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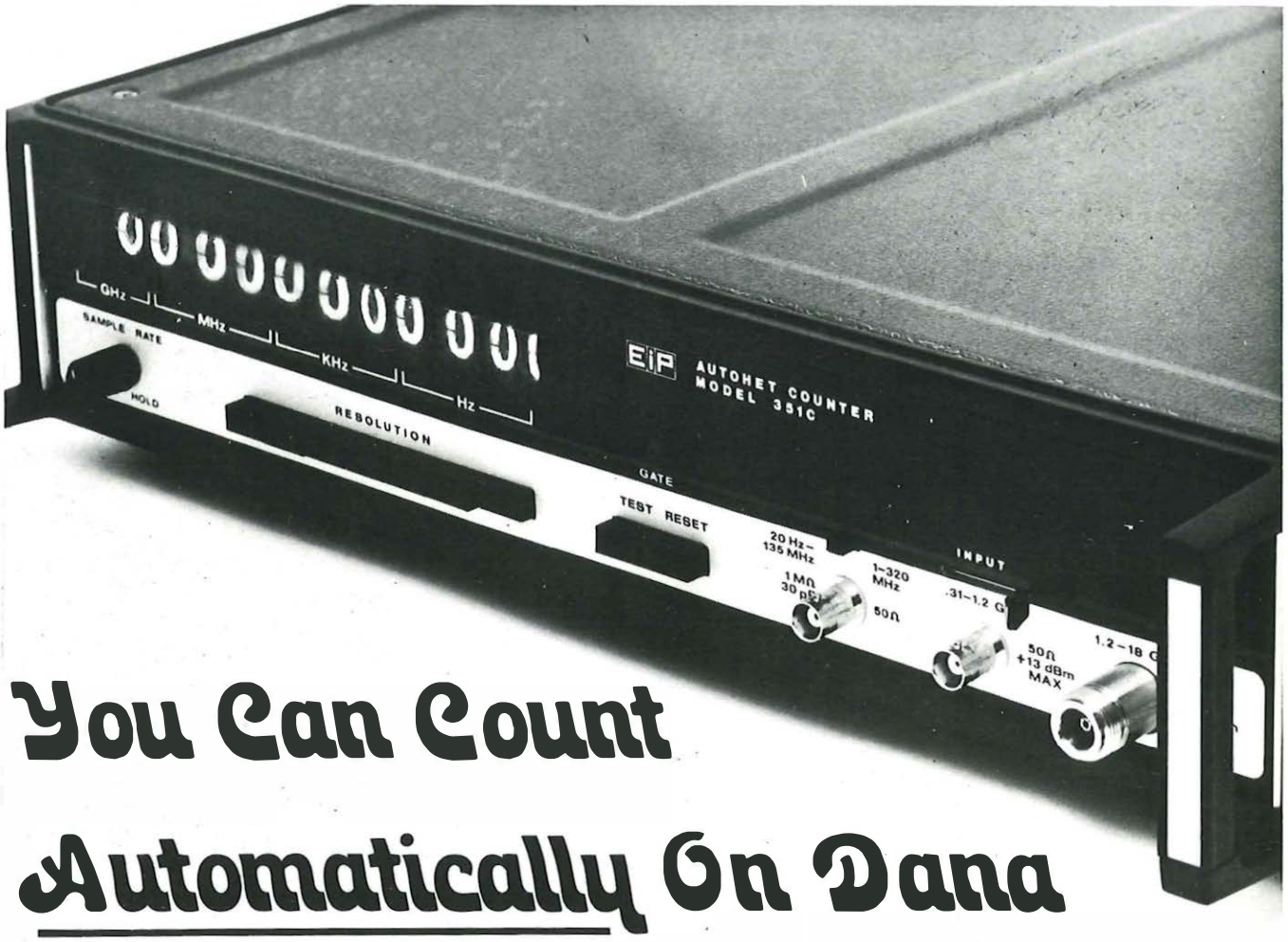

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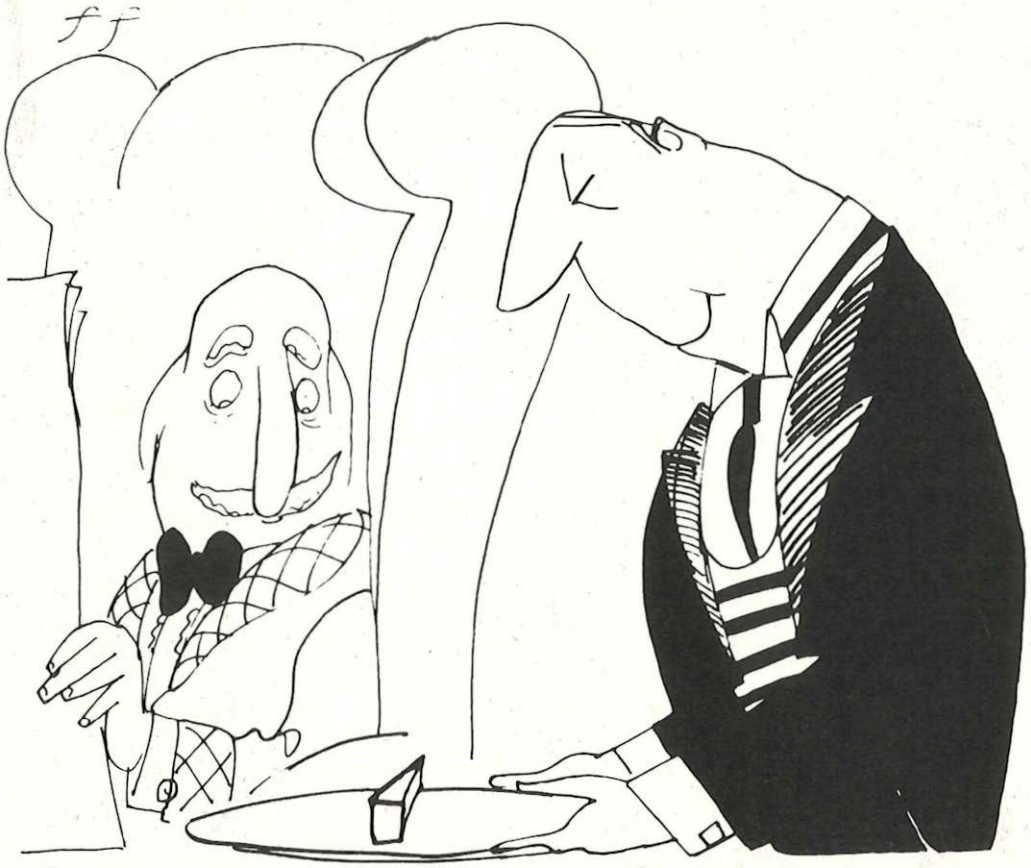

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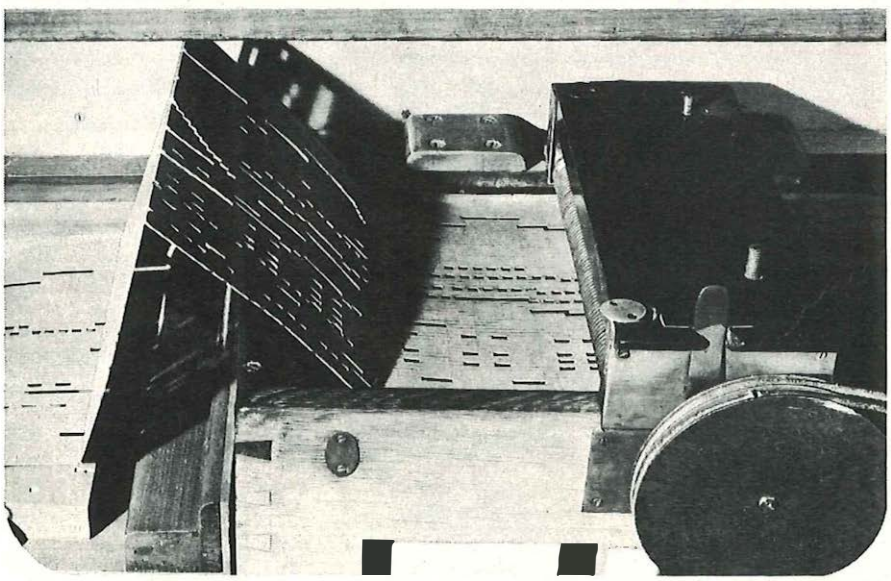

The analogy is far from perfect but the grain of truth in it is the essential one. Because the receiving terminal can reconstruct the message it can be transmitted in a robust code that will withstand almost any amount of noise, distortion or other abuse.
This is the advantage of PCM.
High cost, which was for years its principle disadvantage, has been overcome by integrated circuits; along with the difficulties of maintenance and the lower reliability hitherto inherent in complexity.

