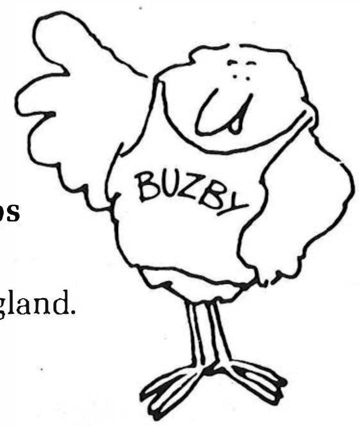

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GROUP INDEX

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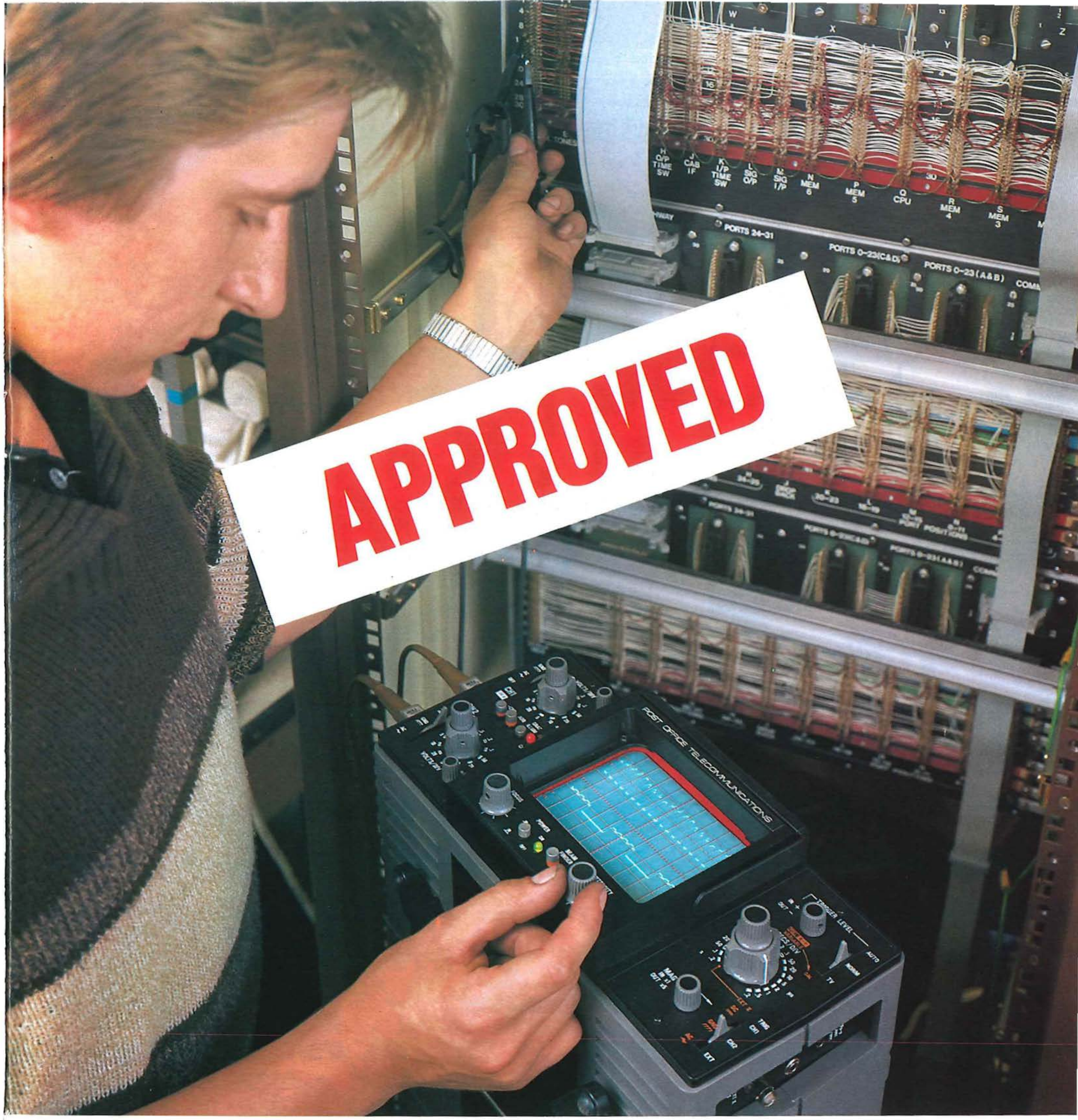
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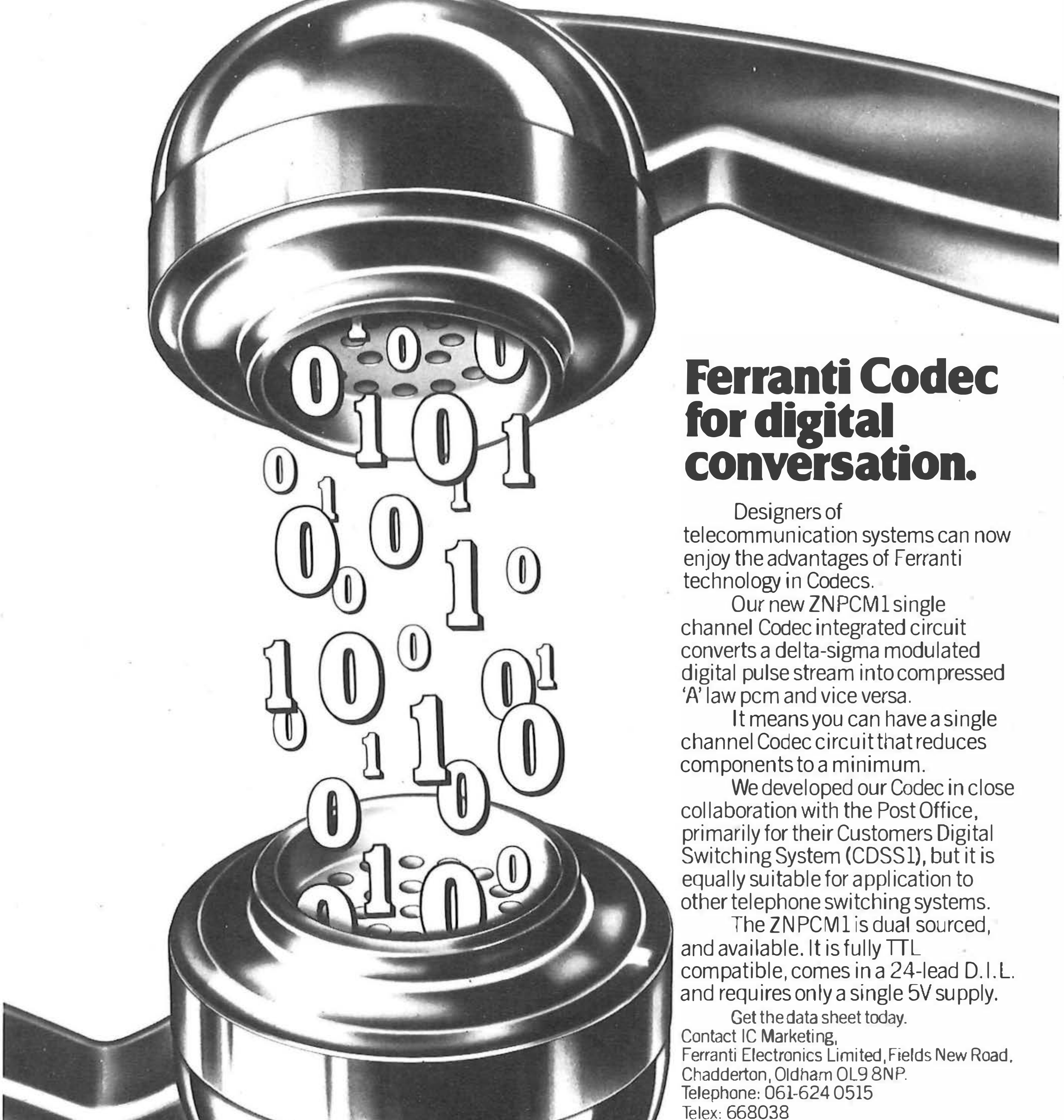

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