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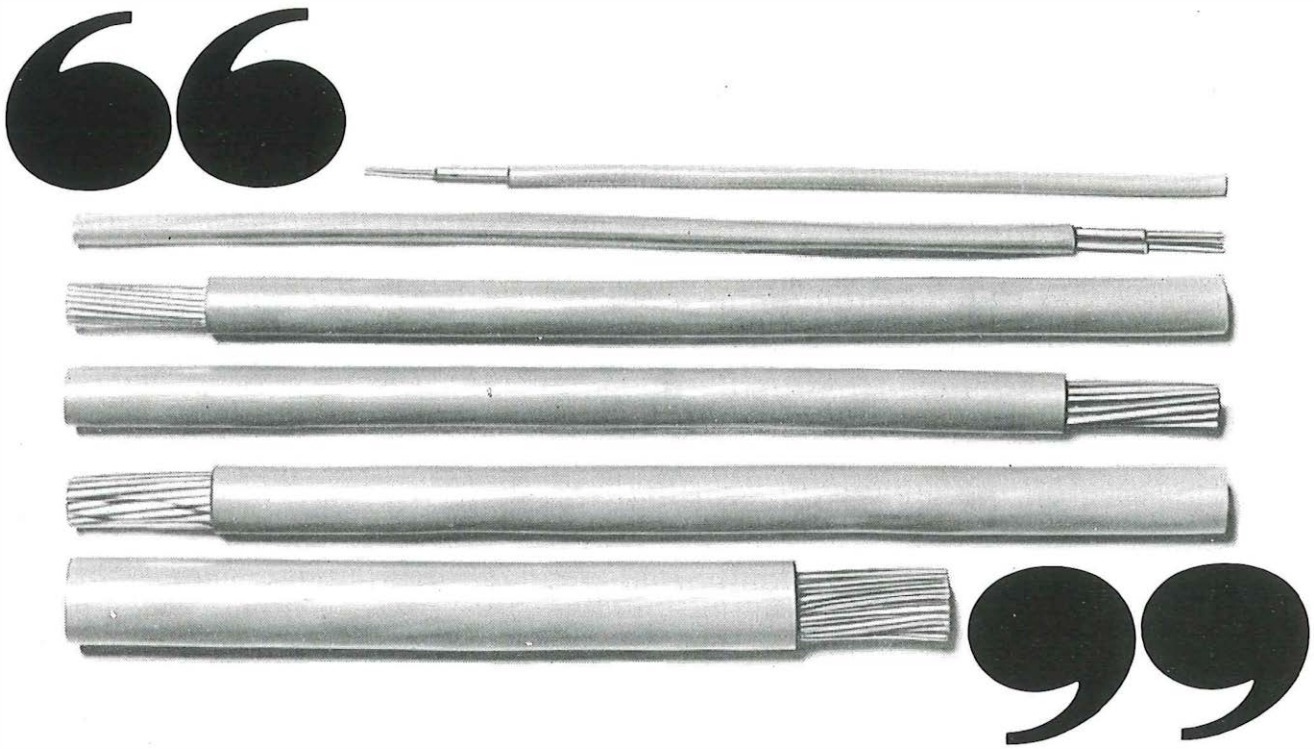

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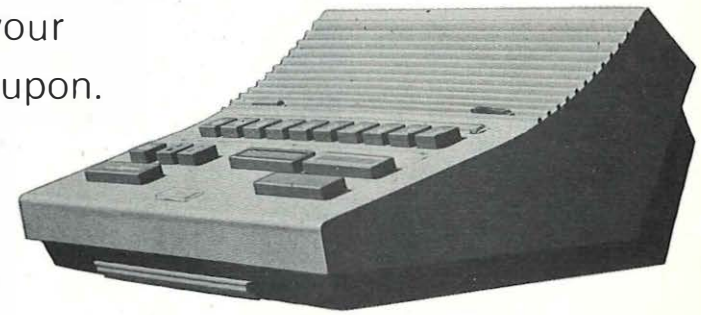

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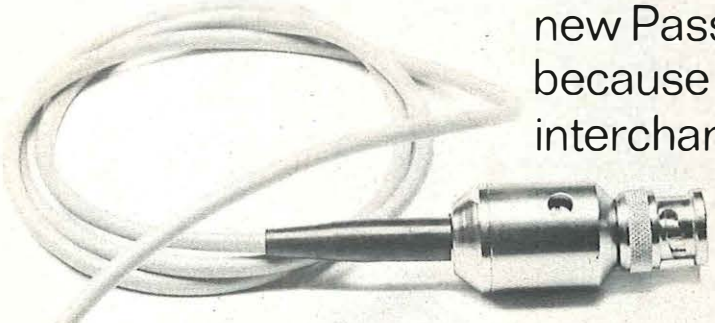

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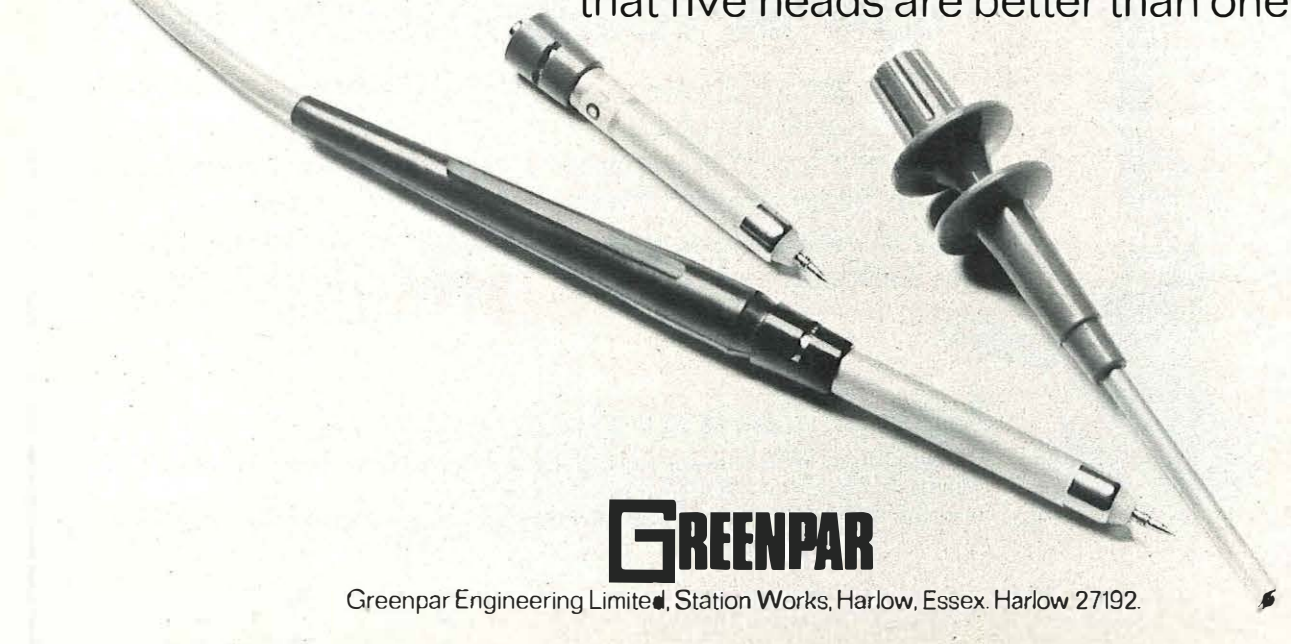

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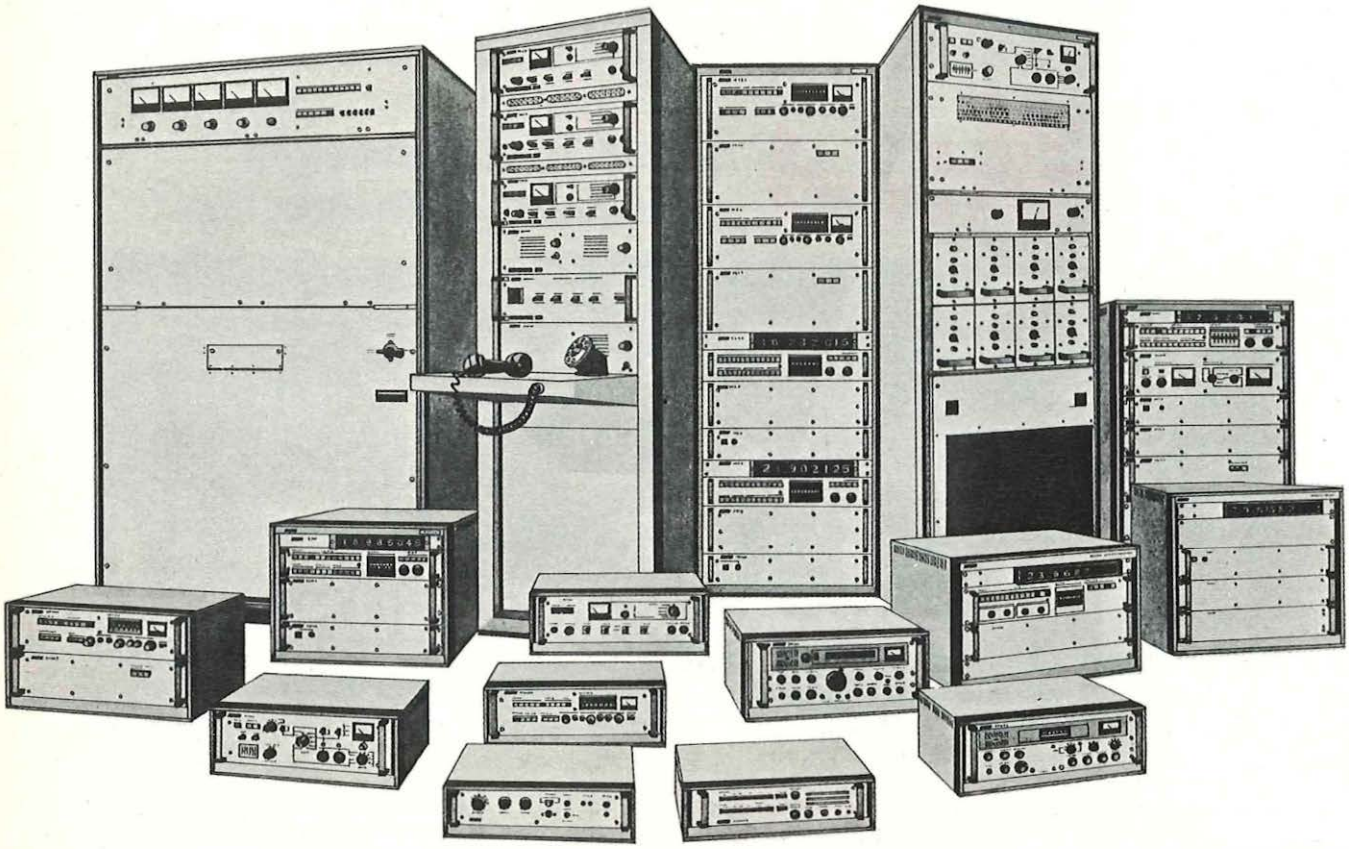

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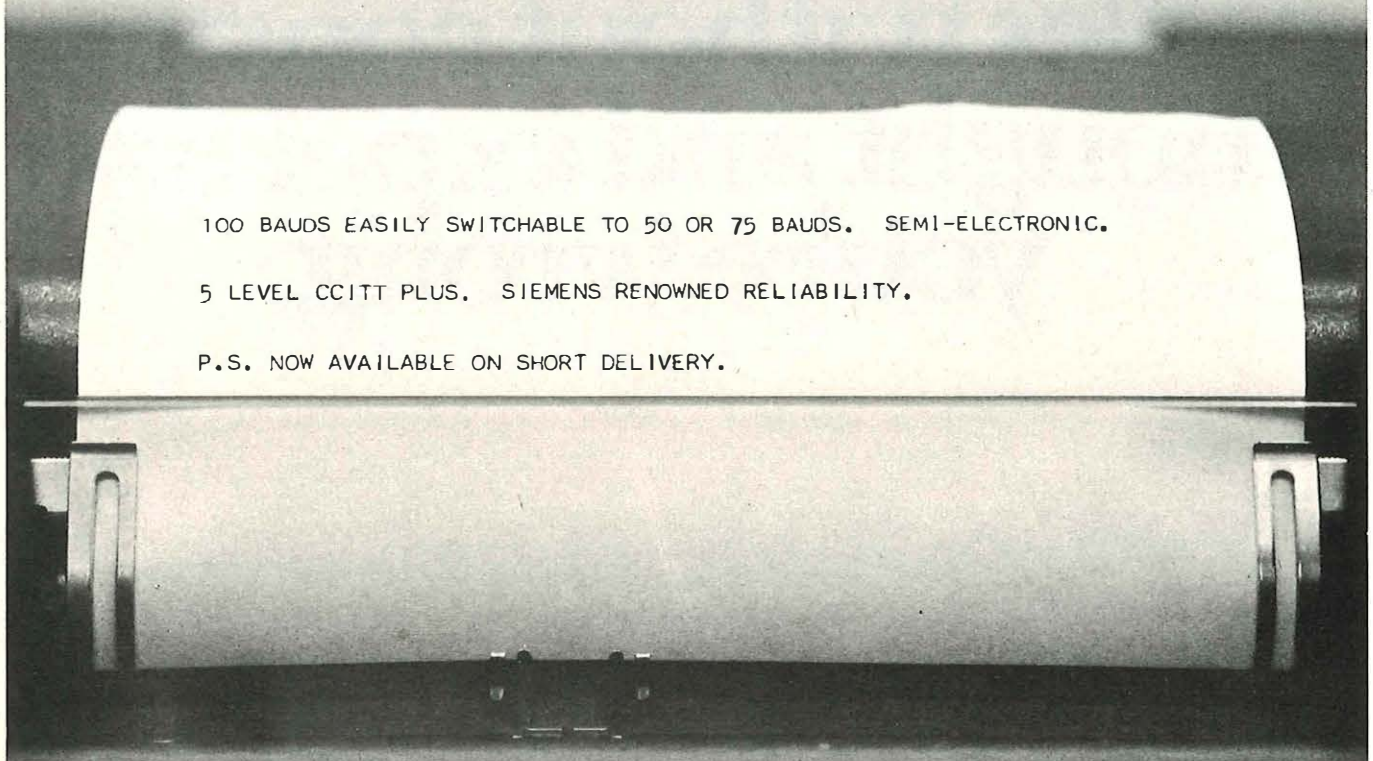

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Post Office telecommunications journal

Summer 1972 Vol. 24 No. 2

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

COVER: A volunteer at the Post Office Research Station in London takes part in an exercise to help determine the best lay-out for the rows of numbers on push-button telephones, including a model which is going on trial this summer (see page 2). The volunteer keys a series of numbers on each "instrument", all of which differ in size and arrangement, and speed and accuracy of operation are measured by a computer. There is more about this type of research on the centre pages, illustrated in colour.

Emergency control for London ambulances: **page 4**

How the business plans for its future: **page 7**

The changing role of the supervisor: **page 10**

Boost for the phone in a car service: **page 13**

Twin cableships join the fleet: **page 15**

Why do you hear so much about data? **page 18**

How management learns to manage: **page 20**

Telecommunications in Australia: **page 24**

New headquarters for Wales: **page 27**

Selling telex – the local campaign: **page 28**

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ROYAL AWARD

A NEW FLAG flies proudly over the headquarters of the Post Office Research Department. It carries the symbol of the Queen's Award, presented for outstanding achievement in industry, and won this year by the research team which has produced an ultra-reliable transistor for undersea telephone cables.

The award has been won for "technological innovation" in the design, development and production of high-quality transistors which have made possible enormous improvements in international communication. These vital components are capable of working to standards of performance and reliability never before achieved. The research team has also perfected a process for manufacturing the transistors, each a chip of silicon about the size of a pinhead, to these extreme and consistent standards.

The transistors have been designed to work non-stop without failure for at least 25 years. They are a key part of the repeaters which boost telephone signals along the submarine cable, and the improvement achieved in their performance has dramatically raised the call-carrying capacity of these international links. The most modern submarine cable systems carry more than 1,800 telephone conversations simultaneously. This compares with a capacity of only about 100 circuits in the early 1960s when work on the new transistors began. Now cable of even greater capacity – up to 4,000 circuits – is on the way.

The quality of the transistors not only determines the capacity of the cable, it also affects the cost. Today the cost of each telephone circuit on a submarine cable is only one eighth of what it was 10 years ago.

In pioneering the transistor production process (described previously in these pages in Autumn 1969 and Winter 1971) the Post Office has established a manufacturing unit at the research headquarters in Dollis Hill, London. In clean-room laboratories, where the air is filtered free of all contamination, transistors are subjected to rigorous reliability tests. In the ten years of their use none has failed in any submarine cable system.

The advances achieved by Post Office research, backed by UK industry and honoured by the Queen's Award, have been a major factor in enabling administrations throughout the world to keep pace with the exploding demand for international telecommunications services, and have helped to stabilise and even cut their costs.

See picture page 31.

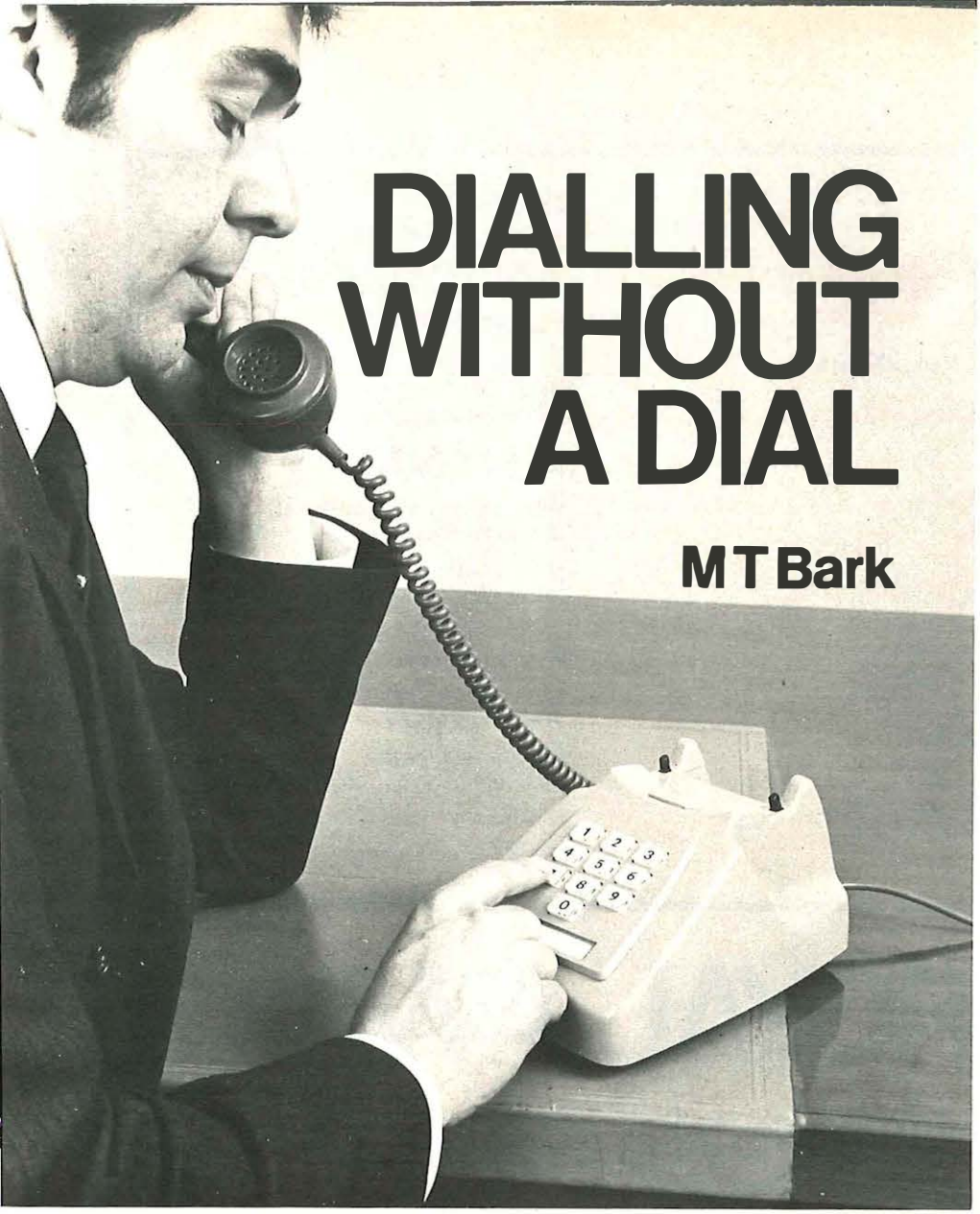
QUOTES:

"In the technology of long-life, high-performance transistors the Post Office has given Britain a commanding world lead. This development has played a major role in providing a means by which people can communicate easily and cheaply on a global scale."