Technical data

Six of the new 8TR 602, 30-channel systems with their line-terminating equipment and power supplies go into a bay only half the CCITT depth and require only 30 watts of power. Up to eight of the voice channels can be used for data transmission at 64 kbits/sec. The connection between the data and PCM terminals is at 2·048 Mbits/sec through normal PCM line-repeaters.

Simplification of maintenance is a principle objective of the design; for example a test probe with a built-in lamp enables a faulty unit to be traced in seconds by a completely unskilled person.

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Why the PO uses over 5 million Mullard Capacitors a year

Mullard capacitors are the preferred choice for PO equipment for two basic reasons. They offer designers and engineers an exceptionally high electrical performance. And they have proved their long-term reliability many millions of times over.

Most widely used by the Post Office are the C281VV capacitors. These are of metallised film construction with a capacitance range from 0.01 μF to 2.2 μF, voltage rating 250V. Mullard research and development departments are never idle however, so here are three new types.

Three new long-life electrolytics

Electrolytic capacitors present quite a problem in Post Office applications where lifetimes are wanted in terms of decades. Electrolytics just can't match the almost indefinite life of metallised film types. And shelf life is another limiting factor.

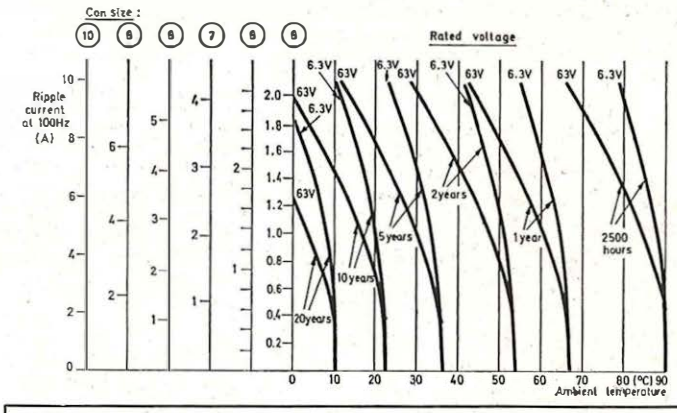
Now with the introduction of the Mullard electrolytics series 108 and 071/072, the Post Office requirements to D2186 specification are fully met, with all internal connections cold welded.

Series 108 axial lead electrolytics have capacitance values from 33 μF to 2000 μF with voltage ratings from 6.3V to 63V and life expectancy of 10000 hours at 85°C or 160000 hours at 40°C.

Series 071 and 072 are designed for applications involving very high capacitance values, again meeting D2186 requirements. Of conventional construction with tag connections, they have very conservatively assigned ripple current ratings. The capacitance range is from 680 μF to 22000 μF, voltages from 6.3V to 63V.

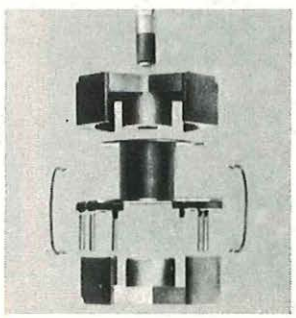
Where exceptionally small can sizes are necessary, Mullard type 121 solid electrolyte capacitors are recommended. They are Post Office approved and have much higher temperature ratings than conventional types. Thanks to their unique construction, drying out is no longer a problem assuring virtually unlimited working and shelf-life expectancy. Mullard 121 type capacitors have no limitation on charge and discharge currents as other conventional 'solid' types have.

For further information, please contact your Mullard representative.



Compact, easily assembled RM Inductor Cores

Mullard RM inductor cores are now being widely specified for PCM and FDM equipment. Compact and easily assembled, they require fewer accessories and are designed for direct mounting on printed circuit boards.



The cores are in two sections, secured by a metal clip, and the coil former carries the pins which connect with the printed board, pin spacing being suitable for 2.54mm (0.1 in) grid boards.

These high quality cores are now available in A13 and A10 material, in sizes equivalent to Vinkor range pot cores.

Ask your Mullard contact for the new data sheets covering the series RM6-R, RM7, RM8 and RM10 inductor cores.

New VR37 Metal Glaze Resistors

High stability voltages up to 2·5kV

The new Mullard VR37 range of metal glaze resistors offers engineers significant advantages in all applications where very high limiting voltages and higher resistance values are required.

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With very high stability, high limiting voltages, low temperature coefficient, economically priced, of proven reliability and meeting BS415 safety requirements, the new Mullard VR37 range of metal glaze resistors is an essential choice in CRT power supplies and other high voltage circuits. There's no limit now to the ingenuity of your designs.

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MODERNISING THE TELEPHONE NETWORK

As Telecommunications Journal went to press the Government was still considering the new Post Office plan for the essential modernisation of the telephone network which aims to improve the quality of the automatic service. After the most detailed investigation – in which the British telecommunications industry took part – the Post Office Board concluded that a new, large local electronic exchange should be used alongside the modern crossbar equipment already being supplied by British manufacturers. The new exchange would be the TXE4 (described in the Spring 1972 issue of the Journal).

It is the intention that the present Strowger electro-mechanical equipment will be replaced gradually by the modern systems which are capable of improving the quality of service tenfold and can provide new customer facilities as these are needed.

Additionally, it is proposed that high-speed signalling should be introduced into the network to take full advantage of the fast switching of modern exchange systems. Detailed plans are to be prepared for the Board's consideration.

Crossbar equipment is already in extensive use and is being supplied in increasing quantities. The new TXE4 electronic exchange has been investigated in depth and compared with other advanced systems, and is judged to be able to meet economically all the current customer needs and also to be capable of progressive development. Installation of the first production exchange has started at Birmingham.

Discussions are already taking place with industry about the planning of the further development of both electronic and crossbar systems to meet future requirements at home and to increase exports. The plans will be part of a move into the even more advanced stored program control systems of the 1980s.

Modernisation of all the exchanges will take time – probably until the end of the century – but considerable progress will be made in the seventies.

Between now and 1980 the programme envisages purchases to the value of £350 million for crossbar; the volume of TXE4 will be growing strongly, passing £100 million by 1980. Subject to the views of Government on the plan as a whole, the present contract for TXE4 would be extended and the established suppliers of exchange equipment would be encouraged to begin production. Under the plan the large electronic exchanges will complement the small electronic exchanges (TXE2) – there are already more than 350 in service – to make Britain's telephone network increasingly electronic by 1980.

Post Office telecommunications journal

Spring 1973 Vol. 25 No. 1

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

Cover: A Post Office pole inspector tests one of the 30,000 telephone poles stored in a timber yard at Belvedere, Kent. He is withdrawing a semple of the wood for a chemical test.

Eleven million records at a glance

JT Greenwood

RECORDS OF ALL the apparatus, facilities and services provided to every telephone subscriber in the United Kingdom will be produced and maintained by a computer system now being set up by the Post Office. The computer will automatically produce a separate record card for each customer, showing what they are renting from the range of more than 500 available items, and the rental charges incurred.

The computerised system, known as Customer Rental Records (CRR), will eliminate tedious clerical work by replacing present manual methods for maintaining 11 million installation records (A3016 cards) – a figure that will increase to 16 million in the next five years. As a result, when changes to standard rentals are made clerical staff will no longer have to alter the installation records by hand. The computer will also produce details of customers' rental charges in a form suitable for input to the computerised telephone billing system, another task that has to be carried out manually at present. Regular marketing statistics will be provided, and the system can be used to obtain a wide range of additional information as and when required to aid planning and management decisions on marketing policies and tariffs.

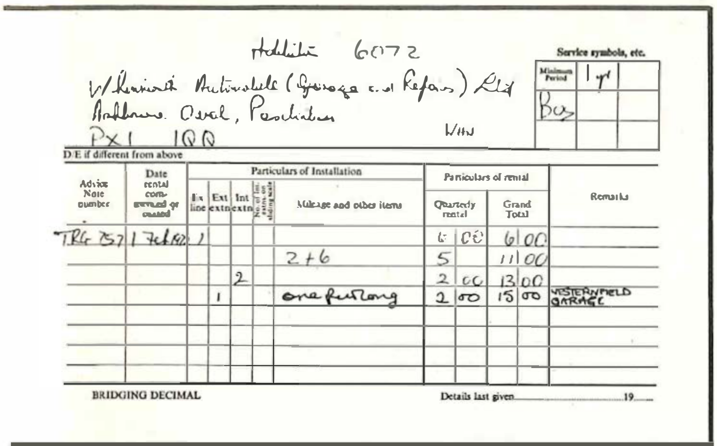
The CRR system will provide sales staff in each of the 61 Telephone Area offices with up-to-date details of their customers' installations. This will enable queries and orders to be dealt with promptly as sales staff will be able to see at a glance the customers' existing services. At present they have to obtain this information from their Area accounts groups, which are responsible for maintaining the A3016 records.