Mr Edward Fennessy, Managing Director Telecommunications.

"This was the culmination of many years of brilliant and painstaking work of teams under the personal direction of Dr J. R. Tillman, led by Mr M. F. Holmes and Mr D. Baker."

Mr John Bray, Director of Research.



DIALLING WITHOUT A DIAL

M T Bark

OF ALL THE changes which advancing technology has created in telecommunications over the years the humble telephone dial has remained somewhat aloof from it all. Time and technology, however, have caught up with it. This summer a marketing trial will introduce to customers in nine Telephone Areas a new instrument, the Keyphone, which represents the most fundamental change in the ordinary telephone since the invention of the dial. Although very like the existing modern telephone in shape and size, the Keyphone is instantly recognisable – it has no dial. Instead it has a keypad containing ten numbered keys.

Its simple touch action has a number of advantages over the rotating dial. It can be used with less effort and is very much faster to operate, making it easier for long STD numbers and even longer international (ISD) numbers to be keyed before the fallible human memory has forgotten them. This should reduce the risk of "dialling" error, one of the most common causes of misrouted calls.

Keyphones have been described as the "phones of the future", and later versions will be ideally suited for operating to the fast switching systems to be brought into service towards the end of the seventies. Eventually it may completely replace the dial telephone. But already technology has made the Keyphone's high-speed keying operation compatible with the slower electromechanical Strowger switching systems which will continue to be a vital part of the telephone network for years to come. More important this has been achieved in a way which makes the possible wide-scale introduction of the new instrument an economically attractive proposition.

Because the Keyphone allows digits to be keyed at a very fast rate, equipment is needed which accepts the electronic pulses from the keypad at the fast rate, stores them and subsequently transmits them in a form and at a speed acceptable to the electromechanical equipment.

On all experimental models until now this equipment has been both bulky and expensive, and has also required a power pack sited close to the instrument. Modern semi-conductor technology however, has reduced the electronic store to miniature proportions. All the electronic circuitry and components needed by the new Keyphone to enable it to work to the Strowger systems is contained within the instrument itself; it is completely self-contained. The Keyphone can be provided on direct and shared lines and all types of private branch exchange extensions as well as the most popular extension plan arrangements without any special exchange equipment.

Compatibility with Strowger equipment is achieved by storing the keyed digits and re-transmitting them as loop/disconnect pulses at 10 pulses per second (pps) – the normal rotary dialling speed. The electronics of the trial instrument are built around two MOS (metal-oxide semi-conductor) integrated circuits. These and associated electronic components are mounted on the rear of the keypad. One integrated circuit stores up to 18 keyed digits; the other provides the timing waveforms for the loop/disconnect pulses. Pulsing out at 10pps begins as soon as the first digit is keyed in and continues, with interdigital pauses of 800 milliseconds, until the store is empty. A mercury-wetted reed relay transmits the pulses to line and a dry-reed relay provides the "off-normal" function.

Power for the keypad is supplied from a nickel-cadmium battery which is housed within the instrument. This is charged when the telephone handset is on-hook, either from the local private branch exchange power supply or a locally sited power unit. On some installations power comes over the telephone line from the exchange battery. In this case an additional electronic circuit is fitted inside the Keyphone to disconnect the battery automatically when the line is to be tested from the exchange. It is envisaged that later the need for a battery will disappear with improvements to the keypad electronic circuit which will enable power to be drawn from the line during pulsing.

New problems arise for Keyphones in the longer term, and it has been recognised that the ability to key numbers quickly should be combined with the inherent fast switching capabilities of newer exchange designs to reduce call set up times and achieve economies in switching and line plant. In this connection the Keyphone Working Party, the inter-departmental group set up in 1971 to examine the technical and commercial aspects of the instruments introduction to the public network, is also studying the development and capital expenditure implications of a multi-frequency (MF) Keyphone system. Digits would be sent in the form of audio tones direct

to receivers in the public exchange to operate local fast switching equipment, where provided, and later on fast inter-exchange signalling systems.

This type of Keyphone promises other advantages; for example since each digit keyed would be recognised at the exchange control equipment by its individual audio tone the use of extra buttons on the keypad would enable additional services to be provided without affecting level codes. Thus by simply pressing button 11, say, followed by a discrete access code, a customer could be immediately connected to an automatic call transfer service.

The dual approach adopted by the Keyphone Working Party recognises the need to develop the potential of newer switching systems, but also the fact that Strowger systems will be in the network for many years to come and that customers will require Keyphone facilities regardless of the type of exchange serving them.

The current marketing trial is on a much larger scale than with any previous launch of new equipment. Over 3,000 Keyphones will be made available in the nine Areas involved. The marketing exercise has included a Product Trial in which the technical performance of the Keyphones has been evaluated under normal working conditions. This has been done by providing the Keyphone to specially selected customers in London Telecommunications Region South Area and in Southampton who will have the new instrument provided free of charge for a period of three months. The performance of these instruments and the reactions of their users will be closely watched and evaluated.

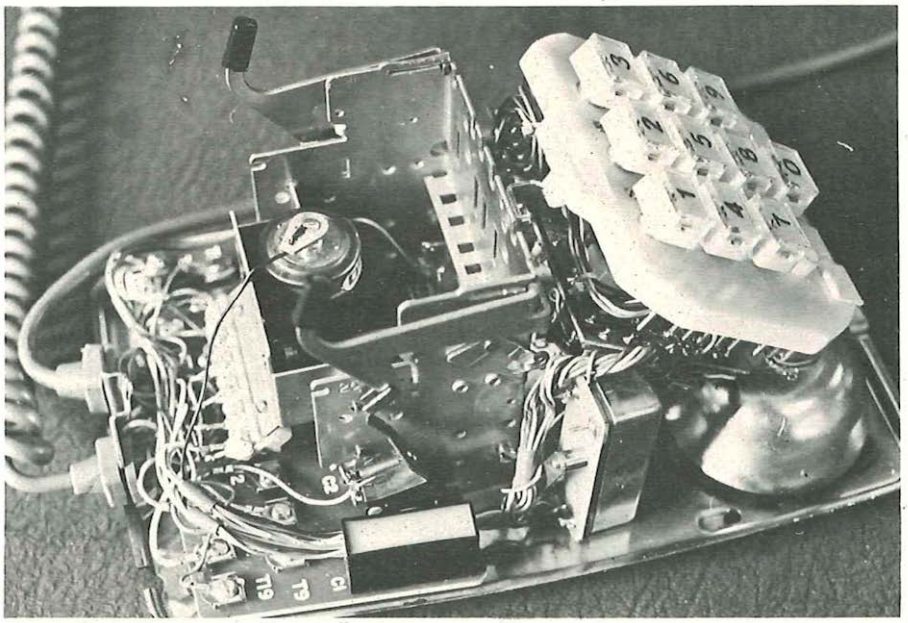
The prime requirement of the main market trial is to assess customer acceptance of Keyphones as measured by the nature, extent and distribution of demand. This information will allow forecasts of future Keyphone penetration to be made and ordering levels for the short term established. This part of the trial will be held in London Telecommunications Region's City Area, in Exeter, Manchester Central, Preston, Nottingham, Leicester and Peterborough as well as the two Areas being used for the Product Trial. They have been chosen to give a close replication of the national profile and take account of Regional and other variations.

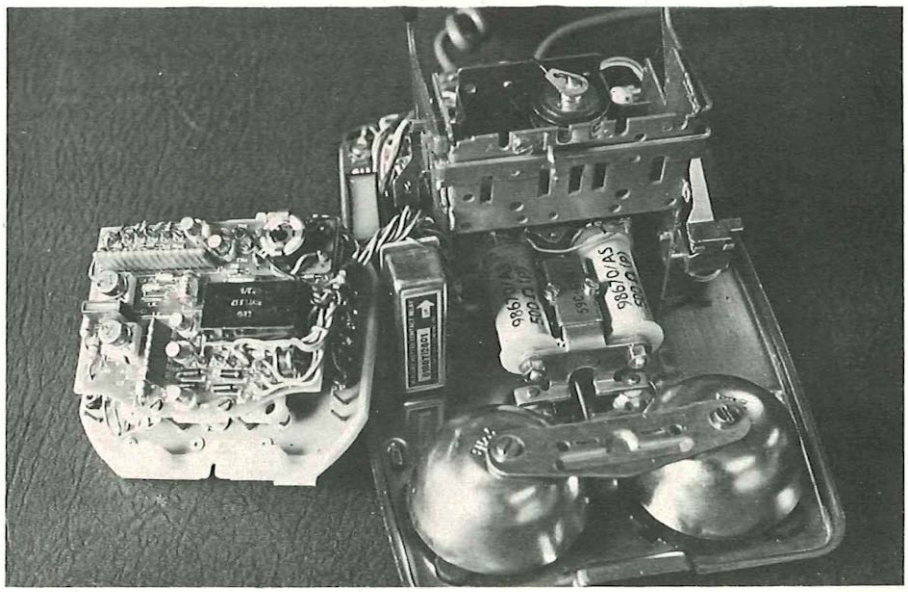
Customers will, from late Summer, be offered Keyphones as an addition to the product range at a tariff of £5 connection charge and £3 quarterly rental. Information collected will include an analysis of sales to business and residential customers classified into socio-economic groups, business classification and types of installation together with an assessment of the effect of sales of related items, for example Trimphones and Repertory Diallers. From post-sales questionnaires customers' opinion on the attraction of the product, its utility, reasons for purchase and overall value for money will be sought. Customer satisfaction with performance and reaction to post-keying delay (the interval between the end of keying and receipt of a service signal) and future requirements for keypad facilities on other products will also be investigated.

A special feature of the marketing trial is the invitation to several organisations representing handicapped members of the community to nominate members who are telephone users for inclusion. This will allow their reactions to be obtained and an assessment made of future sales to this special sector of the market. In addition a separate exercise is being held among the business communities in an attempt to identify the future use of Keyphones in the field of data transmission.

If, as expected, the marketing trial shows a requirement for the Keyphone concept, even without fast switching facilities, the Post Office will be progressively introducing Keyphones to a wider public from Summer 1973.

Mrs M. T. Bark is a Senior Sales Superintendent in Marketing Department at Telecommunications Headquarters with responsibilities for Keyphone instruments and their introduction.

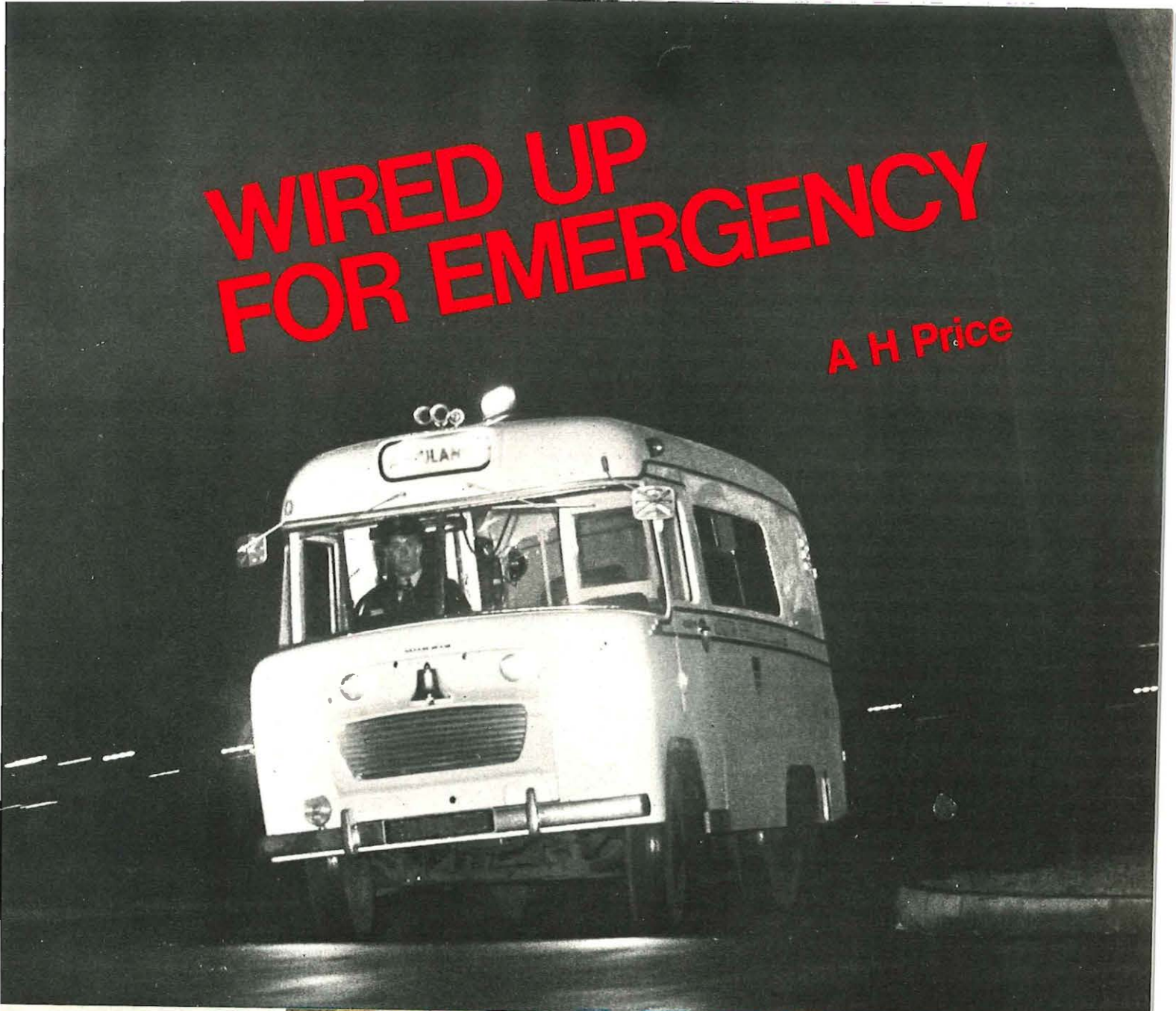


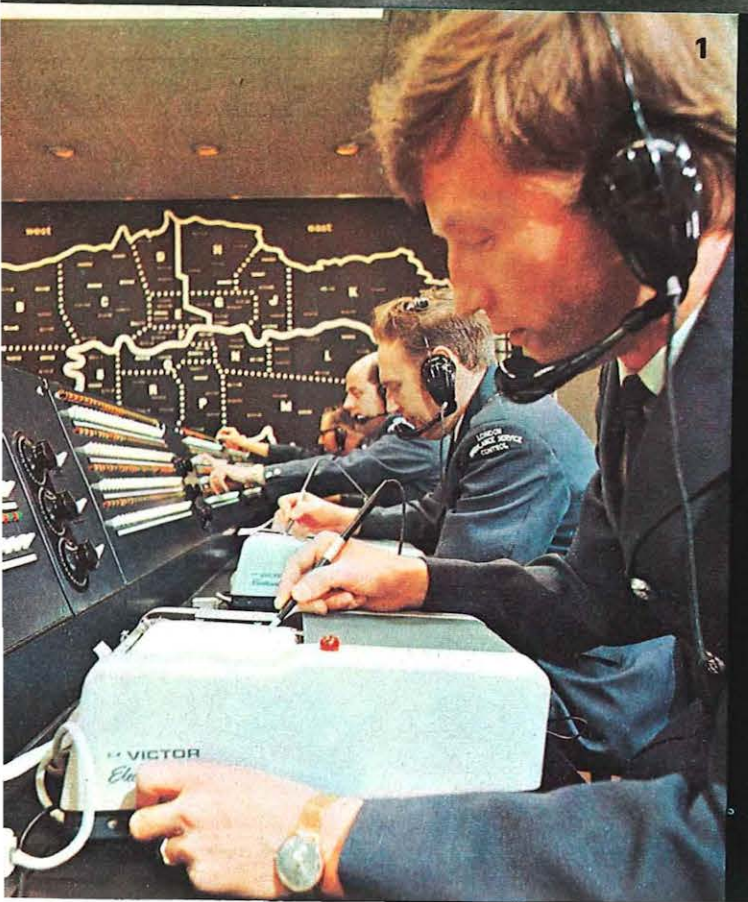


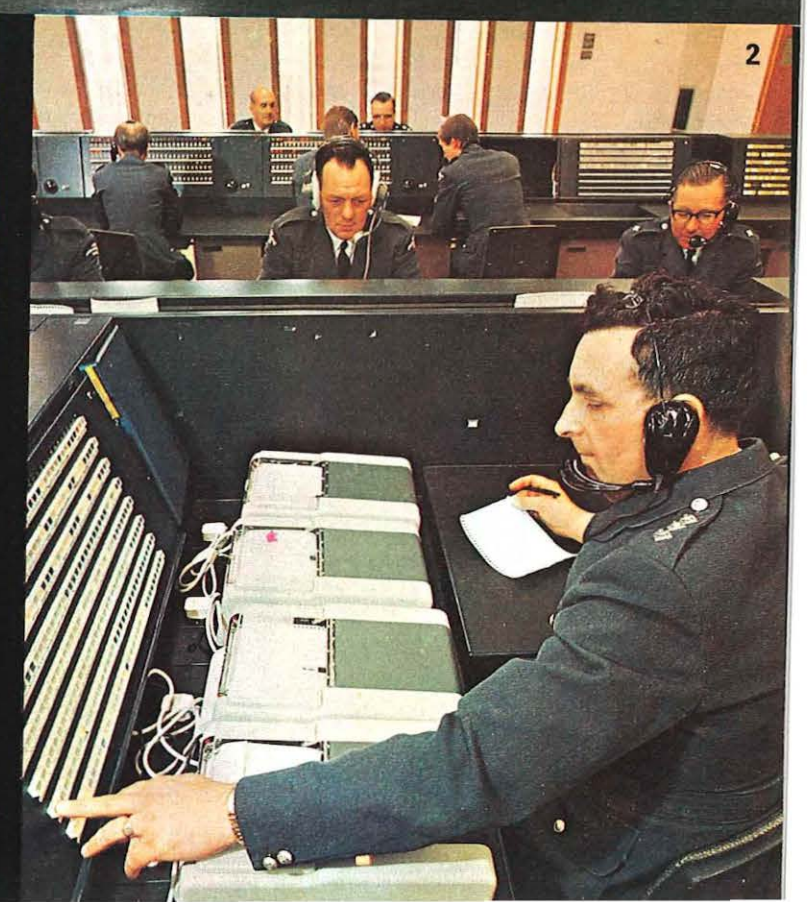
The Keyphone is completely self-contained. All the electronic equipment required to convert the keyed numbers into conventional telephone signals is contained within the instrument itself. Below: The keypad has been removed to show its reverse side which holds the minute MOS chips.

WIRED UP FOR EMERGENCY

A H Price







A NEW ambulance control centre, employing one of the largest control systems of its kind in the world, will open in London this autumn. The centre, which relies to a great extent on the telecommunications equipment provided by the Post Office, is capable of coping with up to 2,000 distress calls a day. That is every 999 emergency call for an ambulance in the Greater London Council area which covers a population of nearly eight million people. The centre's staff will have at their disposal any one of over 1,000 ambulances, many of which will be scattered over a wide area.

Staff in London Telecommunications Region's South Central Telephone Area have been employed on the project for over four years – a time factor which is indicative of the size of the task.

The new system provides for the first time a control organisation purpose-built to meet the demands of the London Ambulance Service. It replaces what was a legacy from the past – an amalgam of several systems operated by the old London County Council (LCC) and the County and Borough Councils around London when each was responsible for its own ambulance service. All of these were brought together by the creation of the Greater London Council in 1965 and resulted in the establishment of a main control at Waterloo Road, SE1 and four divisional controls at Camden, Kenton, Ilford and Bromley. The main control dealt with emergency calls from the old LCC area and the Bromley division. The other divisions were responsible for emergency calls in the remainder of the Greater London Council area and for general service work such as the advance booking of ambulances and the carrying of patients to and from hospitals, railway stations etc.