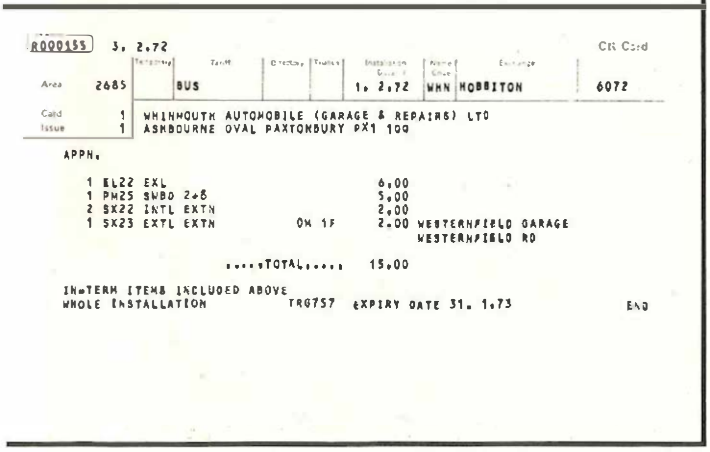
Before the system can be implemented all the information on existing A3016 cards must be transferred to special documents from which the computer can set up an installation file of all customers' records. This conversion work will be carried out in each Telephone Area by task forces specially recruited and trained for the job. National implementation of the system is planned to start later this year, and follows a pilot run started in March last year in the Leeds and Bradford Telephone Areas.

When the computer records have been set up the CRR system will keep them up to date by using information extracted from Advice Notes (ANS). These are prepared by sales staff when customers request new service or changes to their existing facilities. Once the engineering work has been done details of the installations – telephone numbers, names and addresses, together with apparatus, facilities and services provided or ceased – will be coded on to specially designed documents (keyforms) which will be sent daily from each Telephone Area office to the Post Office's Data Processing Service centre in Bristol. Here data on the keyforms is transferred to magnetic tapes by a new technique in data conversion. The tapes are then used on an ICL System 4–70 computer to update the CRR installation file and produce outputs in the form of both magnetic tapes and printed copy.

The principal output is the customer record (CR) card which replaces the A3016 record. A CR card will be printed at the computer centre every time AN data is input which amends an existing installation or adds a new record. It shows up-to-date installation and rental details in a summarised form. Historical data is confined to the original date of the installation, any rental items still in their original term and details of the most recent changes resulting from AN action. CR cards will be sent to the sales staff in the Telephone Area offices, together with lists of ceased installations recorded by the computer.

Another output produced by the computer will be used to update the telephone billing system. The computer will calculate details of new and





Top: the existing A3016 record of a customer's installation. At present 11 million of these cards have to be updated manually.

Bottom: the new computer-produced CR card.

Left: A Telephone Area sales clerk quickly answers a customer's enquiry by referring to the up-to-date rental record card at her fingertips. A specially modified desk houses computer-produced details of each customer's installation. Sales staff will no longer have to obtain this information from accounts staff.

changed rentals and other charges in computerised form from its own input stream of AN details. This information will be produced on a magnetic tape and passed to the telephone billing system to update the records held on its file. At present billing information has to be input manually by clerical staff in the Telephone Area offices, who edit and code punch copies of the ANs.

A key feature of the CRR system is that rental charges can be revised automatically. This means that it will no longer be necessary to defer changes so that as many as possible can be introduced at the same time with one big clerical effort. The rental of any item can be changed more easily to keep charges in line with costs. In the past a major tariff revision meant that every A3016 record had to be altered manually by specially recruited staff. By comparison the CRR system will produce new CR cards automatically, and it can carry out a revision very quickly at little cost. It is estimated that if there were a rental revision when CRR has been fully implemented the saving in staff costs alone would amount to some £769,000.

Tables of rentals are held on the CRR computer's reference file. To effect a revision, these tables are updated with the changes to be introduced and the file is processed with the installation file of customers' records. Two main outputs are produced in respect of installations affected by the changes – magnetic tapes for updating the telephone billing system and replacement CR cards for sales staff.

The computer will take only about 80 hours of processing time to update the CRR reference file, process it with the installation file and create files for the telephone billing system. Efforts are currently being made to try to reduce this processing time. Printing and despatch of the revised CR cards will be spread over the succeeding quarter to avoid swamping sales staff with a vast quantity of cards. At the same time the process will ensure that Area staff have all their updated customers' records by the time telephone bills incorporating the new charges are despatched.

Another of the specific objectives of CRR is to provide a wide-ranging and flexible source of marketing and management information statistics. In order to meet this aim two separate program suites for the extraction of statistics have been incorporated in the system.

One of these suites produces statistics at the end of each month, and is primarily designed to give regular information about the quantities of items being rented and changes to customers' installations, on an exchange, Area, Regional or national basis. For the first time the Telecommunications business will know the total quantity of any rentable item in the records.

The second suite of programs can produce statistics of a more complex nature, as and when required, which cannot economically be obtained from the present manual method of record keeping. Again, results can be produced on an exchange, Area, Regional or national basis. For example, the suite could determine the number of business customers who rent a certain type of switchboard, and their names and addresses could be printed on plain paper or labels if required.

While designing the CRR system it has been found possible to build in other features not included in the original specification. For example, details of ANs input to the system will be monitored by an AN control file, which can be used to provide audit information. Also, to provide research information for the Post Office's Statistics and Business Research Department (S&BRD) one in 400 residential installations and one in 200 business customers in the CRR installation file are specially marked. Details of any changes to these records will be produced automatically on magnetic tape at regular monthly intervals to update S&BRD's own computer system.

The CRR system will help the Telecommunications business to cope with the increasing workloads placed on administrative staff by the constant expansion of its services. It will provide better and more reliable statistics than can be obtained from the existing manual methods of record keeping to aid marketing and planning policies, and therefore to improve services to customers.

Looking to the future, CRR could well be the basis of a much more ambitious computer system for the provision of service, which might involve checking plant records, the issue of ANs, preparation of directory information, sending of bills, and updating of exchange, plant and stores records. The system would process this work to initiate the necessary action and make known immediately any contingency delaying service.

Mr J. T. Greenwood is a Senior Telecommunications Superintendent in Telecommunications Marketing Department. He is a member of the group responsible for planning implementation of the Customer Rental Records project.

THE ELECTRONIC DIRECTOR

WA Ryan & R T Dunn

Director equipment is used at telephone exchanges in large city areas to provide central points for receiving dialled information and translating it into a form suitable for the switching equipment to route calls through the telephone network to required exchanges. Following many years of development a computer-controlled director system is being installed at a number of exchanges.

IN TOWNS AND small cities a person making a telephone call to another exchange in the local fee area dials a digit or digits to route his call to the required exchange, followed by the numerical digits which select the called subscriber's line. The routing digits dialled therefore vary according to the exchange from which he dials.

This procedure is too complex for large multi-exchange local-fee areas like London, Birmingham, Manchester, Liverpool, Glasgow and Edinburgh. In these areas each exchange has a three-digit code and each subscriber's line has a four-digit number within that exchange. Irrespective of the exchange from which he is dialling, the caller can dial the same seven-digit number to obtain the required line.

The facility is made possible by director equipment at exchanges in these areas. It receives and stores (registers) all the dialled digits and then "translates" the exchange code into routing digits – bearing no resemblance to the dialled code – which then directly control the routing of the call.

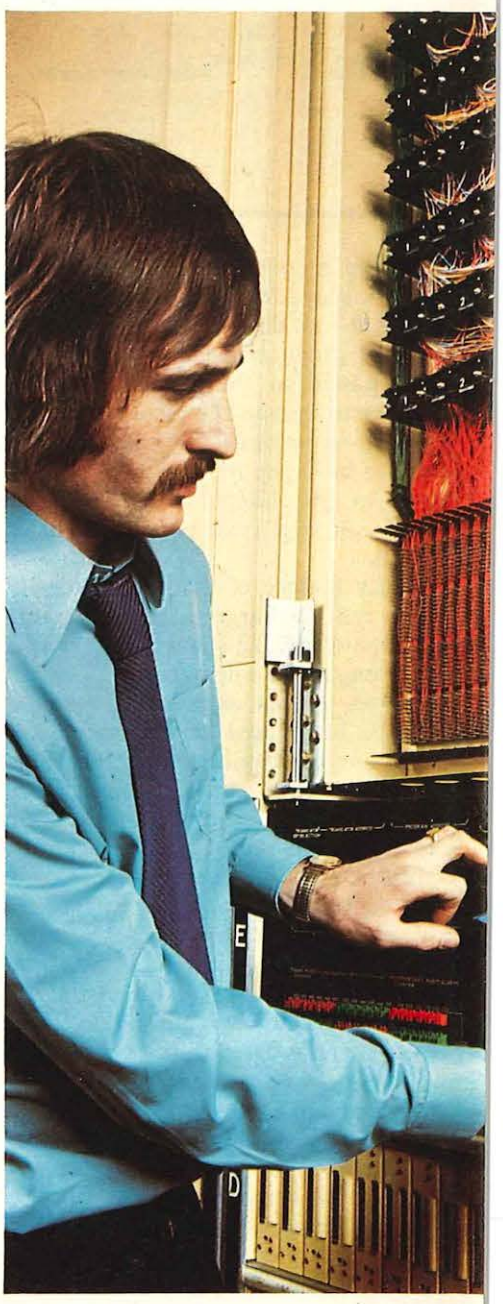
Electromechanical techniques used in Strowger director exchanges are expensive to maintain. Directors working to a large number of exchange lines are kept very busy and therefore make maintenance particularly costly. Other disadvantages of existing directors are that they lack flexibility for modification to new facilities, such as keyphones, and occupy a considerable amount of space.

To improve quality of service and reduce maintenance costs, the Post Office is installing in some director exchanges electronic equipment which uses computer control techniques to perform the director function. This is provided by the GEC Mark IC Stored Program Control (SPC) system, the functioning of which is governed by a pre-determined program of operations. The program is stored in a section of the system's computer processor reserved solely for this purpose, and changes to the facilities provided can easily be made by modifications to the program.

In its director application, the SPC equipment will be used both to replace existing electromechanical register-translator equipment in some Strowger exchanges and for installation in new Strowger types planned for the director areas. An order placed with GEC will equip about 70 exchanges, and these will be brought into service over the next three years.

Each Mark IC SPC processor provides register-translator facilities to control the establishment of up to 60 telephone connections simultaneously. It requires considerably less floor space than the equipment it will replace, is extremely reliable and enables faults to be easily traced. Being virtually silent in operation, whereas the Strowger directors are very noisy, it will create a better working environment for maintenance staff.

The SPC system also provides many new facilities and makes possible the addition of further facilities as and when required. For example, at present all STD calls are routed to Group Switching Centres (GSCs), even if the destination is an adjacent charging group. The SPC equipment can examine the National Number dialled



(STD code) to determine whether the call can be routed locally, thereby avoiding unnecessary use of expensive GSC equipment and providing the necessary routing. (The National Number is a subscriber's number that can be dialled from anywhere in the country, apart from his own local charging group.) The new equipment can also deal with seven- and eight-digit numbers in director areas, which will allow for future expansion of the London numbering scheme.

If while setting up a routing the SPC equipment meets "equipment busy" conditions, automatic alternative routing can be arranged, although there are no present requirements to use this facility.

Present directors use only one selector (C 1st) level to route STD calls to GSCs, with a certain probability of finding the route busy. SPC equipment can make use of up to three C 1st levels, on a sequential basis, allowing GSC traffic to be shared more equally on the available routes and therefore providing a call with a greater chance of obtaining a route.

Provision has also been made in the new system for it to handle keyphone traffic as and when push-button telephones come into general use. Another possible facility is segregated routing of traffic to manual switchboards which would enable operators to determine whether it was ordinary, coin box or keyphone traffic.

As an aid to the maintenance of the SPC equipment, all urgent faults and most minor types will be printed out on a teleprinter installed at the exchange. The print-out will outline the nature of the faults, and it is envisaged that trained staff at the local exchange will carry out most maintenance required, but that Regional "back up" will be available for certain processor faults. To assist fault diagnosis the Post Office is modifying a cabinet pair – ie, a processor and its associated signal conversion circuits – to carry out a diagnostic testing function. When fully developed, testers of this type will probably be situated at convenient central points in four director areas.

The Mark 1C SPC system has been developed from two earlier versions which underwent extensive trials. The first production unit has been subjected to testing both at the GEC works and at the Belgravia telephone exchange in the London Telecommunications Region to ensure that the equipment functions correctly under adverse conditions of temperature, interference and traffic load. In an eight months' service trial about 12 million calls have been handled without a single processor failure.

In adopting a system to control a large number of circuits the immediate advantages are to be found in common busying, common traffic metering and common translation change facilities. With the present directors these are provided on an individual basis. Other advantages are flexibility, particularly in the event of facility changes or new facilities (eg, keyphones), and system security – only seven breakdowns per cabinet pair each year are expected, although in the service trials to date the actual figure is considerably lower.

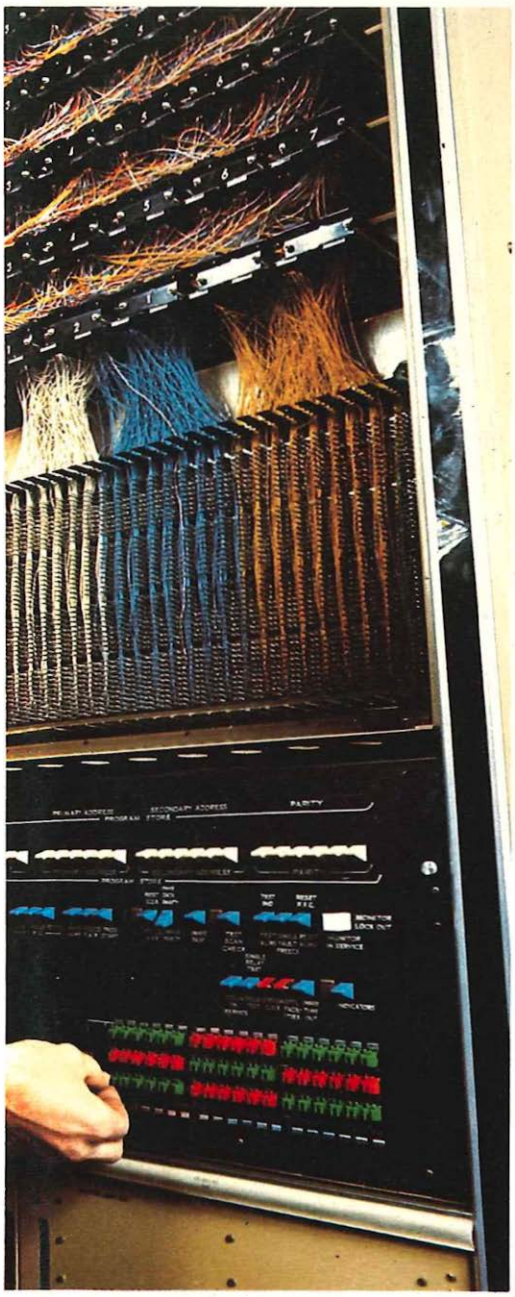
Mark 1C SPC equipment has also been adopted by the Post Office to perform the register, translator and coder functions at seven new crossbar Sector Switching Centres being established in the London area. These SSCs, about eight or nine miles from central London, will reduce the continually increasing flow of traffic in and out of the city centre by routing all the trunk traffic, and some local traffic, to and from the local exchanges within their sectors.

The following is a more detailed description of the SPC equipment and its operation.

The Mark 1C SPC will replace the A-digit selectors, directors and local registers in Strowger director exchanges. Basically it comprises a processor cabinet with up to 64 signal conversion circuits (SCCs) in an adjacent cabinet, the whole being referred to as a cabinet pair. Sixty of the SCCs act as an interface between the processor and the exchange's A-digit hunters, and are available for carrying traffic, while the remaining four SCCs are for test purposes. Therefore one cabinet pair, fully loaded, could replace 60 A-digit selectors and the associated directors and local registers in an existing exchange.

The minimum size of SPC installation in an exchange will have three cabinet pairs, with their SCCs sharing the A-digit hunters. Thus if one processor fails and has to be taken out of service, at least two others will be able to share the additional load at a reduced grade of service.