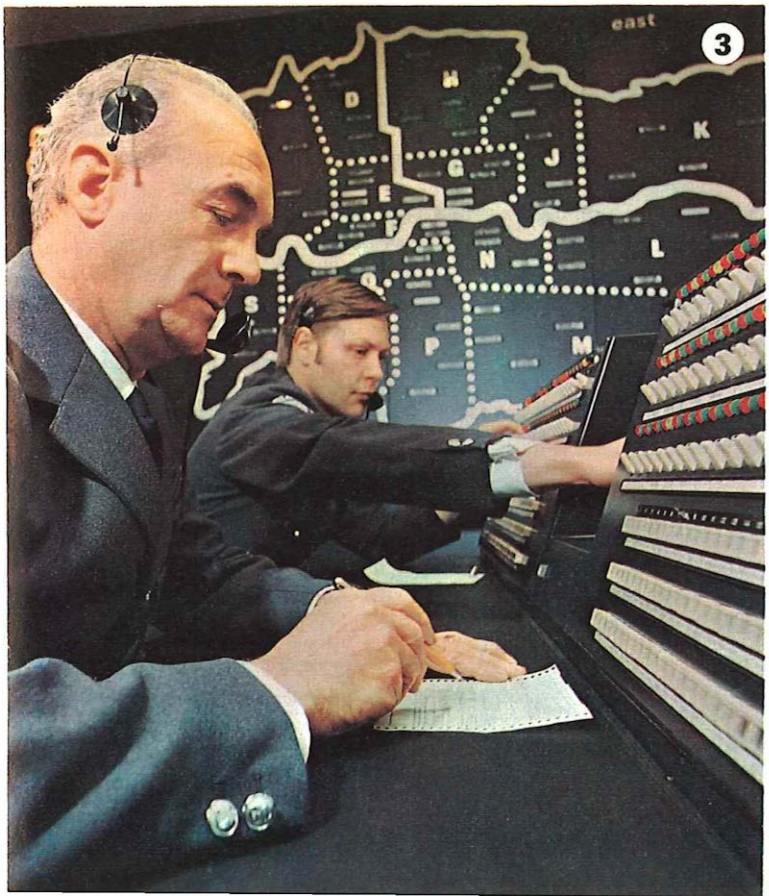
The new centre, which is also in Waterloo Road, has responsibility for all distress calls. This centralisation of control for the vital emergency services will make for a much more efficient operation. It will also leave the four divisional controls free to deal with the general service work.

The emergency control is divided into three sectors, each responsible for a specific geographical area. Each sector operates up to 10 key and lamp units of from 92 to 112 circuits on which all incoming calls are received and eight huge 288-circuit units enable Controllers and Assistant Controllers to monitor all calls as they come in to ensure that none is delayed. Incoming distress messages are taken by receivers (one man to each key and lamp unit) who pass them by conveyor belt to the Controllers. With the aid of an electronically operated mapboard Controllers can see at a glance an ambulance's location and availability. A steady red light on the map signifies that an ambulance is busy; flashing red means almost ready; steady green indicates ready for action and a flashing green light that the driver is returning to his station. The Controller can then decide on the best course of action and his resulting instructions are also passed by conveyor belt to despatchers for onward transmission to ambulances over radio or private wire circuits. A special facility on the 60-circuit key and lamp units enables any incoming distress call to be extended direct to a doctor when this is considered necessary. There is too an inter-communication system between Superintendents, Controllers and Assistant Controllers and a mobile street index trolley to facilitate the location of any given address.

The system has also allowed special procedures to be set up in the event of a major disaster. Should a large scale emergency occur in one sector normal emergency traffic can be switched to the others leaving the sector concerned free to bring all its facilities to bear on the job in hand.

In the case of an emergency near London's Heathrow Airport, the expected location of the incident in one of eight specially designated areas will be signalled to the main control and also to six nominated ambulance stations around Heathrow. Ambulances will then be put on standby to await further instructions.

The 105 exchange lines provided have been spread over three exchanges to guard against system failures and these lines are divided into separate groups for incoming emergency calls, incoming ambulance calls, incoming press calls and outgoing calls. These lines are accommodated on the 57 key and lamp panels together with 97 private circuits to the four Divisional Controls, 74 ambulance stations, police, fire brigade



These pictures show what happens when an emergency call for an ambulance is received in the new control centre. 1. The call is answered at a key and lamp unit and the officer writes the vital details on the facsimile equipment in front of him. 2. This equipment reproduces the written message automatically on similar equipment in front of the Controller, who can also monitor the telephone call on his key and lamp unit and if necessary cut in to seek further information. By studying the electronic mapboard, which pinpoints the positions of all ambulances, he can then decide which one can be directed to the accident in the fastest time. He then passes his instructions on a conveyor belt sited between the rows of key and lamp units to a dispatcher. 3. The dispatcher relays the message over private wires to one of London's 76 ambulance stations. Alternatively, the message can be relayed by radio to an ambulance on the road if it is available. Whichever method is used the Controller's instructions are passed back to an ambulance-movement planner who, by the touch of a button, will bring the positions of the ambulances plotted on the electronic mapboard up to date.

Distinctions for two directors

Two Telecommunications Directors, Mr John Bray of the Post Office Research Department and Mr John Whyte of Operational Programming Department, have been awarded important academic and scientific distinctions. Mr Bray has been appointed a visiting Professor in the Department of Electronic and Electrical Engineering, University College, London, and Mr Whyte a Vice President of the Royal Institution, the learned scientific society.

Both men have made important contributions to modern telecommunications. Mr Bray helped pioneer inland microwave systems and inter-continental communication by satellite. He led the UK team which developed the satellite earth station at Goonhilly, Cornwall, a design which has proved so effective that it has been used as the basis for satellite earth station design throughout the world. He has been Director of Research since 1966. For his lectures at University College Mr Bray is taking as his theme the future of telecommunications and its increasingly important influence on society.

Mr Whyte, a leading figure in the establishment of digital communications, has worked on a number of important research projects. He spent some years with the Treasury in charge of Government computing, and returned to the Post Office with special responsibility for long-range studies.

He became Director of Operational Programming last year.

Mr Bray

Mr Whyte

Technician Terry Smith at work on one of the 288-line key and lamp units later installed at the ambulance centre. All the units were wired and built at the South Central Telephone Area's workshop.

headquarters and certain hospitals. Timing devices associated with all incoming circuits provide a slow flash on normal calls and a fast flash on emergency calls. Unanswered calls switch to the fast flash after 20 seconds. Post Office land lines also provide access to the Ambulance Service radio transmitters in the Greater London area and Controllers and Assistant controllers will have access to these via their key and lamp panels.

Five telex circuits linking the control centre to the national telex network and a battery of private wires for facsimile transmission links between the centre and all the London hospitals have also been installed.

In addition a PABX4 is being provided for administration purposes with 23 exchange lines and 150 extensions, one third of which will appear on the key and lamp panels.

Because of the importance of the control centre the Greater London Council have provided a diesel engined standby generator in addition to the usual Post Office battery capacity.

If all this gives the impression of a very complex, high speed control organisation that is exactly what it is, and purpose made for what is after all a very special job. Very little is standard. Almost everything has had to be specially designed including all the key and lamp units and their associated relay sets.

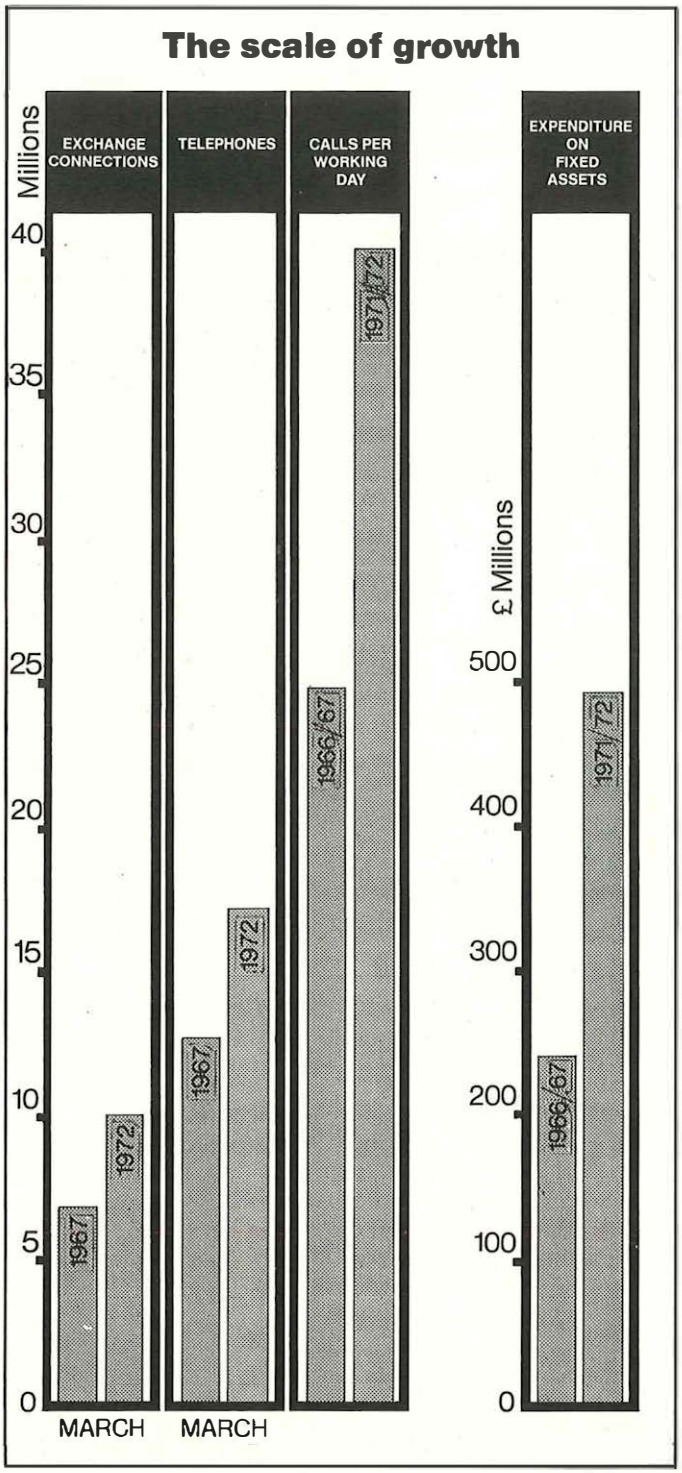
Some idea of the work involved can be gleaned from the fact that an Inspector and 24 technicians were engaged full time on building and wiring these units from February 1970 in a workshop set up specially for the purpose. Terminating cables on the Main Distribution Frame took from December 1970 to April 1971 – in all over a quarter of a million wires and about 10,000 jumpers. One large 288-circuit key and lamp panel has 1,600 wires and took about three weeks to wire up. The scale of stores ordering can be judged from the following items – 31,000 yards of switchboard and power cable, 237,000 yards of single wire and 2,300 relays.

Both in complexity and size the task has resembled an exchange construction job but in fact it has been carried through entirely by installation staff, many with very limited Post Office experience.

Mr A. H. Price is Deputy Telephone Manager in charge of planning in South Central Area of London Telecommunications Region.

Planning for growth and change

K C Grover



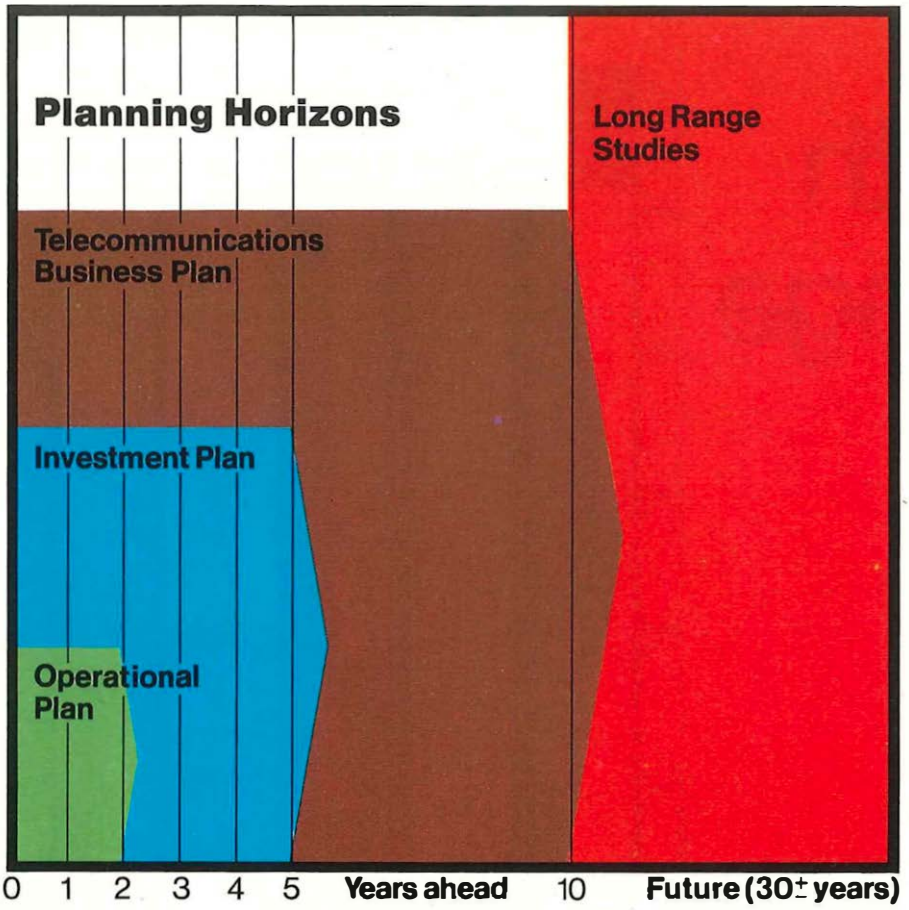
The Telecommunications Business has always done more than most major organisations to plan for the future. This is the first in a series of articles which will describe how the Business plans to meet the challenge of telecommunications growth and technological change, and how business planning machinery and techniques are being developed.

ON A typical working day the telephone system carries 40 million calls – 60 per cent more than five years ago. Over this period the number of exchange connections has been increased by more than 45 per cent to 10 million, and overall there are now more than 16 million telephones in use. The telex and data transmission services are growing rapidly in scale and scope, and other ancillary and private circuits are expanding fast. In the last financial year £1,350,000 was spent *every day* in replacement and extension of the system; double the amount spent five years ago.

The Post Office investment programme is the largest in the UK. Growth on this scale has seldom been achieved in any field and will continue throughout the seventies, but within current planning horizons the market for the long-standing basic telecommunications services will "turn over" and the Business will enter an era of developing new markets. Business Planning means more than merely reacting defensively to the forces impinging on the Business; it involves looking ahead positively so that opportunities can be seized.

To have the right amount and kind of plant in the right places ready to meet demand on time, and the right number of staff recruited and trained ready to extend, maintain and service the growing system is a complex operation. It requires the closest liaison and co-ordination involving headquarters departments and field management. Too much, too soon, and in the wrong places inflates costs and weakens the financial viability of the Business. Too little and too late will put into jeopardy service to the customer.

The Business operates in over 6,000 separate market places, and the prospects in each of these have to be separately assessed. Expansion of the system has to be carefully planned well ahead



of needs to allow time for development, design, manufacture and installation of all the items involved.

The economic alignment of resources to needs is particularly crucial in an era of rapid growth and technological change. Moreover, commitment to expenditure some years in advance in an inflationary climate, when the Business cannot be sure how cost and price relationships may change, raises difficult financial issues. Inevitably the planning problems of a nationalised industry with a high level of investment are particularly acute and call for a very high level of integrated managerial skill. The British Post Office faces another particularly critical planning decision. Within the longer-term planning horizon, the present high rate of growth of exchange connections will ease. By the early 1980s three-quarters of households in the UK will have the telephone. Well before this, however, it will be necessary to start replacement of the widely used Strowger-type exchange equipment by more advanced equipment offering wider facilities and a better quality of service to future telephone users. The nature, timing and pace of such a major reinvestment in the existing system has yet to be decided, but gradually future planning will be directed less to meeting explosive growth and more to economic re-equipping of the switching system.

Although inevitably planning effort is concentrated on the provision of the dominant telephone services, growing attention is also directed to other potential or developing services. Such services may take up a disproportionate share of the total Business Planning effort, but may be extremely important in meeting the special needs of particular major users and will contribute increasingly to the future servicing of industry and commerce. They may sometimes promise an exciting future and catch the public eye and imagination.

Business planning is concerned with the provision of resources of all kinds to meet customers' needs from the immediate future to decades ahead. Its most distant horizon is the possible social, economic, and technological environment in thirty or more years time. Predictions must be made about the size, shape and nature of the telecommunications services people will want and account taken of technological resources that are likely to be available. Its nearest horizon is tomorrow or the next few days and is concerned with the allocation and deployment of the resources which are available to meet a range of immediate needs of varying priority.

Telecommunications **Long Range Studies** are directed to the more distant development of the system. They are concerned with the future technological, social and economic environment in which the Business will be operating. They seek to identify possible changes in the telecommunications facilities which people will want, often before they will have recognised these for themselves. Important studies in this area are those concerned with identifying the probable course of technological change.

In approaching order of timescale next comes strategic planning, concentrating on the demands for the services over the next ten years, and the resources needed in terms of manpower, buildings, plant, equipment and money. A ten-year **Telecommunications Business Plan** moving forward one year annually is being developed to formalise the evolving strategic planning and to provide a stable basis for medium-term commitment. Its purpose is to set the broad course of growth and change to which planning should be directed. It does not predict precisely year by year the level of growth or the resources needed. Only when a signified change in the assumptions on which the Business Plan is based is confirmed is the plan changed

The development of a strategic plan is highly complex; it is the outcome of assumptions and predictions with varying degrees of confidence, and, in some instances about events and conditions over which the Business has no control and little influence. Some of the assumptions are highly significant and crucial to the realisation of the Plan. The Business must respond to commercial, environmental, economic and technical changes as they occur, and anticipate trends of the future. The Business must constantly seek to plan the nature, magnitude and use of its resources to supply customer service at reasonable cost while at the same time having regard to its own demands on national resources.

A Business Planning model is being developed to enable the effects of varying the fundamental assumptions more easily to be assessed and quantified. The results are sufficiently precise to determine the extent to which variations of these critical assumptions could be tolerated without throwing the Business off course; on the other hand less critical assumptions where inaccurate predictions would be less likely to require major changes in planning decisions can also be identified.

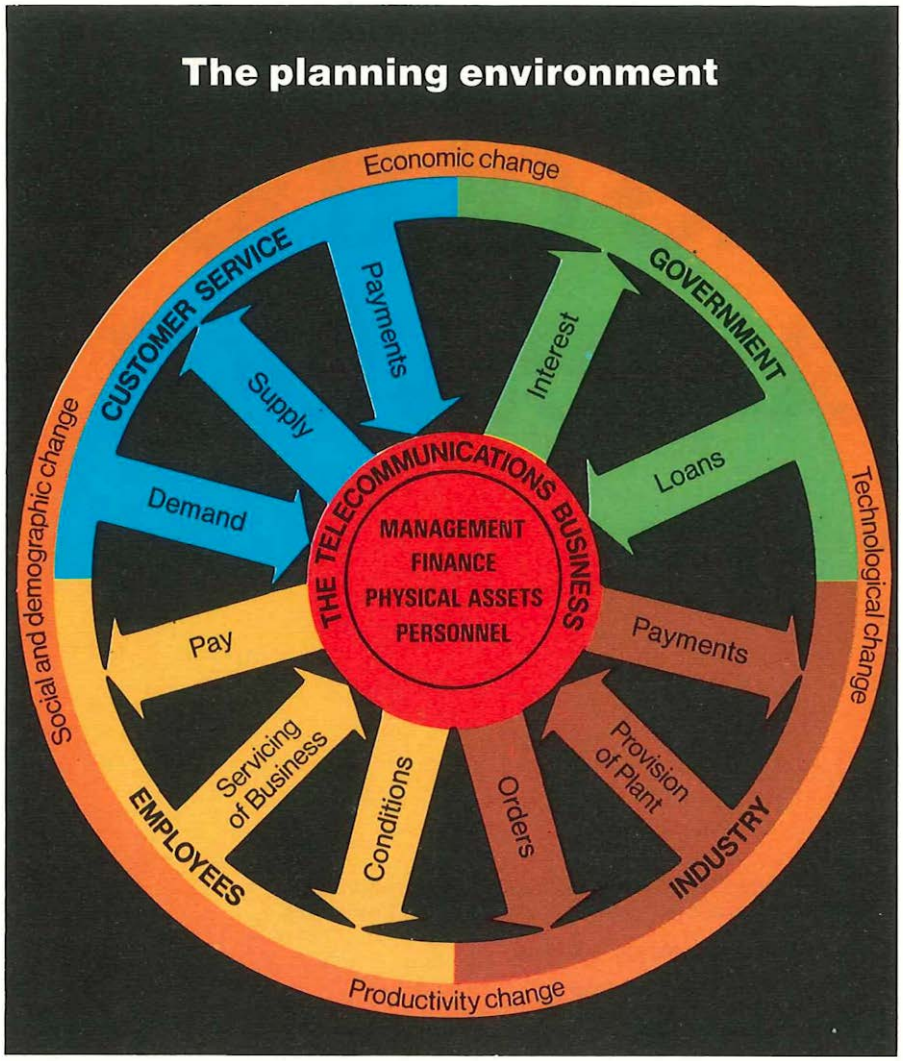
Next in descending order of timescale comes the **Investment Plan,** the tactical planning for investment in additional resources for the next five years. The Business must decide in detail year by year for five years ahead how demands for its services will grow, and what it needs in the form of physical assets,

working capital and manpower. It must decide what its income and expenditure is likely to be and how much of its capital requirements can be financed by the Business. Finally it must decide how much it will need to borrow from its bankers – the Government – to enable its plans for investment to go ahead. Details of the investment programme and the overall Business and financial prospects are reviewed every four months subsequently.