A processor comprises separate data,



Left: A monitor panel is used to carry out a check on electronic director equipment at the new Millbank automatic telephone exchange in London. Above the monitor panel is the processor's program store.

CONTROL OF MODERN SWITCHING SYSTEMS

THE UK telecommunications system contains a significant and growing element of electronic control. Its application is directed both to whole new electronic exchanges (for example, TXE2 and TXE4) and to certain areas of electromechanical exchanges which will exist in the system for some years. Electronic control is also being applied to other functions to provide significant improvements in service and operating efficiency.

The development of electronics has made it easier to centralise the control functions of switching systems. The logical sequence of these functions can then be performed by computer-like control systems which can be implemented in three main ways – by wired logic, programmable logic or stored program.

With wired logic, control actions are predetermined by wired interconnections giving very high security but with some limitations in flexibility.

Programmable logic also has very high security, but gives opportunities for flexibility and change within predetermined limits by strapping or by re-threading wires in ferrite-core stores.

With the stored program technique all the logical sequences are stored in memory as a series of programs, and a control sequence can be altered by amending the program on a computer tape which is then fed into the machine.

Both the stored program and programmable logic techniques are often referred to as stored program control.

In a large complex telecommunications system there is an appropriate role for each technique. This role is largely determined by economic factors. It is also governed by the development, operational and production environment in which the systems operate. Thus both within a single system, and between systems developed around the world during the last decade, there is a variety of methods for handling the different sub-functions of exchange control with storage and control being more or less centralised.

There is a long and successful history of electronic control techniques applied to defined areas of the control function of telephone exchanges. In the 1950s computer-type control techniques – for example, magnetic drum, core store and cold cathode types – were first used in standard operational equipment in the trunk network to provide subscriber trunk dialling and later international dialling. This equipment continues in service with success.

During the 1960s developments took place in the application of electronics and computers to whole exchanges of electronic/reed relay types. Over 300 TXE2 small electronic exchanges (up to a few thousand lines) are now in service, and others are being commissioned at a rate of two per week. Orders have also been placed for 15 TXE4 exchanges (capacity from 3,000 to 40,000 lines) and these will start to come into service early in 1975.

As described in the accompanying article an electronic Mark I processor is being developed to replace the heavily-used call-control portions of Strowger exchanges in the largest cities and to perform a similar function in the Sector Switching Centres being built around London.

A contract has also been placed for further development of electronic directors in Strowger exchanges which will exploit the very latest integrated circuit (MOS) technology.

A Mark II system has been the controlling element in the London terminal of a world-wide field trial of a modern signalling system. The signalling system is being developed to a specification approved by the International Telegraph and Telephone Consultative Committee (CCITT) for use between international telephone exchanges.

In the data field the Post Office has further plans for exploiting processor control. An experimental packet switched data service (also described in this issue) is due to open in 1974. Tenders have been sought for the supply of suitable processors for this experiment. A switched data service making use of computer-controlled digital switching is due to open later, and development work for this equipment is being planned.

There has been a growing awareness for many years that the problems of controlling telephone traffic should be treated on a total network basis. The recommendation of the joint Post Office/Industry Advisory Group on System Definitions (AGSD) is that the next generation of equipment to be developed should make use of stored program control with the capability for individual controls to converse directly with each other.

These techniques will undoubtedly play an important part in the next generation of telecommunications systems and are being actively studied in industry, universities and the Post Office. The techniques will be included to the extent that they can be developed economically within the clearly defined operational and technical requirements, and the high degree of security and reliability necessary for telecommunications.

J. Martin *Head of Systems Co-ordination Division, Telecommunications Headquarters.*

SUMMARY OF MAIN DEVELOPMENTS

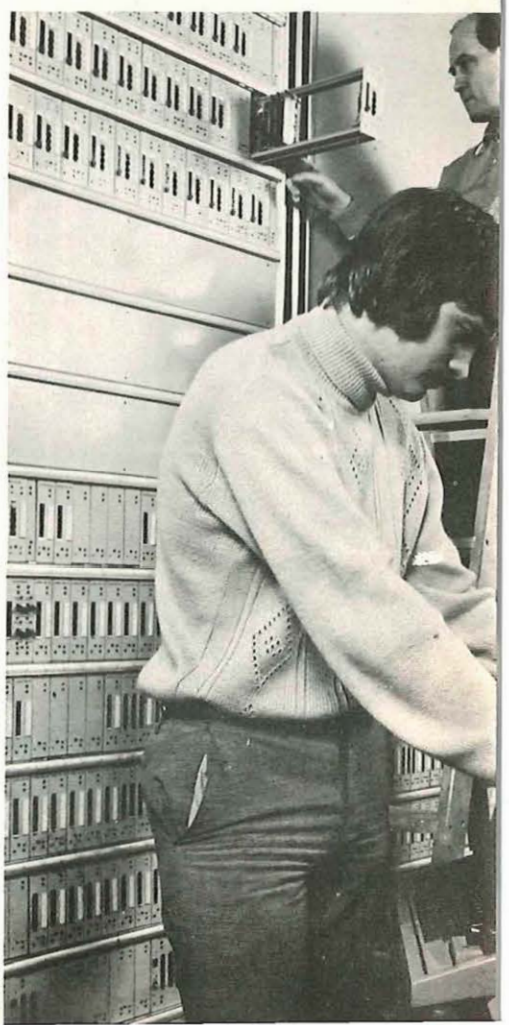
Exchange or system	*Approx. date of introduction*	*Type of control*
Magnetic drum for controlling STD calls in director areas	1958/59	wired logic
Incoming core register/translator for trunk calls to director areas	1964	wired logic
TXE2	1966	wired and programmable logic
Digital switching field trial	1971	stored program
Mark II processor – CCITT signalling system field trial	1972	stored program
Mark I processor – director areas	1973	programmable logic
Mark I processor – Sector Switching Centres	early 1974	programmable logic
TXE4	early 1975	programmable logic
Electronic director using MOS integrated circuits	1976	programmable logic

program and translator stores and other temporary registers, arithmetic logic and gating arrangements to allow access from the various units to a common information highway. The data store is used as a temporary working store and is made up of 16,384 ferrite cores. Each SCC is allocated its own discrete section of 256 cores or bits on which to store incoming and outgoing digits and other information for setting up a call.

The processor carries out the work assigned to it by the SCCs, some of which will be carrying traffic, by "looking at" each SCC and section of data store in turn. Each SCC is scanned every 11.1 milliseconds, this time being a factor of the pulsing out requirements and enabling the processor to initiate timed loop disconnect pulses by operating and releasing a relay and counting scan times, thereby obviating the need for any hardware timers.

Sequential instructions, which control the flow of information within the processor and to and from the SCC being scanned, are read from the program store, the instruction cycle time varying between 7-13 microseconds. The philosophy of operation of the processor is one of complete control, the Strowger equipment not directly

Below: To aid maintenance a teleprinter prints out details of faults in the electronic director equipment.

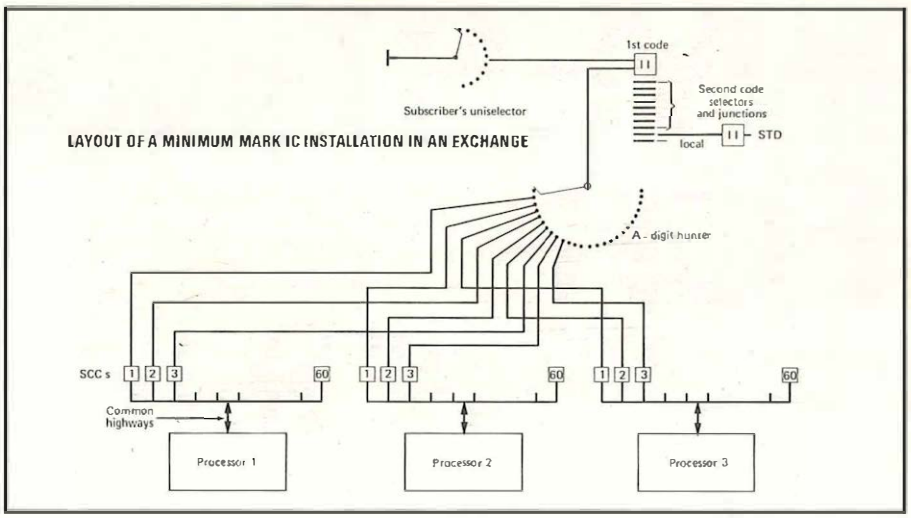


initiating changes in operational sequences. This results in a very flexible system, and different or additional facilities may easily be programmed.