Finally short-term plans must be made for the effective and economic use of the resources available or which can be obtained at short notice during the next twelve months or so, and achieve the standards of service to its customers which the Business has set itself These are being developed as an **Operational Plan** for the Business as a step towards budgetary control and thus accountability.

This article has no more than outlined the approach to planning for the future in the Telecommunications Business. In future articles writers will describe in greater depth how the planning machinery works in practice, and particularly the changes being made to meet the needs of Corporation status and the challenge of growth and technological change.

Mr K. C. Grover is Head of the recently formed Business Planning Division in Telecommunications Headquarters.



Time catches up with the Speaking Clock

The Post Office's Speaking Clocks in London and Liverpool have been overhauled after working non-stop night and day for eight years answering time checks from callers from all over Britain.

Work on the two London clocks was completed early this year and overhaul of the two Liverpool clocks has followed. During the overhaul period each of the installations in turn has provided the "dial-the-time" service for the whole of the country with a temporary clock installed in London acting as standby.

The Speaking Clock service was introduced in 1936 and is now available to 90 per cent of Britain's telephone subscribers. In the year up to March 31, calls to the service totalled a record 331,539,000, an increase of 12 per cent on the previous year. In the last decade the number of calls to the service has tripled.

The time announcements from the Speaking Clocks are fed into a circuit network, the London installation serving centres in the southern half of the country and the Liverpool one those in the northern half. Once a day the clocks automatically check and correct themselves against Greenwich Observatory time. If the two clocks in a pair become out of step by more than one-twentieth of a second or start giving announcements which differ in any way, both clocks are automatically taken out of service and the other centre supplies the whole country until the correction is made.

The present clocks, which replaced the originals in 1963, use magnetic recordings because conventional magnetic tape is unsuitable – both the tape and the replay heads would wear out too quickly. The time announcements are therefore recorded on a magnetic recording material consisting of a homogeneous mixture of synthetic rubber (neoprene) and magnetic iron oxide. Neither this material nor the reproducing heads in contact with it suffer any appreciable wear over long periods.

The constituent parts of the announcements are recorded as circular tracks one sixteenth of an inch apart on a thick tyre of the magnetically loaded neoprene stretched over a brass cylinder, which rotates at constant speed. A total of 79 phrases are recorded on the drum; the first track carries the phrase "at the third stroke", the next 12 tracks carry the hours "it will be one" to "it will be twelve", then 60 tracks have the phrase "o'clock" and the minutes "one" to "59" recorded on them. Finally there are six tracks for the seconds announcements, "and ten seconds" to "precisely". Twelve replay heads reproduce the announcements from these constituent parts.

With the current overhauls completed the announcements to be heard will be fresh recordings from the master tape which was made in 1963 by the Post Office's "Golden Voice" girl, Miss Pat Simmons, an assistant supervisor at Avenue telephone exchange in London.

Changing role of the supervisor

D A Andrews

BY ANY STANDARD the telephone operating service of the Post Office is a major industry and will remain so. The inland services employ a staff of 44,500 at about 400 public exchanges throughout the country. Of these staff 6,000 are supervisors who play a key role in the day to day operation of the services. Over the years, as the business has modernised its methods and equipment and new operator techniques have been introduced, so the supervisor's role has changed considerably.

In the early days, in the manual exchanges and even in the early auto-manual exchanges, they played a vital part in maintaining the quality of the service. Over the whole range of traffic and staffing levels they had to ensure that telephonists were located at operating positions to give the best traffic coverage, and had to draw attention to calls that had waited longer than the majority for an answer.

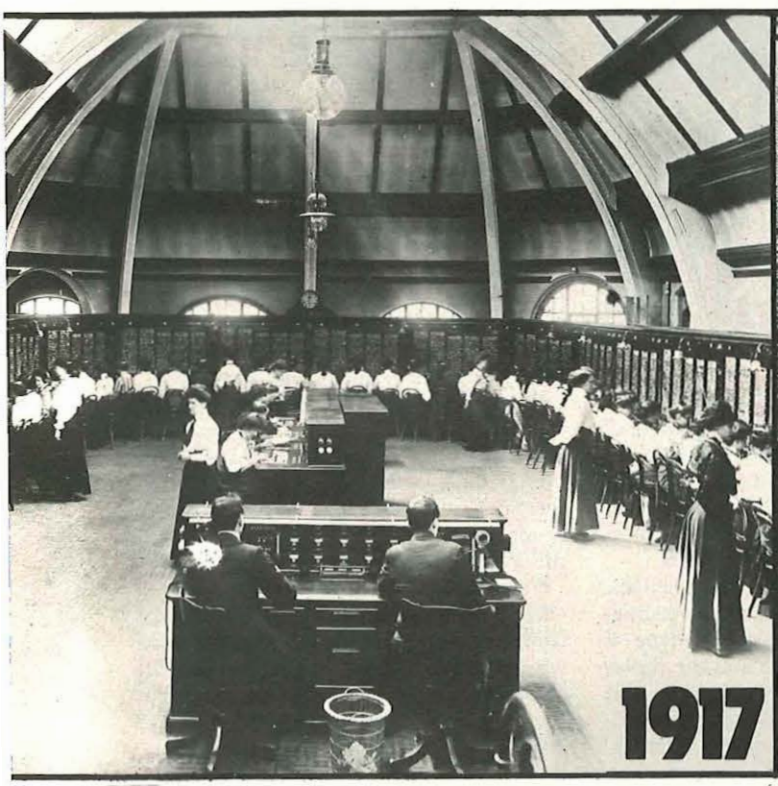
Supervision was strictly authoritarian. The supervisor patrolled behind the eight telephonists in the section for which she was responsible. None could leave her position without permission. By the early 1950s automatic telephony began to alter the nature of the job. Because subscribers could now dial to numbers up to 15 miles away operators increasingly had to deal with the more complicated calls, and supervisors found themselves helping much more with the technical aspects of telephone operating in addition to their other duties. By 1960 trunk mechanisation,

1917 – Birmingham Central exchange. The supervisors stand behind the operators in a strict ratio of numbers.

1927 – Victoria exchange, London.

1953 – Stoke on Trent exchange.

1972 – Cordless switchboards and carpeted floor at Fleet Building, London. The supervisors have desks between each double line of boards, and no longer patrol continuously behind the telephonists.



an increasing use of STD and cordless switchboards had arrived. It was clear that, with operator traffic concentration and increased availability of calling signals to telephonists, telephone operating would change almost out of recognition.

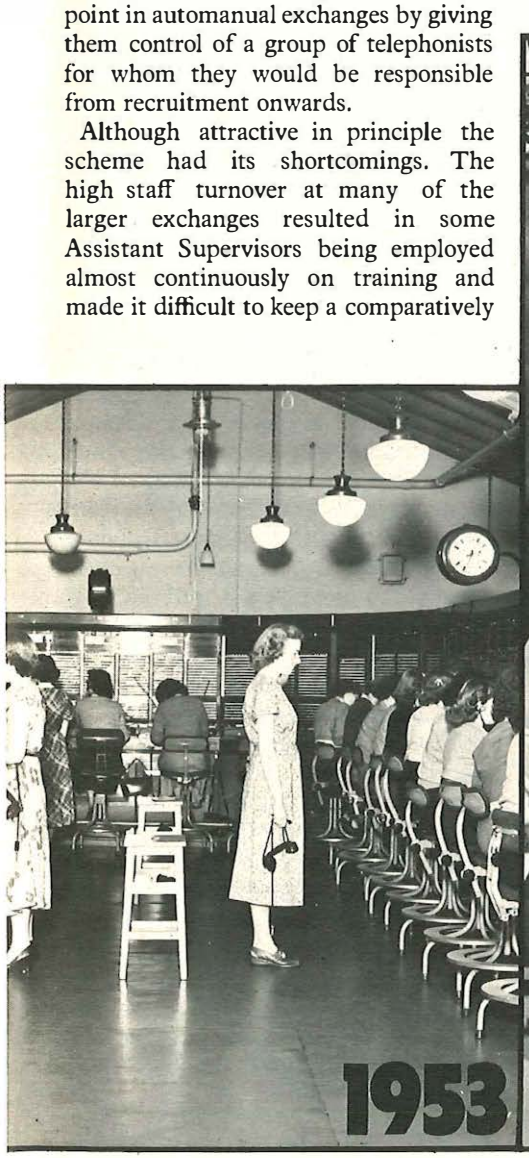
To bring first-line supervision up to date with an automated telephone service the Ray scheme was introduced. It had developed from a report on telephony in the USA by a Post Office team under Mr F. I. Ray, then Director of Inland Telecommunications. Its principal intention was to provide telephonists with a sense of identity which before had been lacking, certainly in those exchanges which had become very large units. Previously telephonists on recruitment had been sent to wing training schools and on return to their exchanges were placed on a rota with a considerable number of other telephonists. Some certainly felt that they were no more than cogs in a very large machine. To give them that missing identity the Ray scheme attempted to make the Assistant Supervisor a focal point in automanual exchanges by giving them control of a group of telephonists for whom they would be responsible from recruitment onwards.

Although attractive in principle the scheme had its shortcomings. The high staff turnover at many of the larger exchanges resulted in some Assistant Supervisors being employed almost continuously on training and made it difficult to keep a comparatively small group of telephonists stable for long enough to maintain a group identity. Nor was a detailed scheme ever worked out for night staff, whose hours of duty and attendances make local training and grouping difficult. By 1967 these difficulties had become so acute that extension of the Ray scheme was suspended and, early the following year, a working group consisting of member unions and management was set up to consider the problems and devise means of overcoming them.

By this time it was becoming clear that the reduction in first-line supervisor involvement in the direction of the actual process of call connection as a result of STD was affecting the relationship between supervisors and telephonists. This was particularly true of exchanges where the ratio of section supervision had remained at 1:8. Some members of the supervisory grades themselves were of the opinion that they were under-occupied and telephonists felt that the presence of a supervisor continually behind them was oppressive.

Against this background the working group felt that as the direct involvement of first-line supervisors in telephone operating diminished their role was becoming increasingly that of training and organisation. The Exchange Supervision and Training Scheme was therefore developed. This divides the first line supervisor force into operational and training complements, each related to needs at individual exchanges.

The ratio of first line operational supervisors to telephonists has changed to 1:16. With the reduction of the first line supervisor's direct involvement with telephone operating the need for minute to minute direction of telephonists has been greatly reduced. Provided that duty rotas are carefully organised and telephonists know clearly when they are to come on duty, the time of their breaks, and when they should leave, little detailed direction is needed; and so long as absences from the switchboard are kept at a reasonable level there is no reason why telephonists should get prior permission. As a result, and in keeping with their increasing involvement with training and



organisation, first-line supervisors no longer continuously patrol behind telephonists but are provided with desks at which they may sit to do such administrative tasks as are required when their operational duties permit. This progressive reduction in overseeing does, of course, put the onus on telephonists to ensure that they do not leave the switchboard at a time when their presence is especially needed, and to work without detailed direction.

Telephonists are now also grouped under a Supervisor for personnel purposes such as arranging training, advising on personal problems and organisation of duties, etc. Supervisors also have functional responsibilities for operating and non-operating work, and have thus become the focal point at the larger exchanges. Senior supervising staff now also have an operational responsibility in the recruitment of telephonists. As a result of changing management techniques which, throughout the business, have seen the increasing relaxation of detailed central control of field managers in the deployment of the resources at their disposal, telephonist recruitment and training is now the responsibility of supervisory staff under the exchange officer in charge. As time goes on there will be an increasing tendency to assign responsibilities to individuals and to hold them accountable for the performance of the work under their control. To do this effectively entails giving them much greater personal responsibility in the discharge of their duties, and as this change is introduced there will be a need for a broader training programme for all levels of supervision.

Perhaps the major changes in the supervisors' job, however, will come from the introduction of the Cordless Switchboard Systems. The effect of the Cordless Switchboard System No. 1 for example has already been felt. Its design was based upon engineering techniques available in the early 1950s. Because of this it has limitations in its arrangements for assembling calls into queues for presentation to telephonists. In an exchange of 96 positions calls are assembled in four main queues, and for the auxiliary services in up to 13 subsidiary queues. The precise way in which the queues are arranged in relation to operating positions is determined by the needs of each exchange. In general, however, the efficient operation of the system is greatly dependent upon the way in which staffing requirements are specified by the exchange superintendent, and the efficiency with which supervision allocates staff to positions and makes adjustments to meet short term variations in traffic levels. Thus, although because of the use of queues the direct involvement of first-line supervision in call connection is very limited the influence that skilled location of telephonists can have on quality of service is almost as great as at a manual exchange. Exchange supervisors have had some difficulty in making the adjustment back to what are essentially manual exchange staffing techniques.

The number of exchanges to be equipped with the CSS 1 is to be limited and development concentrated on the Cordless Switchboard System No. 2 which, with its use of a single queue system, will further reduce the necessity for direct operational supervision.

The CSS 2 will have a considerable effect on supervising staff. At the present time, for example, automanual switchboards are located at points determined by the economics of network design; location having been decided on this basis, size has been dictated by demand for service at that point. As a result centres are widely dispersed and vary in size between about 10 and 600 staff. The problems involved in fitting a common supervisory and complementing organisational structure to a service employing three fundamentally different types of switchboard system at exchanges varying in size in the ratio of 60 to 1 and providing service 24 hours a day are considerable. At exchanges equipped with CSS 2, however, there will generally be between 50 and 100 operating positions. With its advanced technology the CSS 2 will also allow for the first time the setting up of operator units removed a considerable distance from the automatic equipment which they will use. While the siting of the latter will still be determined by plant economics it will be possible to house the switchboard operators many miles away and at points where staff are most likely to be readily available. This could result in large units of operating staff being some considerable distance from the Telephone Manager's Office responsible for their management. It will therefore be necessary for operator units increasingly to become more managerially self-contained. It is a situation which will require a much greater integration of operator service management and supervision than before.

An Operational Supervisor at her control console in Fleet Building.

Mr D. A. Andrews is a Principal Telecommunications Superintendent in the Operator Services Division of Service Department. He is head of the projects section with responsibility for the introduction of major changes in operational methods.

The Post Office's Car Radiophone service, at present operating in London and South Lancashire, is to be extended to five other major centres during the next three years. Birmingham and Coventry will get the service towards the end of next year and will be followed by South Yorkshire, the Glasgow-Edinburgh area, Cardiff-Bristol and Newcastle-Middlesbrough. Meanwhile a re-equipped and expanded service has been introduced in London.

Boost for car phones

D R Joyce

"KEEP IN TOUCH" – the phrase has become a byword of the businessman. For the executive on the move, perhaps miles from office and associates, keeping in touch may be difficult. But for London's motoring businessmen the communications problem has been solved by the Post Office's Car Radiophone Service. It enables them to make and receive telephone calls to and from any other telephone in the country from their own vehicle.

The service has always been popular. It was to cope with the demand and at the same time to modernise and streamline a seven-year-old service that the Post Office opened a new Car Radiophone Service for subscribers in London earlier this year.

It has a number of advantages over the present service. From the outset it will have a capacity of some 700 customers – more than twice that of the old system – and by the end of next year or early in 1974 it will be able to serve up to 1,800 customers. When additional frequency space allotted for mobile radiophone services by the Ministry of Posts and Telecommunications is fully exploited the ultimate capacity of the system could be upwards of 3,000 customers.

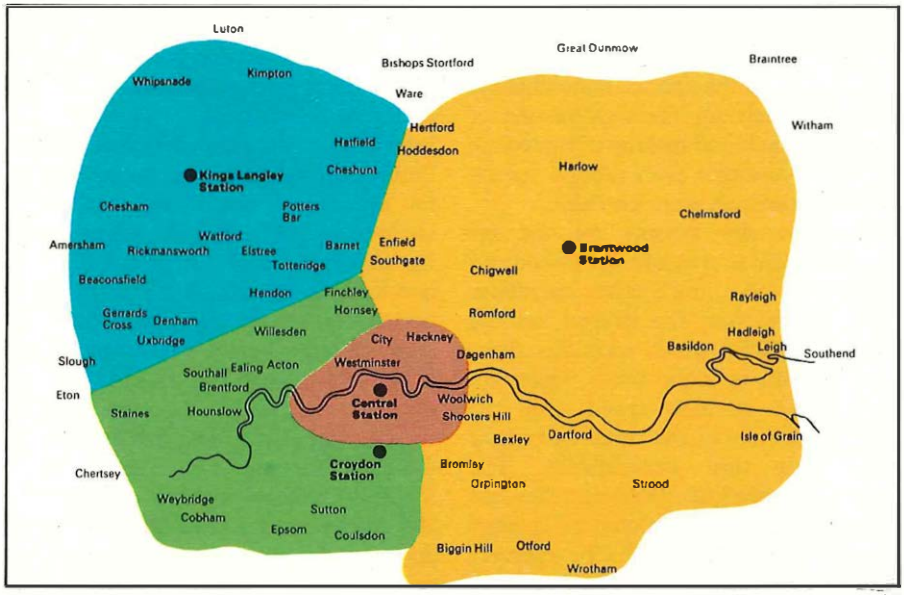
For the first time, too, Radiophone users will be able to make calls to a number of European countries. Call-connection times between the Radiophone switchboards and the customers will be considerably reduced – from up to 30 seconds on the old system to under two seconds. Privacy will be assured since the car sets are designed to avoid intrusion on engaged radio channels. Performance in central London will be improved – an area where in the past signals have sometimes been of poor quality because of the density of buildings, heavy traffic and high electrical noise level generally.

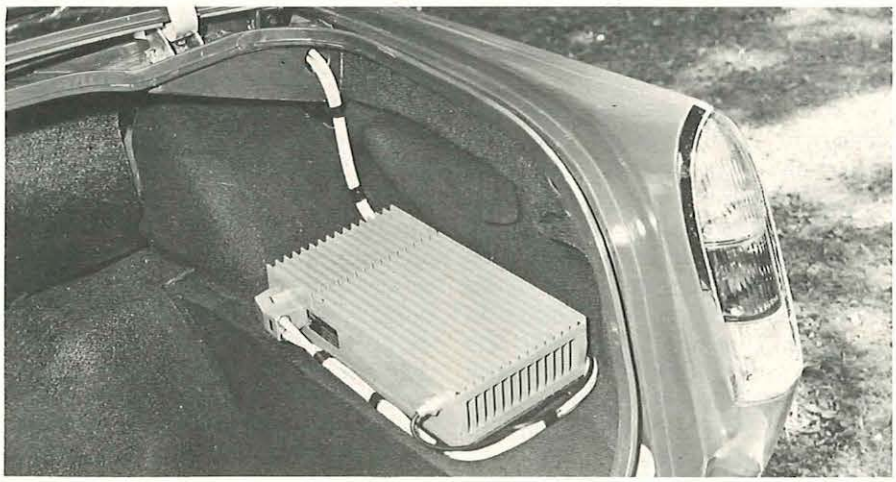
In some respects the new system is similar to its forerunner. The total geographical area covered – up to 30 miles from central London – is the same. The three original radio base stations, at Kelvedon Hatch near Brentwood serving the Eastern sector of the service area, Pimlico Station near Watford in the North West and Beulah Hill near Croydon in the South West all remain although a fourth station near Waterloo has been added which will provide the better signals for central London.

Some major changes have been made however. For example, the use of 25 kHz spaced VHF channels instead of the 50 kHz channel spacing of the old system has allowed a more efficient use of the frequency spectrum and has contributed greatly to the increased capacity.

Perhaps the most important change has been the introduction of the very much faster selective calling system which has considerably increased the amount of traffic which the Radiophone system can carry. Previously switch board operators dialled the number of a wanted mobile subscriber. Digit by digit the number was converted into a series of tone pulses and transmission of the number could take up to 13 seconds. Often the whole process would have to

This map shows the four base stations used by the London Radiophone service and the area each station covers.





Above: The Radiophone control unit can be fitted into the dashboard or, as in this car, below a normal car radio in a console built over the transmission tunnel. The two knobs on the right of the unit are for channel selection and volume control. Two push-buttons on the left are for on-off switching and for calling the Radiophone exchange.

Left: All the transmitting and receiving equipment needed in the car is housed inside this 14 in. by 10 in. box in the boot. It is connected to the aerial and controlled from the unit inside the car.

be repeated via each of the base stations in turn until the mobile subscriber was located. It was a time-consuming operation which sometimes resulted in "blocking" of the special radio channel reserved solely for the transmission of dialling signals and making it impossible to call a customer even though speech carrying channels were available.

With the new system the operator uses a keypad to transmit the customer's number, itself a much faster operation. The signals from the keypad are fed into an encoder which translates them into a chain of audio tones which are transmitted at high speed over the control channel to the three outer base stations in turn automatically. The complete signalling operation takes less than two seconds, the control channel being engaged only while the operator first takes it into use, keys the wanted number, and the automatic sending sequence proceeds. Thus many more calls per minute may be handled than with the superseded system.

Development engineers have also ensured that switchboard operators will have much better control over the system. Previously, for example, operators had no indication that a call had been received by a mobile until such time as the customer lifted his handset and announced his identity. But driving a car, perhaps on a busy highway, it could be many minutes before a customer found it possible to stop and answer. Operators had often to dial the same number several times over. The modern car set designed for the new service automatically acknowledges a call without the customer having to lift his handset and operators are given a lamp signal to confirm that the call has been picked up by the car. Previously too there was no indication that a call had been completed. Lamps will now also provide positive clear down signals. Such changes have also allowed the introduction of automatic call timing facilities. With the old system, timing of calls had to be carried out manually, the operators starting and stopping the timing clocks by hand.

The mobile equipment consists of a radio transmitter and receiver unit, usually mounted in the boot, an aerial, a control unit which may be mounted under the dashboard, and a handset. The control unit accommodates an on/off switch and a green pilot light (the radio need not be switched off when the car is not in use since the supply current is small and the drain on the vehicle's battery negligible) an amber incoming-call lamp, a "call" pressbutton, a

channel selector switch and a "channel engaged" lamp. A rotary channel-selector, similar to those on some household television sets, is used instead of a row of push-buttons so that the control unit may be made more compact.

Making a call from a mobile is a simple operation. The customer has only to lift his handset, switch to a free connecting channel appropriate to the sector area in which he is situated, press and release the call button; he cannot intrude on to an engaged channel. He will hear ringing tone until the exchange answers. He then passes his number and the details of the call he requires to the operator and is connected.

When a call is made to a Radiophone subscriber, the exchange operator keys out the code number and a signal goes out over the controlling channel. The mobile equipment automatically acknowledges receipt of the call and causes the acknowledgement lamp on the switchboard position to light. In the vehicle the call lamp glows and the subscriber receives a brief audible signal. As soon as he is able to do so, he lifts his handset, thus extinguishing the call lamp, and switches to a free connecting channel appropriate to his location. If he cannot answer his call immediately, the call will not be lost. The operator will have a record of it and will connect when the customer calls the exchange.

To give time for the existing Radiophone users to change over to the new system, the old scheme is being gradually phased out over a period of eight months. It will continue to operate side by side with the new system until January next year when it will be formally closed down freeing radio spectrum for the provision of more speech channels and enabling more new customers to take up service.

Subscribers to the original system were informed of the Post Office's new plans last December and were quick to take up the offer of service on the new system. At the same time the first 350 on the waiting list – the number which could be offered service immediately – were invited to arrange with their manufacturer for the supply of their mobile equipment.

London has now been given a modern Radiophone network with a potential capacity which will soon enable the Post Office to give the service to all who require it.

Mr D. R. Joyce is an Executive Officer in Service Department at Telecommunications Headquarters where he is involved in the planning and implementation of new services, including Radiophone.

Twin cableships join the fleet

The Post Office is to order two new cableships at a cost of about £7 million. The order will go to British yards and tenders for the vessels, each of 3,500 tons displacement, will be invited this summer. Final specifications are now being completed.

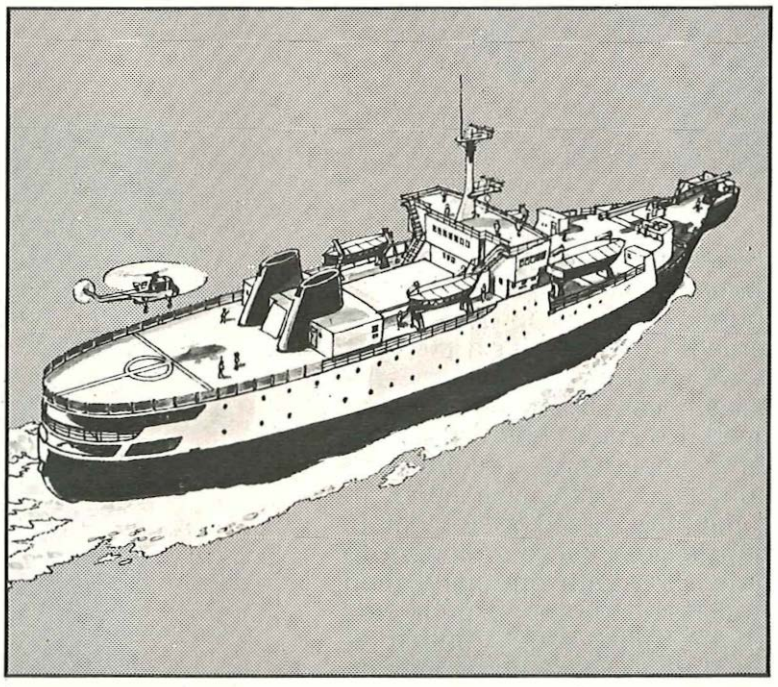
The ships will adopt a new technique for loading cable in containers. Known as pan loading it could reduce turn-round time at the cable depot from days to a matter of hours. The technique enables cable to be loaded and unloaded by crane in giant containers instead of being hauled in and out of cable tanks as at present. A new cable depot with pan loading facilities is being built by the Post Office at Southampton docks to serve the cableships. Fast turn-round times will speed up cable repair work and keep service interruptions to a minimum.

Each ship will also have a helicopter landing platform which will enable vital equipment and stores to be flown to them to speed repair operations still further.

They have been designed for rough weather work and will be able to continue repair operations in near gale force conditions – Force 7 (wind speed 30 knots). Present Post Office cable repair ships must stop work in Force 5 conditions when the wind speed reaches 20 knots. The new ships will be 310 ft long, have a 48 ft beam and a draught of 15 ft 8 ins. They will have a crew of 64, each with a private cabin, and be able to stay at sea for six weeks. To evolve the best design a 27 ft long scale model fitted with all manoeuvring devices was built and underwent extensive trials at Cowes, Isle of Wight.

There are two existing repair ships, Ariel and Iris, operating in Continental waters and the larger Alert designed for ocean repairs and cable-laying.

An Artist's impression of the new cableship.



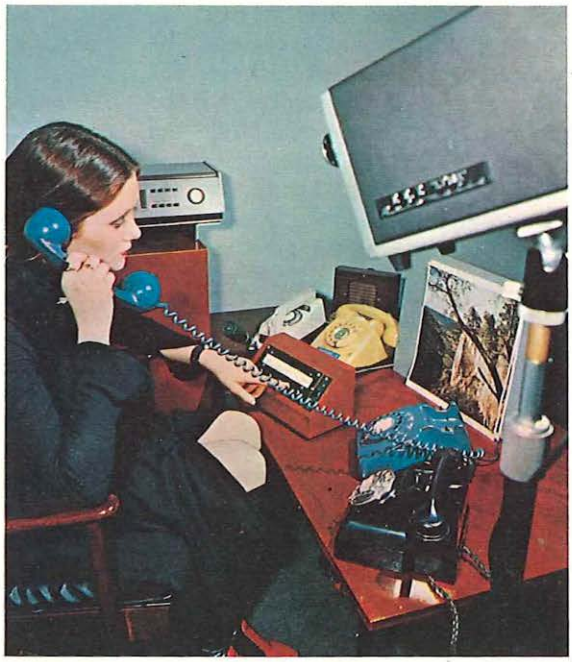
There is one factor in the highly technological world of telecommunications that cannot be ignored – the human factor. The triumphs of research and development in telephone equipment end up in the hands of the ordinary customer and the busy switchboard operator. It is important that they understand how to use this equipment, and can operate it efficiently. At the Post Office Research Department, Dollis Hill, a team of human factors research engineers are looking into the problems that arise when people come to grips with telephone equipment. A small part of their work is described and illustrated on these pages.

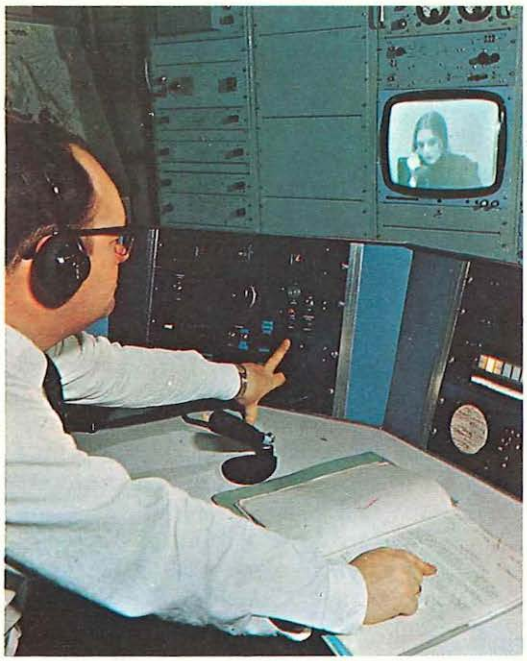
THE HUMAN FACTOR

To help achieve maximum operator efficiency at telephone switchboards equipped with push-buttons instead of dials, tests are being carried out to establish the best position for the buttons on the switchboard consoles. First, however, research engineers need to know how efficiently people perform simple tasks – such as the keying of numbers – with each hand. In the picture a volunteer, timed by stopwatch, is re-arranging the blocks from random to numerical order, first with one hand then with the other. This and other experiments have proved that most people find it as easy to key with their left hand as they do with their right, although the majority of people are naturally right-handed. As a result, switchboard designers will have greater freedom.

What is the ideal angle for the dial of a desktop telephone? The question isn't as simple as it seems. To find out research engineers have constructed a series of mock telephones with dials at the same height but set at a variety of angles ranging from the vertical to the horizontal. A conventional desk was marked out with normal-working, near-reach and far-reach "zones" as in the picture, and each phone in turn was switched from one position to another. The dialling efficiency of volunteers was monitored by a computer and, from analysis, it was established that for the majority of people the most convenient dial angle is about 45 degrees. In the far-reach zone a more vertical angle (about 50 degrees) has an advantage while shallower angled dials become markedly more awkward to use.

Engineers are constantly seeking ways of improving the design of telephone kiosks. Is the dial at the most convenient angle for the majority of people? Is the coinbox set too high or too low for the average user? In the experiment pictured here a volunteer is being measured before entering the kiosk and dialling a series of numbers which are back-projected on to a screen in front of her. Each number disappears the instant she starts dialling, thus increasing her concentration. The test is then repeated in adjoining kiosks with different dial and coinbox arrangements. Computer analysis of the results has shown that a dial height of about 46 ins and a dial angle of about 50 degrees make for easier use than the somewhat steeper mountings now being replaced.





How do people react to differing conditions during a telephone conversation? To find out a volunteer conducts a telephone conversation with another person in an adjoining room while an engineer in a separate studio (right) watches her reactions closely by means of a closed-circuit TV monitor as he creates or simulates different line conditions. He can vary the amount of background noise, for example, or by simulation adjust the length of line between theoretical exchanges and between the exchanges and the individual callers. The girl registers her opinion of the quality of conversation on each line by pushing an appropriately marked button on the console in front of her. The TV screen also enables the engineer to note such detail as the manner in which she is holding the handset and other equipment allows him to determine how loudly she is talking. The photograph in front of the girl is used to help stimulate conversation. With some volunteers a flow of conversation can be difficult, and the photograph gives them something to talk about. The overall aim is to make the telephone as efficient as possible in any given situation.

The advertisements reproduced on these pages illustrate the emphasis that is being placed by the Post Office on the marketing of data communications services. This article asks . . .

WHY IS DATA DIFFERENT?

R Cosgrave and G E Russell

DATA COMMUNICATIONS represents only one per cent of the telecommunications business, but it requires a heavy investment in publicity, customer education, forecasting and market research. The projected digital data network will demand an initial commitment of about £60 million. This figure is only a small part of the £3,000 million investment over a five-year period for the telecommunications business as a whole, but it is considerably more than the present size of the data communications business would seem to warrant. What then is the justification for this?

The growth of data transmission has been a remarkable achievement. In 1965 there were only eight modems in operation. (These are the devices which convert data signals into a form suitable for transmission over Post Office lines.) Three years later this figure had risen to over 1,000 and in March this year there were 19,000 Post Office modems installed. Although the United Kingdom has only 24 per cent of the computers installed in Europe, it has more data communications terminals than the rest of Europe put together. This suggests either that British manufacturers are unexpectedly forward thinking in their undertanding of the potential of data transmission, or that services available to UK customers are very much more extensive than those available in Europe. It is probably fair to say that the Post Office has earned this European pre-eminence in data communications.

In 1968 the Post Office commissioned a report from Scientific Control Systems, Ltd (SCICON) on the future requirements for data transmission in this country. SCICON forecast a rapid growth which at that time the Post Office was not geared to meet.

Although a great deal of technical progress had been made, there was very little knowledge of the services customers were likely to need and how to provide them. It was decided as a result of this report and internal researches to set up a separate marketing division – the Data Communications Division – whose responsibility would be to cater for customers' needs in the short term and to plan for long-term rationalisation of data transmission services.

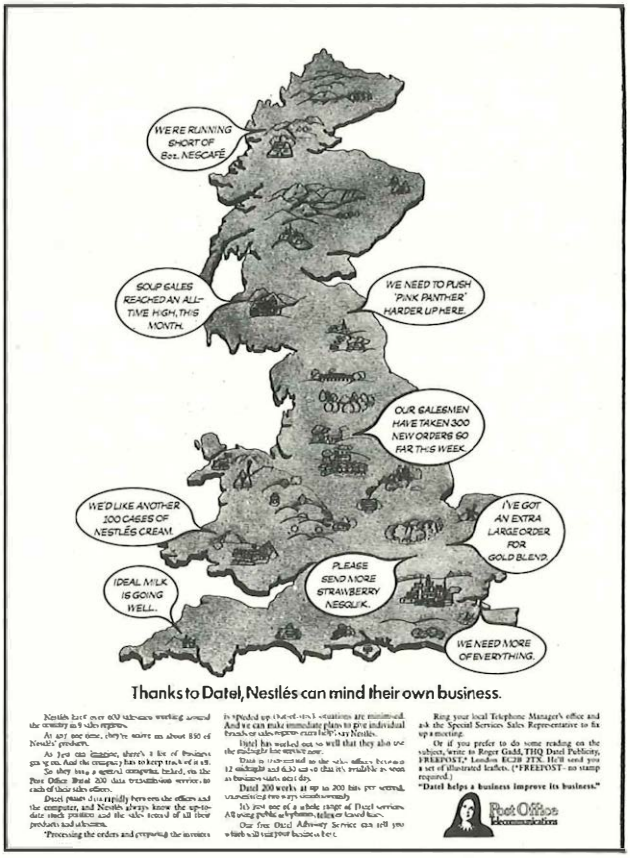
An immediate problem facing the newly created Division lay in staffing. There was a good deal of expertise available in the field of telecommunications marketing, but little in marketing data communications specifically. It was realised from the beginning that it was necessary to recruit directly staff who had served at least a two-year period in the data processing industry, and whose understanding of the computer world would give them a basis on which to graft a knowledge of communications. It was intended, and this has proved successful in practice, that the combination of professionals from the computer and the telecommunications fields would provide a hybrid Division with a cross section of the necessary skills. Simultaneously a great deal of effort was put into setting up intensive training courses in data processing, telecommunications, data communications and business appreciation to enable all members of the Division to operate knowledgeably in the computer world.

It became clear at an early stage that there were serious problems. For example, forecasts were likely to be erratic – SCICON itself was out-of-date within a year. The contrast with the forecasts of telephone business was remarkable – but explicable. To forecast telephone growth primarily involves estimating the number of exchange lines and telephones required: obsolescence is not a problem. Additionally, there is historical information back as far as 1915 which provides reliable data on which to base a forecast. The area sales force, as a result of local knowledge and wide experience, are a vital element in producing accurate estimates of future demands. Forecasting data transmission requirements is a very different matter. There is a crippling lack of historical information: statistics on the datel services go back only six years and relate to a small proportion of our present data services. Forecasts must be made for an ever-growing, ever-changing range of equipment.

Our market researchers face similar problems. They are required to elicit from customers information on their future requirements in the data communication market, although many of these customers are hampered through inexperience, over-optimism or sheer lack of knowledge from giving any sensible guidance on their future needs.

After two years of existence, the Division now has sufficient staff and a broad enough knowledge of market requirements to be structured to meet the long-term needs of the data communications business rather than the exigencies of the moment. It now has four sections. One is concerned with short- and long-term forecasting of data communications growth within the UK and also co-operates with European administrations with the aim of encouraging international compatibility of future services. A second section has responsibility for marketing existing data transmission services, management of new products and publicity. A third is concerned with market research and with an intensive study of the marketing aspects of the projected digital data network.

The largest of the four sections within the Division is the customer advisory service. It is comprised largely of staff with extensive Post Office sales experi-



ence who have had the technical training necessary to equip them to act as advisers in the field of data communications. This service deals only with those cases that cannot be dealt with at Regional or Area level, and these tend to be cases involving geographically diverse networks or requiring a high level of expertise. The banks, for example, with extensive, complex and continuously changing networks require centralised control. An example of the kind of case handled by the advisory service for both geographical and technical reasons is the National Coal Board. In addition to handling the normal day to day data communications requirements of the NCB, the advisory service, in conjunction with Network Planning Department colleagues, is currently working on a detailed survey of its transmission needs over the next five years. These cover seven computer centres and almost 200 terminal locations and involve making recommendations based on analyses of traffic patterns.

Members of the advisory service have been seconded to outside firms in a consultative capacity as data communications experts. It is likely that, when Regional and Area staff have been given the necessary training to enable them to deal with complex data cases, the headquarters advisory service will move further towards consultative work and in-depth studies akin to TAS reports produced by the telephone side of the house.

It will be clear from the foregoing that the Division, although new, appreciates the problems facing it. It has proved itself willing to experiment, and to learn from its mistakes. A recent example of its pioneering spirit was shown by the decision to offer to the public a series of 26 seminars which set out to explain the Post Office role in data communications. The primary aim of the series was in the sphere of customer education: papers on existing and future UK and international services were offered. However, it was hoped that there would be a public relations bonus, and that ideas would be gained from customers through discussion on the kind of services and facilities we should offer in the future. Criticism was encouraged.

The audiences varied greatly. Some of the seminars were presented to specialist groups: one, for example, was geared to the needs of the communications managers division of the Institute of Office Management. Others were presented to wide-ranging audiences whose only common feature was that they had responded to newspaper advertisements for the seminars. In retrospect, the experiment proved to be worthwhile, principally for the ideas it gave for future developments in customer education. The idea of holding specialist seminars has been vindicated. It also became clear that there was a widespread demand in industry and in educational institutions for courses in data communications. It was therefore decided that the Division should launch a series of commercial training courses – to be run at a profit – which would fulfil the basic training requirements outlined by customers. This series will begin in October this year.