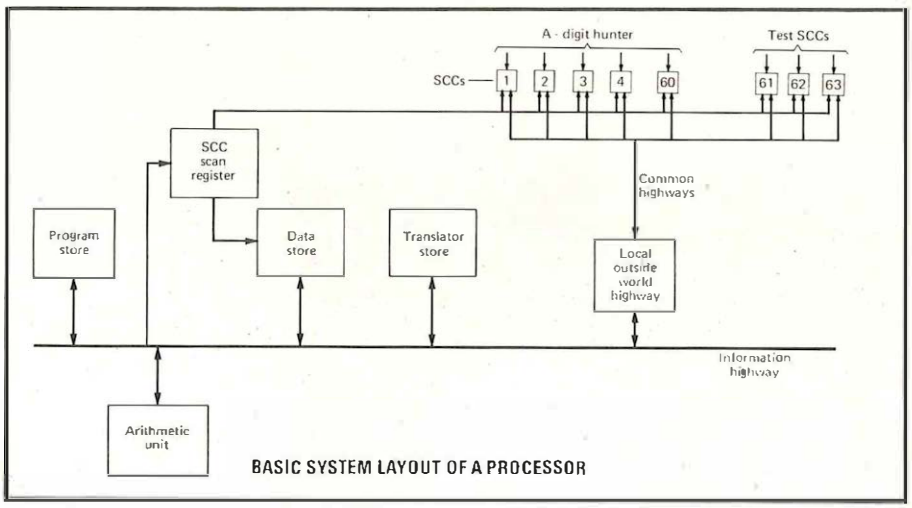
The program itself is dictated by the facilities required of the SPC equipment to operate as a director replacement. The facilities are converted to flowchart form from which the program is written. It then remains for this to be fed into the program store. The program store consists of transformer cores (Dimond rings) through which wires are threaded. The route taken by a wire through the program store cores makes up one instruction; approximately 1,300 of these are used for the Director program, leaving 1,200 spare instructions for future use. Changes to the program may be made by rewiring parts of the store.

The translator store holds the routing information for a call and operates in a similar manner to the program store.

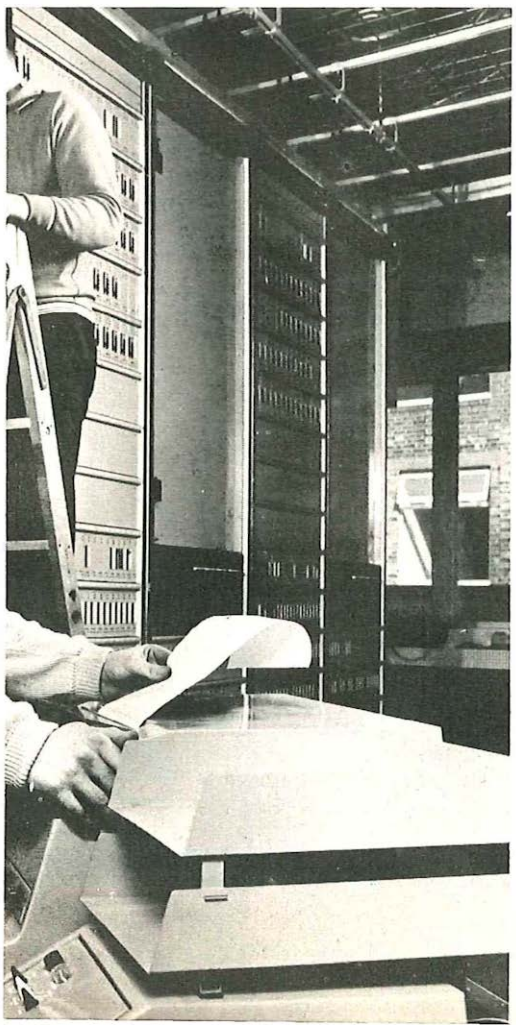
To ensure that faults in the processor hardware are detected, units other than the scan logic and translator store are protected by parity checks on every operation against "corruption" of information, the scan check being carried out by hardware. Two of the four SCCs allocated to test purposes are termed master and slave SCCs. The master of one cabinet pair is linked with the slave in the adjacent cabinet pair, the end two cabinet pairs also being linked. A ring of master/slave test SCCs is thus formed in an installation and each master initiates a check of all the translation store information in the adjacent slave. If the check fails the cabinet pair adopts a self-check mode and attempts to isolate the cause of the failure.



LAYOUT OF A MINIMUM MARK IC INSTALLATION IN AN EXCHANGE



BASIC SYSTEM LAYOUT OF A PROCESSOR



All faults diagnosed by the program or the master/slave tests are detailed in coded print-out form on the fault teleprinter in the exchange. Faults that cannot be diagnosed by the program, concerned with faulty units in the processor, initiate print-outs which detail the state of the processor at that time. These and other serious faults may be diagnosed by the manipulation of keys on a monitor panel on the processor rack, enabling overriding manual control of processor functions.

In the event of a power failure to the SPC equipment, the temporary call information will be lost along with those calls being set up, but all the program and translation information will be retained.

One test SCC position enables maintenance to be carried out on an SCC unit while the cabinet pair is in service. An inlet tester has been developed to allow a maintenance engineer to pass calls through an SCC in this position. This test position will also be used for checking translation changes with the aid of an inlet tester.

The SPC equipment is mounted on 10 ft 6 in high T 10000 racks as used in TXE2 exchanges. The logic is built up mainly from discrete components and semiconductors, and 12 V power supplies for the logic are derived from the standard exchange −50 V battery using DC/DC converters which are mounted at the base of the equipment.

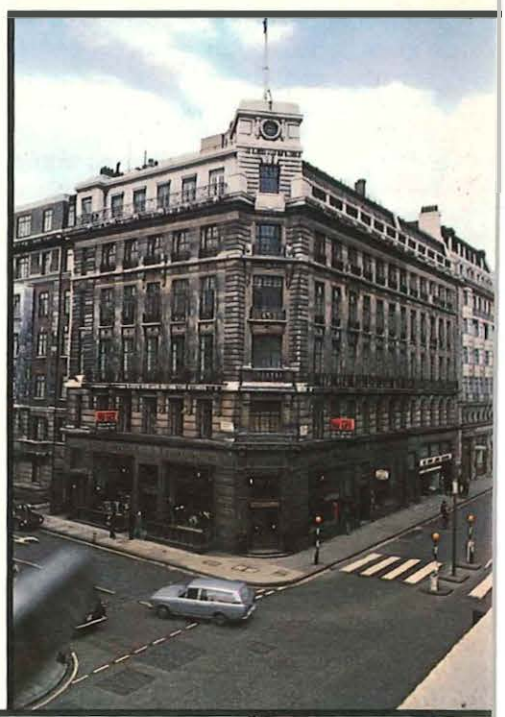
In order to accommodate the interfacing of the single design of SCC to a great diversity of C 1st selectors, design changes to the SPC equipment were necessary during the service trial.

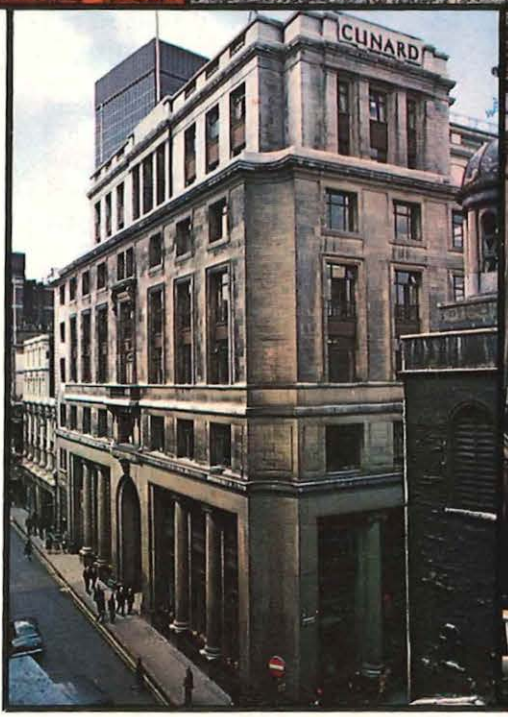
Mr W. A. Ryan is head of a group in Telecommunications Development Department responsible for national and international switching, and for two developments in electronic directors.