This has been a brief survey of the way in which one Division has attempted to cope with the manifold problems posed by the computer age. The responsibilities of the Post Office to industry in general are already enormous, and data communications is becoming a vital part of the industrial scene. With the rapid technological advances being made in the United States and in Europe, to be competitive abroad our manufacturers must develop their expertise in communications equipment. The Post Office must co-operate to ensure that its own technology is compatible with these developments. In the interests of the whole spectrum of British industry it must also ensure that data communications in the UK maintains its European pre-eminence. The Data Communications Division is a small but vital part of this effort.

Mrs R. Cosgrave is a Senior Sales Superintendent in the Data Communications Division of Telecommunications Marketing Department. Her work deals with the customer advisory service.

Mrs G. E. Russell is a Telecommunications Management Entrant working in the publicity group of the Division.

Learning to manage

E S Loosemore

A new residential management training college, purpose built to provide the type of training that will be needed in the late 1970s and beyond, is to be set up by the Telecommunications business. As a fully integrated unit it will bring management training activities under one roof for the first time and will ultimately replace the widely dispersed organisation which has existed since the late 1940s. This article looks at the way management training has developed within the business over the years.

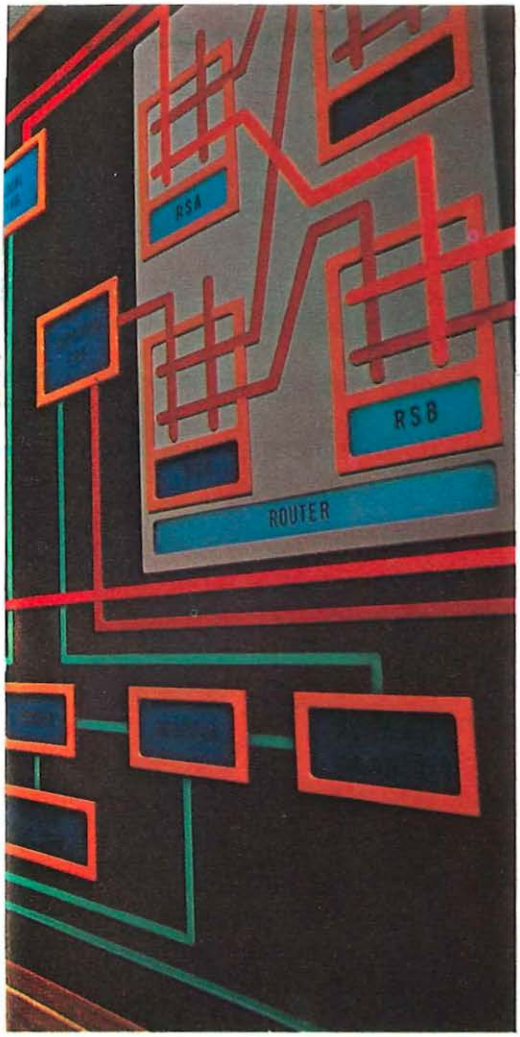
THE PRESENT arrangements for management training within the Telecommunications business stem from the efforts made immediately after the Second World War to establish internal training courses specifically for the study of management. By the late 1940s training in Organisation and Supervision for engineering first-line supervising officers and middle management had become a recognised feature of the courses at the Central Engineering Training School (CETS) at Stone, Staffs. This was followed at the beginning of the 1950s by a development of considerable significance – the setting up of a residential Management Training Centre (MTC) in an hotel at Clacton-on-Sea, Essex.

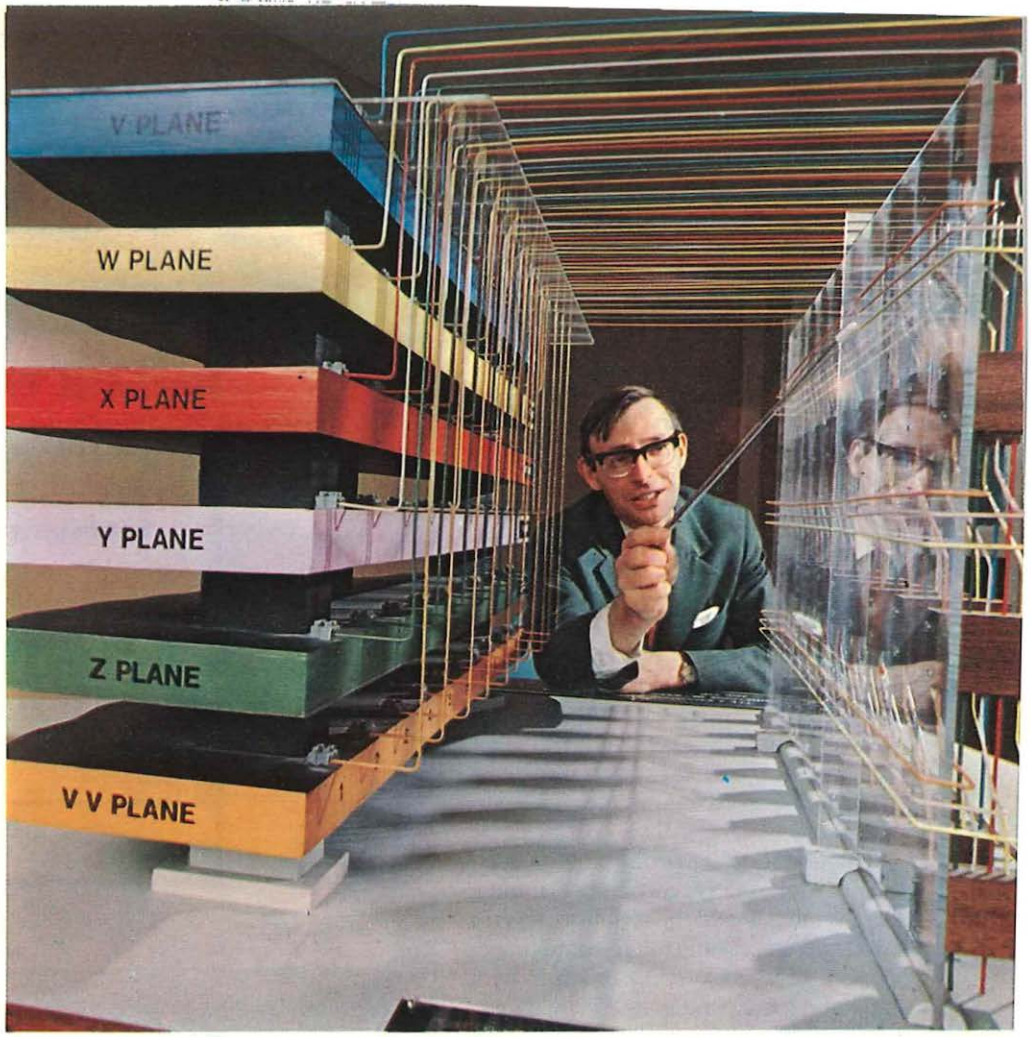
At first the month-long courses catered for both Postal and Telecommunications staffs. The earlier courses were attended by Head Postmasters of the larger offices and by Telephone Managers but, within a year or two, the range of eligibility was extended to include heads of divisions in Telephone Areas and a small number of staff at corresponding levels in Regional offices and at Headquarters. Subsequently the Management Training Centre was moved to Eastbourne, Sussex, and separate programmes of studies developed to meet the differing needs of Postal and Telecommunications managers.

The growing interest in management training and the needs of staff other than engineering led, during the late 1950s and 1960s, to the development of management training on a hierarchical basis for staff in the executive, sales and traffic grades. In 1965 premises were acquired at Bexhill-on-Sea, Sussex, which enabled a considerably increased programme of engineering management training to be undertaken. At the same time it relieved the pressure on accommodation at the Central Engineering Training School.

Following the setting up of a separate Telecommunications business in 1968 the various management training establishments were drawn together to form a single organisational unit. This set in motion a process of rationalisation and development of management training to meet the needs of the Business which should continue throughout the 1970s.

The Telecommunications Manage-





In the days when the telephone network consisted solely of Strowger electro-mechanical equipment it was a fairly simple and cheap exercise to set up a working model to show students how a call was routed step-by-step through an exchange. With the introduction of crossbar and electronic exchanges no such simple demonstration is possible. TMC *London uses the electronic board (pictured above left) which is programmed to show the routing for seven different types of call through a crossbar exchange. By a remote control switch, shown here in the hand of tutor David Hardwick, the board can be lit up section by section as the call progresses through the equipment, and each step of the process can be explained to the students. Above right tutor Brian Fisher is seen with part of a three-dimensional model which he uses to explain the different switching stages involved in the most modern of the electronic exchanges, the* TXE4 *large local exchange.*

If you catch the boss puzzling over a jigsaw or building towers with Lego bricks don't worry – he is probably attempting to develop his powers of leadership. The belief is growing that business leadership is not so much based on a great list of fine human qualities, but more on a man's ability to accomplish certain functions which need to be performed in a given situation. This concept has become known as Action Centred Leadership (ACL). *It is a concept now being practised at* TMC *London by the use of management games, one of which is the building of a tower with Lego bricks officially known as the Mast Contract Game. The idea is to build the tower at maximum profit . . . the higher the tower the higher the profit, the less bricks used the greater the profit and the faster the tower is built the more profit is made. The game is played by a leader and a team of four who are given three graphs which relate height, bricks and time against profit. The team is given half an hour to decide how they will go about the job and up to 10 minutes to build the tower. From the information supplied and within the time limits set the leader has to deploy his team in a way which will enable him to build a tower of maximum profit. For example would he be better building a small tower quickly, saving time and materials, or would it be more profitable to build as tall a tower as possible in a longer time. He also has to consider the type of structure he is going to use – the width of the tower and how many bricks will be needed at the base to hold a tall structure. The vital part of the exercise is played by the remainder of the class who are looking on. They discuss the actions of the leader, the merits of his decisions and how well the team and its individuals have performed in achieving the task overall. In the picture two participants in the Mast Contract game put the finishing touches to their tower at Manor Gardens, London.*

ment College (TMC) was established in January 1969 with the Head of Management Training Branch in Telecommunications Personnel Department as its Principal. At its inception the college consisted of the various functional and training establishments in being at that time. Engineering management courses were conducted at Bexhill, general management courses at Eastbourne and in London courses for executive, sales and traffic grades were conducted at premises at Manor Gardens and Bridgewater Square. Provision was also made for the Telecommunications Management Entrant (TME) – graduates who after about two years' training are regraded in non-engineering posts as Higher Executive Officers, Senior Telecommunications Superintendents or Senior Sales Superintendents.

During the last three years a number of changes have taken place both in the organisation of the constituent parts of the college as well as in the range and scope of the courses on offer. The Manor Gardens and Bridgewater Square establishments have been regrouped to form TMC London and additional courses on

Instructor training and Management Sciences/Techniques made available. Special seminars are now also held at TMC Eastbourne and a new Management Education and Research Unit has been set up.

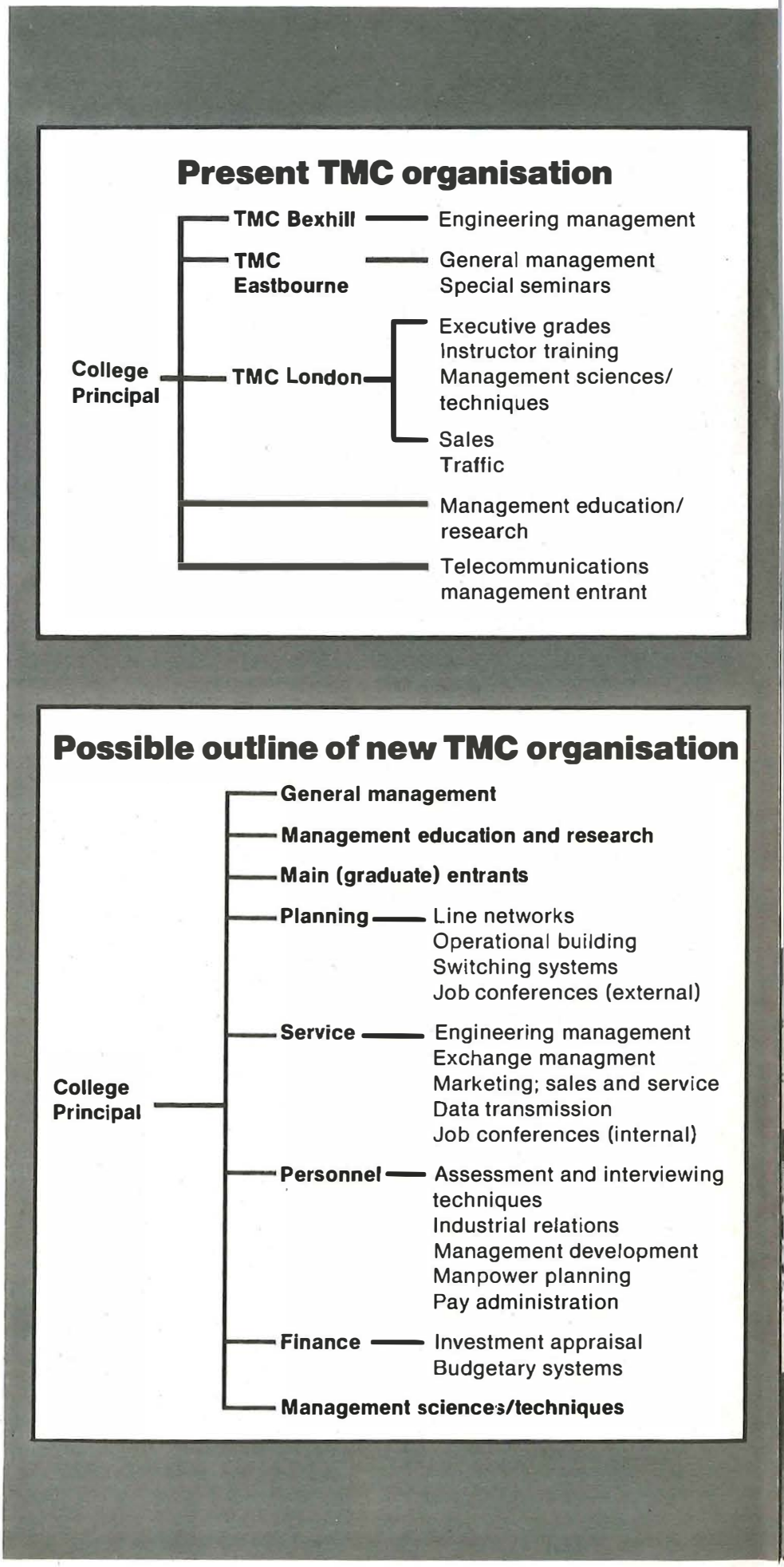
TMC Bexhill is a residential wing of the college which provides training for first and second level engineering management. The needs of the customer in terms of timely and reliable service, the need to develop and maintain good individual and group relationships, cost consciousness and the need for further improvement in productivity provide the underlying themes for these courses.

TMC Eastbourne is also a residential establishment utilising a suite of rooms in an hotel during the period October–May each year. Studies in general management are held for staff taken from "across the board" at middle and senior management levels. The studies cover such subjects as environmental factors, business objectives, corporate planning, organisational and behavioural science concepts, the customer and communication. The special seminars deal with human relations and industrial relations. Courses last either one or two weeks and mostly cater for mixed groups of Headquarters, Regional and Area staff. A small number of courses are arranged for Headquarters staff only.

TMC London covers a variety of training for executive, traffic (excluding Telecommunications Traffic Officers) and sales (excluding Sales Representative) grades. Instruction in management sciences/techniques includes courses run at a private conference centre near Northampton and investment appraisal courses at Manor Gardens. This series of courses, and others on interviewing techniques, are available for staff drawn from "across the board". Courses for training instructors and tutors and for occasional speakers are among those in constant demand.

A management education adviser, a former principal lecturer at a polytechnic, was recruited in April 1971 to head the new management education and research unit. He is currently assisting with the training of TME recruits, undertaking a number of research projects, and reviewing the need for management education as a complement to management training, within the business. A possible outcome of this may be the development of studies in the social sciences, particularly in relation to their implications for the Telecommunications business.

The organisation and general oversight of TME training is in the hands of a Director of Studies (Controller) assisted



by a number of Principal Tutors covering those in Headquarter's Departments and working closely with Personnel Controllers in the case of those attached to Regions. These arrangements extend to other main graduate entrants, for example Executive Engineers engaged on field work on completion of their course at the College of Engineering Studies, Horwood House, Bletchley.

Attendance on the various courses is arranged according to the particular needs of an individual in relation to his present job or in preparation for a change of job. In addition to TMC courses there are the engineering training courses held at Horwood House, Bletchley, and a number of specialist courses run by individual Headquarters departments such as the management sciences courses provided by the Telecommunications Management Services Department and the value analysis seminars arranged by Purchasing and Supplies Department.

Thus far, the article has dealt with the main historical aspects of the development of management training within the Telecommunications business as background to the present arrangements. But what of the future?

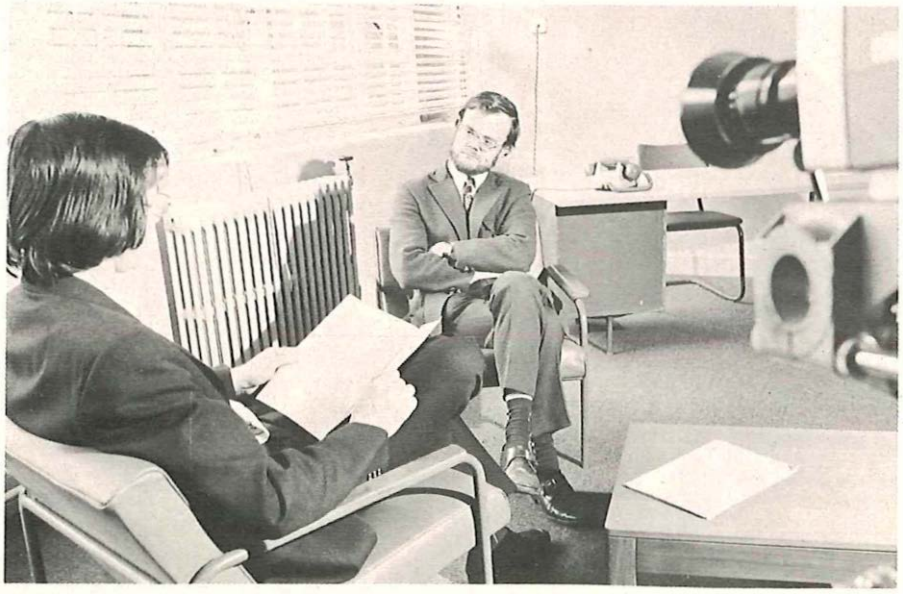
The TMC as at present constituted with its various dispersed establishments is rapidly reaching the limit to which it can be usefully developed and adapted to meet the needs of managers as the business moves towards an organisation based throughout according to purpose and function. It is to meet changing requirements of the business in the late 1970s and beyond that a new purpose-built residential management college is to be set up.

A start has been made to determine likely requirements. Sites have been investigated and one now looks particularly promising. Planning currently assumes a student population of 200 at a time for an opening date in 1976, and some thought has been given to the new programmes of courses that will be held at the College and to the new organisation that will be needed.