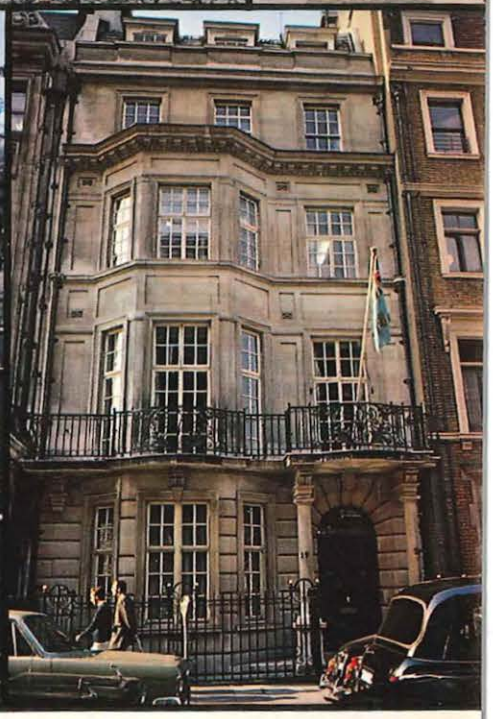
Mr R. T. Dunn, an Executive Engineer in the group, is responsible for type approval of the SPC director and for design of the SPC diagnostic tester.

INVESTING FOR PENSIONS

FJL Clark







Some of the buildings owned by the Fund:

Devonshire House, London (top)

Princess Way, Swansea (centre left)

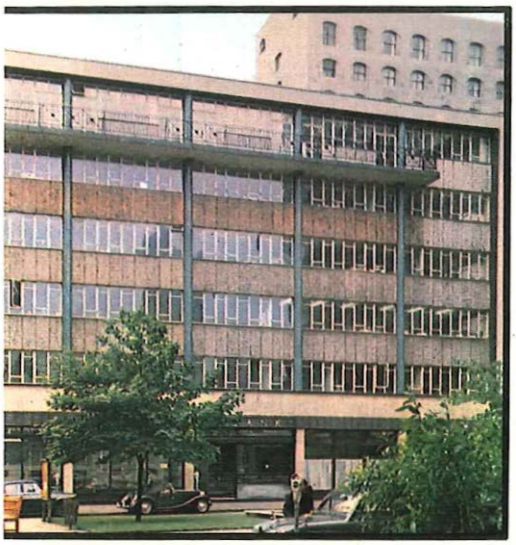
Industrial development et Blandford Forum, Dorset (centre middle)

Aldermanbury House, London (centre right)

Cunard House, London (bottom left)

Upper Brook Street, London, heed office of the property company (bottom right)

Post Office staff who contribute towards their pension have become men and women of property as a result of investments made by the Staff Superannuation Fund. On these pages we show some of the buildings which the Fund now owns after buying a large property company. The Fund has also provided the financial backing for a number of modern town centre developments.



AS CIVIL SERVANTS before the introduction of corporation status in 1969 Post Office staff received their pensions and gratuities by virtue of the Superannuation Acts from the annual Superannuation Vote for the Civil Service. There is no pension fund for the Civil Service – no actual sum of money is invested to provide an income. However, the pension liability for Post Office staff had been calculated since the introduction of commercial accounts which identified the income and expenditure involved in Post Office operations. (The pension liability is the obligation for future payments to existing staff who will become pensioners.)

Before 1961 no cash passed, but the pension liability was recorded by the Post Office and the Treasury and deemed to be invested in 2½% Consolidated Stock – a reasonable enough procedure when instituted half a century ago. In 1961 the Post Office became self-financing and the Treasury was paid in cash the difference between the pension liability and the pensions paid out. These sums, too, were deemed to be invested in 2½% Consols. On the eve of corporation status they stood at £1,449,278,000 in nominal value – a market value at the time of over £400,000,000.

The Treasury made it clear that it would not be possible to pay the full amount over to the new Post Office Staff Superannuation Fund which had to be set up on corporation day – 1 October 1969. A sum of that size could not in any event have been invested, and the Treasury eventually agreed to pay over £45m a year in quarterly instalments. The procedure is that on 5 January, April, July and October each year it credits the Fund with the interest on the nominal amount outstanding and then "sells" stock at the mid-market price of Consols to make up £11¼m. At present, therefore, the payments are mostly interest (so far £34,847,000 has represented capital and £77,653,000 interest) but as the balance falls more stock will have to be "sold" to make up the quarterly payments. At the present rate, full repayment will take about fifteen years.

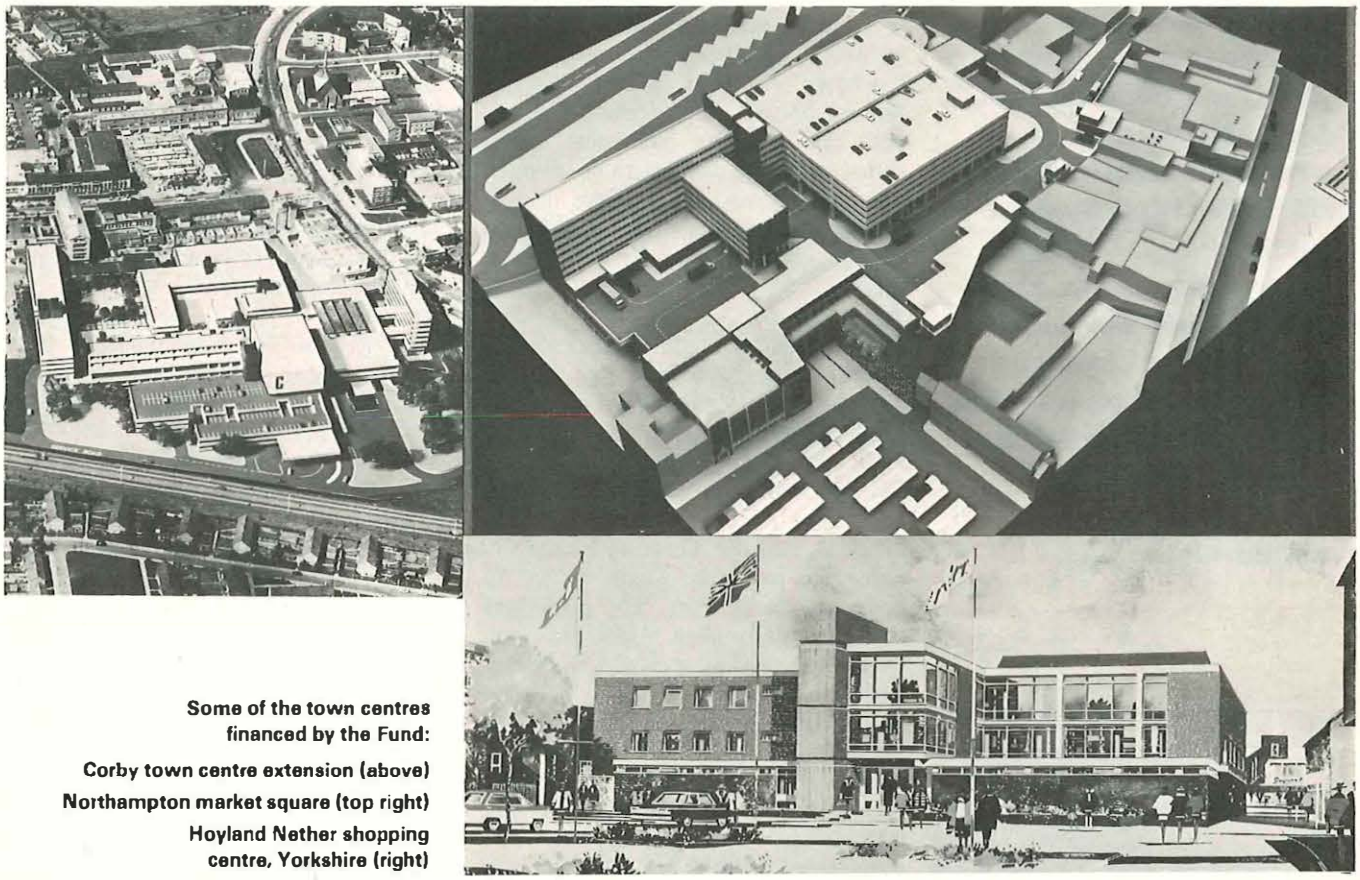
Since 1 December 1971 members of the Fund have been contributing 6% of their pay, and the Post Office an amount equal to 1½ times that sum. At present, therefore, in addition to the £45m a year from the Treasury, about £150m a year is coming into the Fund from members and the Post Office as employers.