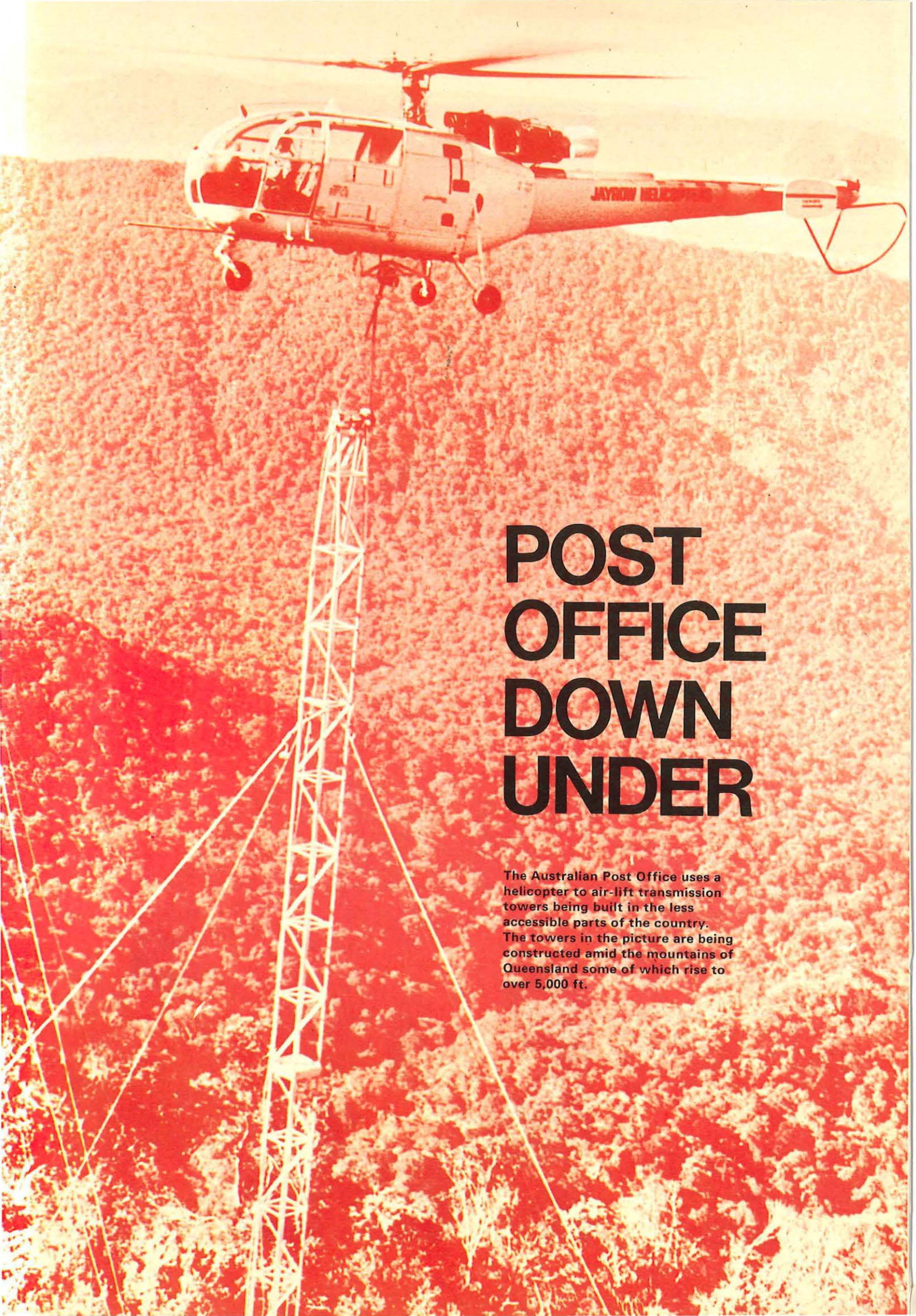
Much, however, still remains to be done before the concept of a fully integrated residential telecommunications management college becomes a physical reality. But when it does the managers and the business in general should benefit tremendously.

Tutor Bert Coltman explains to sales staff some of the different types of telephone plans that are currently available to Post Office customers. This demonstration room at TMC London contains about 100 different types of telephone equipment, and all the equipment is "live" so that students can not only have the various telephones and extension plans explained to them but can actually try them out.

Modern teaching aids are used extensively throughout the TMC organisation and closed-circuit television is no exception. This picture shows the CCTV studio at Manor Gardens, London, which is often used as an aid in demonstrating and discussing different types of interviewing situations; it may be a salesman attempting to sell Post Office equipment to a very awkward customer or a senior officer in a counselling interview with a member of his staff discussing the latter's work performance and promotion opportunities. In the picture above a counselling situation has been set up with a student playing the role of the senior officer and a tutor acting as one of his junior staff. In a separate classroom students watch the performance on a TV monitor and can discuss the good and bad points which occur throughout the "interview". At the same time a video tape recording is made and parts of the interview can be played back so that the tutor and class can highlight aspects of interviewing technique.



Mr E. S. Loosemore is Principal of the Telecommunications Management College. He was formerly Director of Studies in Management Training at TMC Eastbourne and before that Controller of Recruitment and Training in London Telecommunications Region.



POST OFFICE DOWN UNDER

The Australian Post Office uses a helicopter to air-lift transmission towers being built in the less accessible parts of the country. The towers in the picture are being constructed amid the mountains of Queensland some of which rise to over 5,000 ft.

A COUNTRY of only 12½ million people spread unevenly over a vast three million square miles, Australia has always posed basic communications problems quite different from those of most other nations in the world. While the greatest population concentrations are along the Eastern and part of the Southern seaboards, smaller population centres thrive throughout the rest of the continent. All require modern and effective communications links.

In the 183 years since European settlement, unique communications problems have arisen as people moved to settle in communities across the vast open spaces. Further strains have been imposed by the rapid increase in population which has doubled in the past 40 years. Spurred by an energetic immigration campaign, the population figure has risen more than 50 per cent in the past 25 years.

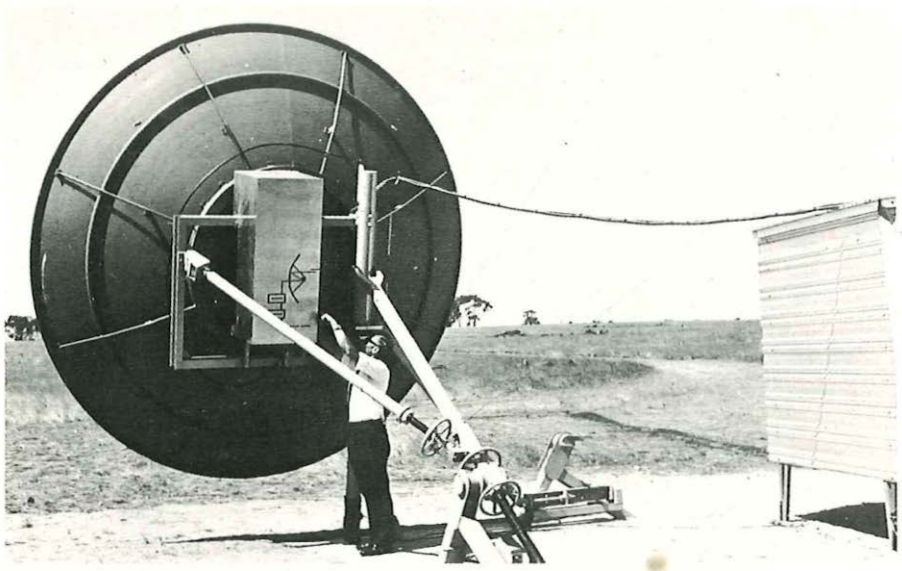
With a workforce of about 110,000, the Post Office is Australia's major single employer. Sixteen thousand migrants with 50 different national backgrounds work in many areas of Post Office operations. Of the total workforce, 28,000 are engaged directly, and several thousand others indirectly, in telecommunications fields. Because of Australia's size, a high measure of mobility is essential. The Post Office operates the nation's biggest motor fleet: 13,000 vehicles, ranging from postmen's motor scooters to heavy delivery trucks and earth moving equipment.

Telephone lines in operation total 2.1 million, just double the number of 13 years ago. This year the service will handle 3,000 million telephone calls – the number has doubled in 12 years.

Until 1960 the telephone network operated by step-by-step systems. Since then a modified L.M. Ericsson crossbar system has been gradually introduced and today handles about 50 per cent of the telephone operations. The Australian Post Office has adopted the ITT 10C system as an alternative standard to the crossbar switching system for trunk switching, and the first of these installations is due to be commissioned in Sydney in 1973, followed by Melbourne and Adelaide in 1974/75.

Studies are being made into the further use of stored program controlled systems for other applications, in particular for use in large local exchanges in central business districts where there is a combination of heavy telephone traffic and a requirement for advanced facilities.

Subscriber Trunk Dialling was introduced in 1959. Now half of the 225 million trunk calls made annually are dialled STD. With continued expansion of STD facilities, this figure is expected to reach 66 per cent by 1975. Automatic dialling is available to all in metropolitan areas – the six State capital cities – and to 80 per cent of country subscribers. Altogether 92 per cent of subscribers, in the most closely settled areas as well as the remotest, have automatic services.



Australians living in the lonely outback may one day have their own satellite tracking earth station in the back garden. An antenna like the one in the picture could link them via a domestic satellite to the national telephone network. The 12 ft diameter antenna can be manually pointed directly at a satellite. A very sensitive amplifier mounted behind it receives the extremely weak radio signals from the satellite and amplifies them sufficiently to permit connection to telephone terminal equipment.

It is an illustration of the success of STD and the increased use of telephones that 10 years ago each subscriber made on average only 46 trunk calls a year while today the figure has reached 80 a year and continues to rise. Subscribers in the metropolitan areas make only about half the number of long-distance calls logged by subscribers in country areas. This again demonstrates the pressure on the Post Office to cater for the greater demand for trunk services in the less populated areas. But the busiest trunk route has always been between Australia's largest cities: Sydney and Melbourne. In 1961 that route operated with 156 trunk channels. Today it has 764.

To carry its communications across the country, the Post Office has more than a million miles of aerial wire and 24 million miles of cable. Straddling the continent are 100,000 miles of pole routes, but this mileage is steadily decreasing.

In 1962 the first interstate coaxial cable was installed over the 580 miles between Sydney and Melbourne. Today there are 15,000 miles of coaxial cable carrying Post Office telecommunication services throughout Australia. In more recent years long-distance microwave systems have been introduced covering 45,000 bearer miles. They are still being expanded, and in July last year the West Australian capital, Perth, was linked with Sydney (capital of New South Wales) by a 2,600-mile microwave link.

There has been dynamic development in all branches of electronic operations, but perhaps the speediest growth has been in Telex services. Fifteen years ago Australia had only 100 Telex services transmitting 5,000 messages a year. Now more than 7,000 services handle more than 10 million calls yearly.

The development of a major oil industry and vigorous expansions in mineral explorations and marketing have accelerated demand for both Telex and data transmission services. More than 1,100 computers have been installed throughout Australia, and to meet the demand for communication of data from and between these machines the Post Office introduced its Datel service in 1969 to enable digital data for computers to be transmitted over telephones and telegraph lines. Switched circuits provide a guaranteed service at 600 binary digits per second (bit/s) and this is expected to reach 1,200 bit/s over all circuits in future. On leased circuits modems are provided for up to 4,800 bit/s.

A wideband network for data transmission (Common User Data Network) is being established, and message switching centres incorporating duplicated computers and mass storage systems are being installed in the State capital cities. The first centre was brought into service in Brisbane at the end of 1971 and the

A technical officer tests equipment at the Common User Data Network Centre in Sydney prior to the launching of Australia's first wideband network for data transmission. The first message switching centre has opened in Brisbane, and the full network linking State capital cities should be in operation next year.

A cable layer in operation on the 1,140 mile Perth-Geraldton-Carnarvon coaxial cable project in Western Australia – one of the longest coaxial cable trunk system routes in the world.

full network is expected to be in operation by the middle of 1973.

In June the Sydney and Melbourne premises of a computer organisation were linked by a special service allowing data at 40,800 bit/s to be sent over a wideband circuit equivalent to 12 telephone circuits. It was the first service of its type in the Southern Hemisphere, and its introduction added the Australian Post Office to the short list of administrations providing 40.8 kilobit/s transmission service.

As part of its general research and planning programme, the Post Office since 1966 has been investigating the possibilities of operating its own domestic satellite for internal telecommunications services. An Australian domestic satellite would immediately remove many of the difficulties standing in the way of extending full telecommunications facilities to some of the nation's more remote areas. In the less populated parts of the interior, great areas of uninhabited and often difficult terrain pose acute problems for the installation of earth-based telecommunication facilities.

Recent studies into the practicability of a domestic satellite revealed that the costs of long-distance telephone calls and television relays could be economically attractive, the Post Office has already done some work in this field of domestic satellite links. Last year, before the East–West microwave link was completed, the Intelsat satellite system was used as a communications link for traffic between Perth and the Eastern States.

Planning philosophy takes account of the dynamic nature of the network, which is evolutionary. Some aspects of network development are planned 20 years ahead. State, metropolitan and regional network plans are prepared to cover eight-year periods and are updated each three years, or as necessary. The Five Year Plan of Development summarises the requirements of the network in capital and material resources and the achievements expected in the next five years. This is updated yearly, as are the three-year works programmes of engineering construction. In addition, there are long-term policies forming a basic framework for all planning. These include the Community Telephone Plan 1960, which has the prime objective of a fully automatic nationwide telephone system and covers the period up to the year 2010. To include the large component of the network which will cater for services other than voice telephony, new plans are being formulated with wider scope including The National Telecommunications Plan, which will reach forward to the year 2020.

HQ FOR WALES

A new headquarters is being built for Wales and the Marches Telecommunications Board. It is described here by Mr A. Evans, Planning Officer for the project.

THE MOVE to a new headquarters complex outside Cardiff's city centre will ease a chronic accommodation problem for staff of Wales and the Marches Telecommunications Board. Like so many others, the headquarters staff has long suffered from out-dated accommodation, and now gradual growth of the headquarters and the ending of tenancies has made the need for a new building imperative.

Cardiff has the usual elements which make it difficult to find suitable new office accommodation in large centres – a scarcity of sites and soaring costs, coupled with increasing traffic congestion. Those buildings which were available were either too expensive or unsuitable for other reasons, and a move out of the city centre seemed inevitable.

Informal discussions revealed that staff associations would not object to the setting up of the new headquarters at Coryton, an attractive site five miles from the centre which already holds Post Office training buildings. The site was considered some years ago for a new Telephone Manager's office, but discarded because of travelling difficulties. However, car ownership has increased substantially in the intervening period, and a survey of headquarters staff opinion showed that a majority were in favour of the move.

Coryton is close to residential areas and one of the main routes into the city, so many people will be able to get to work more easily. The opportunity for traffic-free travel and easy parking close to the office undoubtedly influenced attitudes. Special bus facilities will be arranged for those without their own transport, and for those unwilling to go to Coryton, because of travel difficulties or for other reasons, interchange with staff from Cardiff TMO will be arranged.

We are particularly fortunate in the Coryton site which covers 19 acres and will meet all accommodation requirements for an indefinite period. It was once the home of the coal-shipping Cory family and overlooks the city and Llandaff Cathedral to the south, attractive countryside to the west and Castell Coch, at the head of the Merthyr Valley, to the north.

Part of its attractiveness is that it can, and probably will, be developed as a sports and social centre for all Post Office staff in Cardiff. Tennis and putting are two of the outdoor activities planned for the extensive grounds, and extra-high lounge and dining areas, with wood block floors to allow for such games as badminton, will be features of the building.

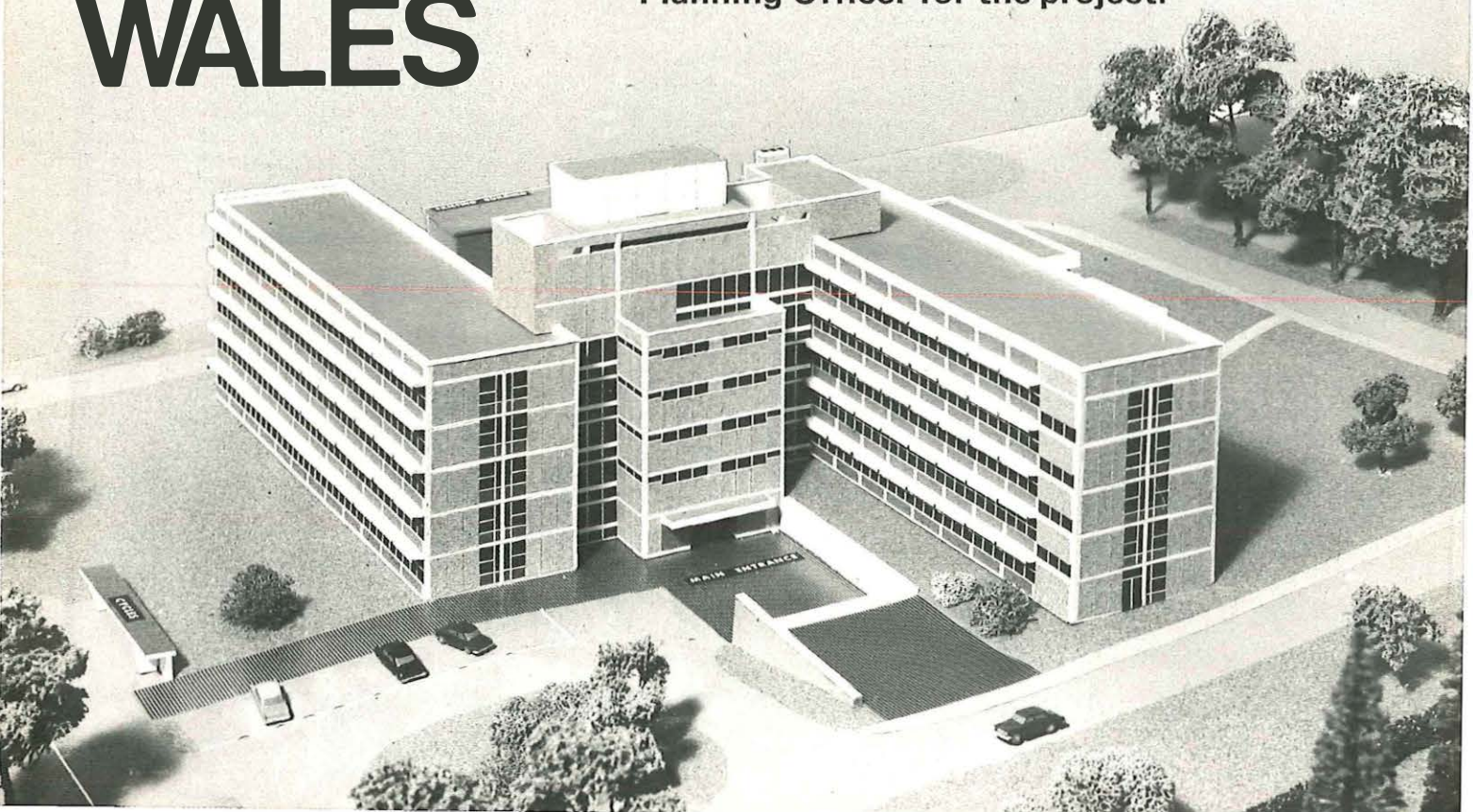
The headquarters will consist of two five-storey blocks joined by a six-storey lift and lobby complex. A single-storey welfare block consisting of kitchen, dining room and lounge, toilets and showers, will be linked to the main office block by a short covered way.

John Laing Construction won the contract for the headquarters building and started work on the site last October. The building, expected to cost £763,000, will be completed in May 1973 and occupied the same year. (A model of the building is shown below.)

Points which may be of interest to office planners are that all windows will be capable of being cleaned from inside the building, and those windows on the long, south faces will be partly screened from sunlight by overhead ledges. The extra cost incurred in providing special windows compares favourably with that of window cleaning cradles and will, of course, obviate the danger of using such equipment – and the cost of maintaining it – as well as speeding up the operation.

Carpet will be provided throughout the building. It costs more than lino and will not last as long, but it is more comfortable, will reduce noise levels in open-plan offices and will enable a saving to be made in acoustic ceiling tiles. A study of overall comparative costs came down in favour of carpet.

It is appropriate in this building that telephone cables are to be laid in the floor surface, and ducts will be parallel to the wall so that the best access for any desk position can be provided.



SELLING TELEX

THE LOCAL CAMPAIGN

W E Ward and
K C Wilson

Above: Part of the exhibition at Grimsby.

Right: The authors Bill Ward (left) and Ken Wilson (centre) discuss the Grimsby campaign with Regional Public Relations Officer Peter Frost.

THE GROWTH rate for the telex service in the North Eastern Telecommunications Region stood until recently at 7 per cent against the national annual growth target of about double that rate. Currently, however, telex sales in the Region are rising faster than at any time before. Despite the fact that the North East of England has suffered more than most other areas of the country from large scale unemployment and economic instability, the growth rate is now approaching 12 per cent.

Significantly, the improvement dates from the decision in the Region to alter its approach to telex marketing by concentrating its resources on localised campaigns aimed at specially selected groups. We have dispensed with what can best be described as a very general approach to telex selling in which anyone willing to listen was approached, although many had no real need for the service at all. We have put in its place a system which uses modern marketing techniques to produce a group of selected customers whom we know will benefit from telex and who are therefore "real" potential customers. This marketing approach is concerned with who the customer is, what he wants in a given product or service, what price he will be willing to pay and where and when he will want it.

The previous general approach was a selling job pure and simple. It depended on the day to day activities of sales representatives who were given little if any specialised support like local advertising or market research surveys. The result was that much of their time in the field was unfruitful. There was also participation in numerous commercial exhibitions held throughout the Region. But such displays always attract the general run of public visitors, not to mention the inevitable hordes of schoolchildren, all of which makes it very difficult to identify the real customer.

We now devote our marketing efforts exclusively to customers whom we know have some need that could be satisfied at least as well and as economically by the renting of telex service as by any other available means and, equally important, who have the financial ability to satisfy that need.

A significant factor in the local campaigns is their dependence on the skills of the Region's own staff. No outside help is sought. They are very much a team effort by Marketing and Public Relations Division staff at Regional Headquarters and staff in the Area involved. This has resulted in a large reduction in potential costs.

One of the most interesting localised campaigns took place in the fishing town of Grimsby and the surrounding business communities based on South Humberside. It began by looking at the heterogeneous collection of 6,000 business telephone line users in the locality.

As a starting point we knew that we already had in the catchment area 143 existing telex users. What we didn't know was whether we had reached saturation point and we set about identifying the true potential market.

Desk research revealed 161 large customers with PBX installations of 3 plus 12 switchboards and above, with a further 200 renting 2 plus 6 boards. Telex penetration into the latter is only five per cent or so at best and identification of the firms within this bracket who have both the need and the financial resources for a telex service is very difficult indeed. But Sales staff set about weeding out those customers who were not likely to rent telex – small schools, surgeries, Customs Posts etc – and by the time they had finished the list of potential customers looked quite small. The deep water port of Immingham, for example, produced less than 20 PBX installations not already renting telex and of these only one rented a PBX of sufficient size to suggest that telex might be useful to it.

At the end of the exercise, of the 6,000 business telephone line users in the catchment area that we started off with only 262 could be considered as potential telex users. By the time we had added those existing customers whom we thought might be interested in automatic telex – those who were renting the older standard teleprinter 7E or who had basic service only – our list jumped to 350. It formed the basis for a mailing list of both new and replacement business. We had our true potential market.

The next step was to determine the method we should use to sell to these customers. The chief problem in industrial selling is often to get in touch with the right man. It is even more complex with telex since several people from operatives to top executives may be involved. We decided upon a local exhibition which does provide the right kind of platform for this particular function. It allows displays and working models to be set up in an environment which can be made attractive and satisfying for the customer. And, of course, unlike the major commercial exhibitions, we had a very carefully pre-selected audience.

A suite was rented at the Humber Royal Hotel and an exhibition display was planned. Public Relations Division provided the high standard of specialist expertise that was required in this field. They played their part in the selection of the site and were responsible for the design and erection of the display which included original panels featuring Grimsby and the Humberside Region to provide local interest points. This work has eliminated the need for outside designers whose fees for major exhibitions can be several thousand pounds. Moreover floor space of 20 ft by 15 ft at a big exhibition will cost in the region of £300. For local exhibitions a suite in a local hotel eight times that size will cost as little as £40 and, in the larger towns like Newcastle, seldom more than £170. The average costs of the localised campaigns varies between £250 and £350.

Normally we support local campaigns by advertisements in the local media. But at Grimsby we were using sales promotion methods – bringing the products to the customer – and therefore had no need to advertise. It is sound policy, however, to build upon the awareness of telex such an exhibition can create and a Public Relations Division news release was despatched to local press. This subsequently produced a story and photographs to spread the telex message for us.

In industrial selling, and particularly so with a proposed new and relatively more expensive service, there is an interval between a change in the selling activities and its effect on sales. At Grimsby 29 firms accepted our invitation. So far we can claim four orders for new lines and one change of instrument to Auto Console.

The marketing function in industry stems from and is based upon fundamental considerations of needs and wants. Our approach is essentially one of offering an integrated team of specialist services to our Areas in support of declared objectives and to help pave the way of the selling force by identifying the interested parties.

To avoid confusion we place management responsibility firmly with the Area in question. It is their stand, their customers, their campaign.

At Grimsby the exercise achieved its objectives; namely to identify the interested segment and devote time to the satisfaction of their needs; to prospect a market containing a higher than average number of telex customers and to learn about the make-up of the remainder.

Mr W. E. Ward is the North East Telecommunications Region's Marketing Officer with responsibilities for Regional marketing policy, market research and sales.

Mr K. C. Wilson is Production Officer in the Region's Public Relations Division, with responsibilities for exhibitions and displays and print and graphic production.

IMPORTANT NOTICE

TO: ALL USERS OF PLESSEY TDMS SERIES 5 & TSG 10

The Carpenter Relay 3N1Z, used as the output relay, is now obsolete and can be replaced by a high-speed, maintenance-free, solid-state type which is directly interchangeable with the existing relay. Distortion is less than 1% but this can be varied for operating purposes ±10%. Available for immediate delivery. Price £30 for small quantities.

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MISCELLANY

In demand

A new type of cable-laying machine which enables undersea cable to be laid faster and more efficiently than before is now in demand by other organisations. It has been developed by Post Office Research Department for use on cableships. The first production model of the new linear cable engine made by Dowty Boulton Paul Ltd under licence from the Post Office has been bought by the Canadian Government for their ice-breaker and cable-layer John Cabot.

A second engine is also being made for Cable and Wireless cable-layer Mercury. Both engines are improvements on one that has operated successfully on the Post Office cableship Alert. (See Telecommunications Journal Spring 1971.)

The new machine allows the bulky repeater in the cable to be paid out as part of normal cable-laying while the ship keeps up a steady speed. Previously the repeaters had to be manhandled and the ship slowed down while they were paid out.

More capacity

A development which could double the traffic capacity of satellite communications systems is to be investigated by Marconi Communications Systems Ltd on behalf of the Post Office. The key to this development will be an "add-on" circuit to improve the mode of operation of the travelling wave tube amplifiers used both in satellites and in their associated ground terminals.

The Post Office contract to Marconi calls for a thorough investigation of ways of improving the linearity of these high-power amplifiers in order to increase the effective power rating of the communications transmitters. In this way it is anticipated that the addition of a single unit to an existing transmitter will double its effective power rating and, therefore, its traffic carrying capacity.

Good design

The electronic keysender with a push-button keypad which the Post Office is planning to install in automanual exchanges to replace conventional rotary dials was among the prizewinners in the 1972 Design Council awards. The judges looked for design originality and improvements in technical and economic performance combined with ease of use and appearance.

The keysender, made by Pye TMC Ltd, has been designed specifically for use with traditional electro-mechanical exchange equipment and is simpler and faster to use than the conventional dial. Trials have shown that it saves some two to three seconds on each call. Maintenance costs are reduced virtually to nil. Conventional dials need frequent adjustment and are replaced about every nine months. In contrast the push-button keypads have an expected life ranging from 15 to 20 years.

Standard Telephones and Cables Ltd also won an award for a computer-based telegraph communications system which greatly speeds message delivery and improves operator efficiency.

Ann Glover, an Assistant Factory Technician at Dollis Hill, displays one of the brooches decorated with a Queen's Award emblem which the Research Department has given to each of the women in the team which produces submarine cable transistors. The men in the team, which won the Queen's Award for technological innovation, were not forgotten. They got the choice of cuff links, lapel badges or ties bearing the Award emblem.

Test scores

Telephone information on this summer's England-Australia test matches is available to more people than ever before. New places receiving the service for the first time this year are High Wycombe, Oxford and Colwyn Bay taking the total centres providing the service to 74.

The service is also being extended this year to take in the three one-day international matches between the two countries in August at Old Trafford, Lords and Edgbaston. Information about the tests and internationals is available between 8 am and 7 pm each day during matches, except Sunday.

Dial direct

Telephone users in London, Birmingham, Manchester, Liverpool, Edinburgh and Glasgow can now dial direct to Denmark, Sweden and Greece. More than 1½ million telephone calls a year are made to these countries from Britain. In the whole of Western Europe only Austria, Spain and Portugal are not yet on International Subscriber Dialling.

An automatic telex service has replaced the operator-controlled links to the Lebanon, Morocco and Brazil. The opening of the Brazil service took the number of countries now available automatically on telex from the UK to 37.

Possum to Pounc

Mr David Hyde, a member of the National Executive of the Disablement Income Group has been appointed to the Post Office Users' National Council. Mr Hyde is a Departmental Head of the POSSUM (Patient Operated Selector Mechanism) Research Foundation and is Joint Administrator responsible for the supply of POSSUM equipment, including telephone control systems, to the Department of Health and Social Security.

Film awards

Communicate to Live, a film about data transmission sponsored by Post Office Telecommunications, has won a Gold Award in the British Industrial and Scientific Film Association annual festival and a Certificate of Creative Excellence at the US Industrial Film Festival in Chicago.

Another Post Office film, No Ordinary Cargo, won an award at the First International Telecommunications Film Festival in Geneva. It came second in its category, and features the cableship Alert during the laying of the undersea telephone cable between Britain and Spain.

Essay winners

Prizewinners in the Institution of Post Office Electrical Engineers Essay Competition 1971/72 are – A. Buttree, Technical Officer, Wakefield, £15; R. Andrews,

The world's first 18-Tube Coaxial Cable for 60MHz systems.

An innovation in telecommunication cable, this 18-tube coaxial was developed by TCL in co-operation with the British Post Office.

Well established frequency division multiplex techniques enable each pair of tubes to carry 10,800 conversations making possible a total of 97,200 simultaneous conversations between centres on the one cable.

The techniques of laying and jointing the new cable are currently being proved in the Marlborough area, Wiltshire.

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TCL

Telephone Cables Ltd., Dagenham, England. Tel: 01-592 6611. Cables: Drycore, Dagenham. Telex: 896216.

Technical Officer, Glasgow, £10; D. W. Kidd, Tech 2A, Preston and J. Parker, Mechanic, Nottingham, £6; D. J. Griffin, Technical Officer, Glasgow, £3. Institution Certificates of Merit have been awarded to Technical Officers J. Morrison, Dundee; A. Barclay, Glasgow; A. W. Pettie, Edinburgh; Tech 2B A. D. Ward, Birmingham; Tech 2A M. I. Stephenson, Scarborough.

Pension fund

The Trustees of the Post Office Staff Superannuation Fund have appointed Mr George Dennis as an Investment Manager. Mr Dennis (35) was formerly with a firm of London stockbrokers and was an assistant to the manager of the British Petroleum Pension Fund. He has also worked with The Distillers Company, Tube Investments and as a part-time consultant to the Economist Intelligence Unit.

He will work closely with the Investment Managers of the Superannuation Fund, Schroder Wagg and Warburgs, as well as Bernard Thorpe and Partners the Fund's property advisers, on the control and co-ordination of investment. Mr Dennis will also be responsible for direct management of part of the Fund's future income.

New member

The Sultanate of Oman has become the 142nd member country of the International Telecommunications Union.

BOOK REVIEWS

Solid-state Devices and Applications
by Rhys Lewis
Published by Newes-Butterworth. £2 (limp) £3 (cased)

This book is intended primarily for electronics students (eg HNC or City and Guilds Course 57) and gives a state-of-the-art summary of semi-conductor devices, simple theory, manufacture and typical applications.

The first part of the book describes semi-conductor principles and goes on to describe the techniques and properties of diodes of various kinds, bipolar and unipolar transistors and integrated circuits. The following chapters deal with audio and radio-frequency amplifiers, dc, wideband and operational amplifiers; oscillators, logic circuits and power applications. The book concludes with chapters on equivalent circuits and Boolean algebra and appendices explaining counting systems (binary, octal, decimal) and deriving expressions for efficiency of Class A and Class B amplifier stages.

This authoritative volume will be of interest and value as a text book for HNC students as well as a reference book for technicians, engineers and others interested in solid-state devices. **MBW**

Radio and Line Transmission Volume 2 (Second edition)
by G. L. Danielson and R. S. Walker
Published by the Butterworth Group. £1.60

This is the second in a series of three volumes offered to meet the needs of the technician student specialising in radio-communications in the City and Guilds of London Institutes' Telecommunications Technicians' Course. Volume 2 aims to cover the syllabus of "Radio and Line Transmission B". The new edition gives greater emphasis on transistors (including a section on hybrid parameters) as well as other changes, such as the use of SI units exclusively. The authors write as, respectively, former Head of Department of Telecommunications and Electronics and Senior Lecturer at Norwood Technical College.

Volume 2 deals with the elements of radio propagation, lines and cables, frequency-division multiplexing, aerials and components. Audio and radio-frequency amplification and frequency-generation is described with reference to valves and transistors. Modulation, detection and rf measurements conclude the volume.

The treatment is clear and straightforward, well-illustrated with diagrams and supported by problems, with numerical answers where appropriate. The volume adequately covers the current syllabus and can be recommended for the purpose claimed. **MBW**

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Contributions:
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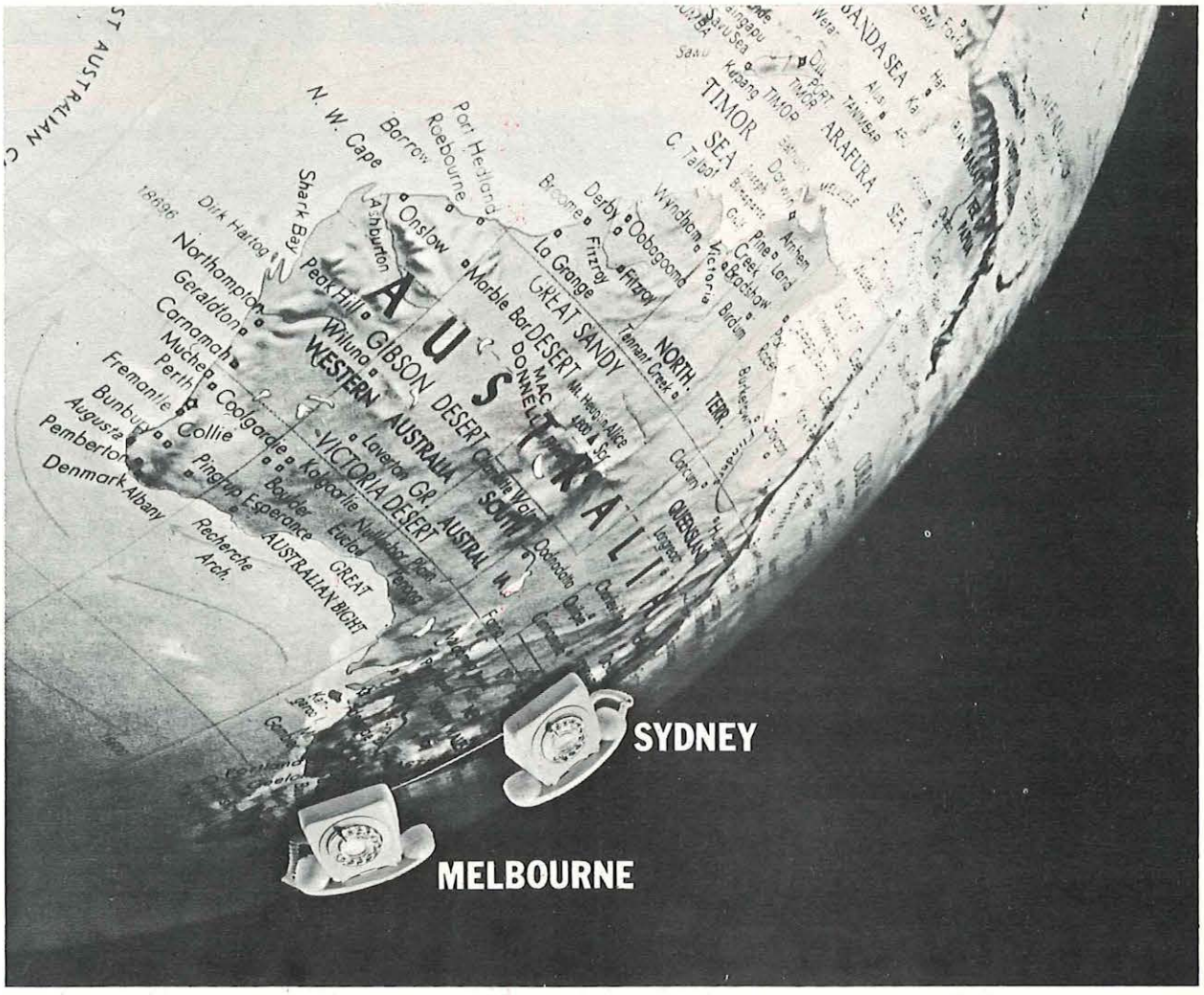
STC Telecommunications



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Standard Telephones and Cables Limited, Transmission Division, Basildon, Essex, England. Telex : 99101 (STC Basildon).

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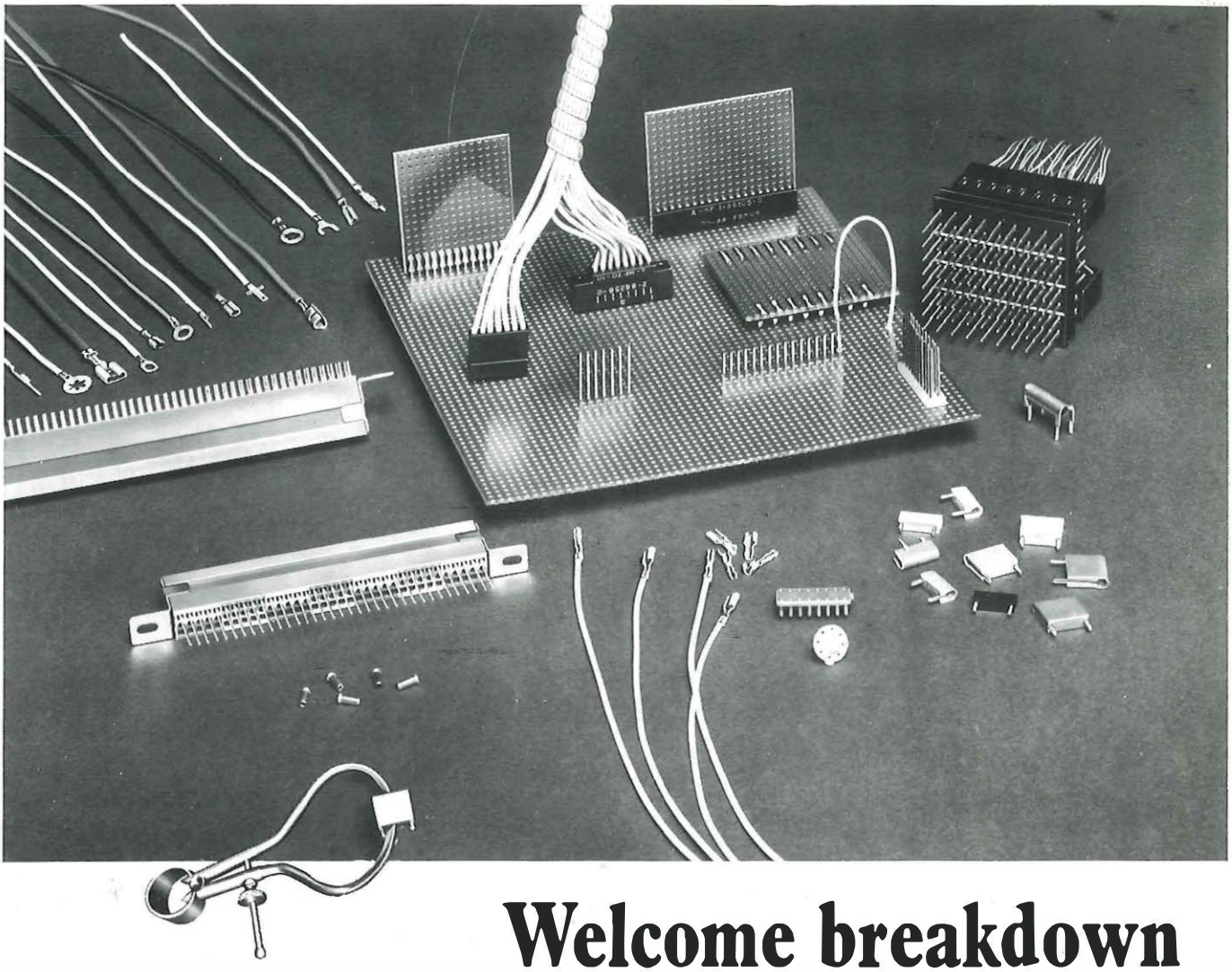

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