On the other hand, about £64m a year is going out in superannuation benefits – pensions and lump sums, the whole reason for the Fund's existence. The question immediately springs to mind "Why should income exceed expenditure so much?" The next obvious questions are "Why not reduce the contribution?" or "Why not increase the benefits?". The answer is that at any time the investments of any Pension Fund should be sufficient to meet all its liabilities even if income stopped immediately. It is impossible to imagine such a situation in the Post Office, but it is possible to envisage some time in the future a declining working force and an increasing number of pensioners so that expenditure exceeded income. The balance the Trustees build up now may well be needed for the people who are only just joining the Post Office and will expect to draw pensions between the years 2010 and, say, 2025. Every three years the Fund's actuary will say if the Fund is on the right course to meet all future liabilities. Once he can say that, and add that there is a surplus in excess of what is required, then the Trustees can think about improving benefits or reducing contributions.

It is time to say a word about the Trustees who are responsible to the Post Office for running both the pension scheme and the investment of the Funds. There are seven – Mr A. Wolstencroft, former Secretary of the Post Office, is Chairman, with Mr A. S. Ashton, Board Member for Finance & Corporate Planning, Mr K. M. Young, Board Member for Personnel and Industrial Relations, Mr K. H. Cadbury, Senior Director, Planning & Purchasing, Mr L. V. Andrews, former Deputy General Secretary of the UPW, Mr C. Morgan, former treasurer of the POEU and Mr K. R. Thomas, Deputy General Secretary of the CPSA. To assist them, there is a Secretary and Deputy Secretary who are Post Office officials. The Trustees also employ and pay from the Fund an Investment Manager and three other investment staff.

To undertake the enormous task of investing as profitably as possible the money flowing in, the Trustees employ four Merchant Banks – Warburgs, Schroder Wagg, Flemings and Morgan Grenfell. These undertake the day to day investment within a policy laid down by the Trustees at quarterly meetings with them individually. During the quarter, the Investment Manager keeps in touch and advises the Trustees of any unusual development of which they should be aware or on which they have to decide. At the regular meetings the Trustees are presented with a valuation of the Fund's investments, reports on economic and market conditions and a forecast for the next quarter. The Investment Manager studies the performance of the Merchant Banks and reports these to the Trustees. In the light of all this information the Trustees discuss with each Merchant Bank its activities in the previous quarter, and consider and approves its plans for the next quarter.

The Trustees have some fairly firm rules about investment. They will not invest more than 5% of the Fund in one company or own more than 5% of one company's shares. They do not think that more than 10% of the Fund should be invested outside the



Some of the town centres financed by the Fund:

Corby town centre extension (above)

Northampton market square (top right)

Hoyland Nether shopping centre, Yorkshire (right)

UK, but do think that good opportunities of investing abroad should be taken and have made considerable investments in Europe and the USA.

The Fund has a considerable investment in property on which it receives professional advice from Bernard Thorpe and Partners. Property values may not continue to rise as fast as they have during the past year or so, but in the long term – since suitable land is limited – it is reasonable to expect above average growth. Since many of the liabilities of the Fund also lie far in the future, Trustees have been taking an increasing stake in property. The Fund has recently bought the property company owning Bush House, Cunard House and Burmah House in London and has financed a number of town centre developments.

At present the value of its properties, at cost, is £84m but the market value is, of course, very much higher. Property is only revalued at intervals and the Trustees intend to keep a fairly conservative valuation. The general policy is to invest in large properties such as office buildings and town centres which do not create management problems, but the Fund does own a new industrial estate in Lancashire and also two one-thousand acre agricultural estates in Yorkshire and Norfolk.

The Trustees also have the responsibility of exercising their discretion on the granting of benefits under the Rules of the Scheme. Normally, benefits are a right and are paid automatically, but the Trustees have the power to grant benefits before normal retiring age to people who are forced to retire by circumstances which make retirement the only course open to them. This is usually the need to take full-time care of a near relative. There are two criteria by which the Trustees judge such cases. The first is that retirement is the only course open to the member and the second that payment of benefits is essential. Such cases are not, of course, easy to judge. As much evidence as possible is gathered from the local office and Welfare Officer, but the Trustees do have to be satisfied that retirement is inescapable and not just convenient. It does not, however, follow that payment of the superannuation benefits needs to be made. It is fair to say that it usually does, but it is not unknown for other income to be available and adequate.

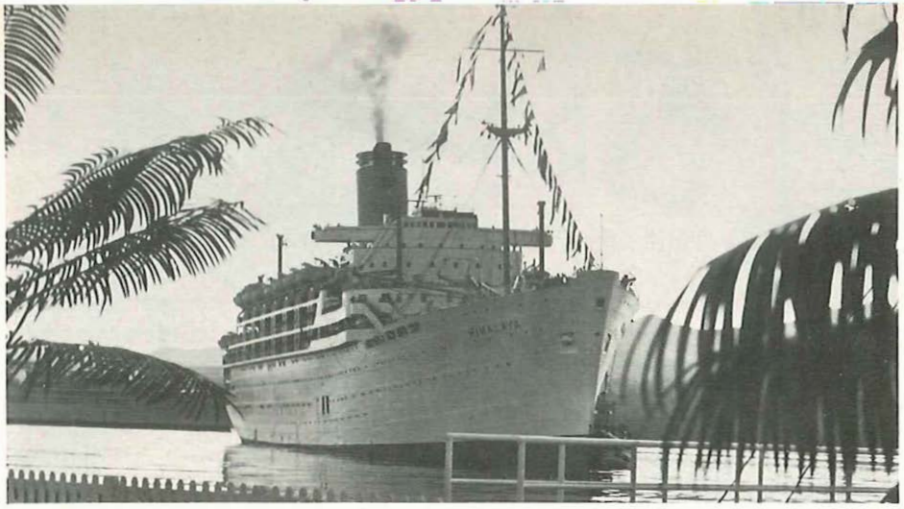
It should not be overlooked that superannuation benefits are not payment as of right until members reach the age of 60 – or are retired on other grounds – and that earlier payment on voluntary retirement is a matter for the Trustees' discretion. The Fund belongs to its 430,000 or so members, all of whom will depend on it in due course, so the first duty of the Trustees is to look after the majority interest, however sympathetically inclined they may be towards individual cases.

The Trustees may also grant earlier benefits to members who retire voluntarily, freezing their benefits, but whose health breaks down or who have to look after a relative and would have had to retire. The same considerations apply as to the cases mentioned above.

The Trustees rely on the Pension Section at Chesterfield to undertake the task of awarding and paying pensions through Post Office Giro – not an easy one at the moment now that all those awarded since 29 February 1972 have to be reviewed to take account of the new benefits in the Post Office Scheme following the improvements in the Civil Service Scheme. Once this has been done the Trustees look forward to a period of consolidation after an exciting first three years. There will be big changes in the pensions world with the introduction of a new Government scheme in 1975, but they should not affect the Post Office Staff Superannuation Fund which may by then have become the largest in the country.

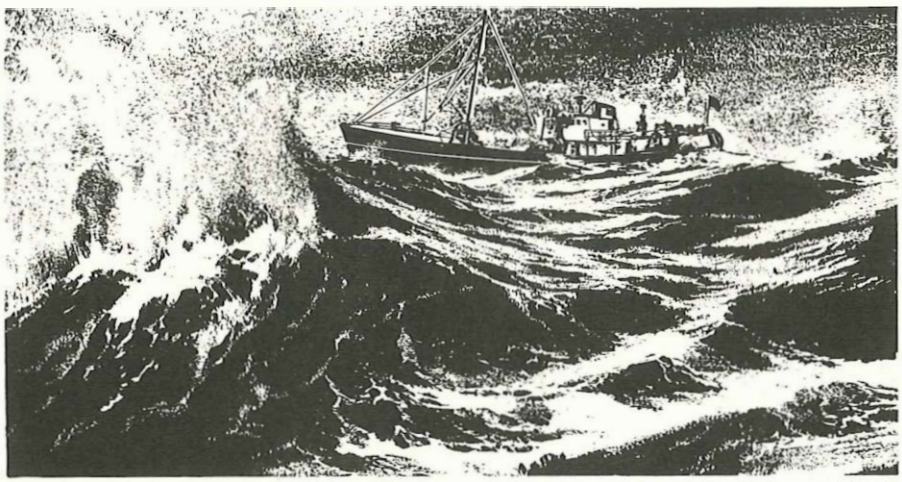
Mr F. J. L. Clark has been Secretary of the Post Office Staff Superannuation Fund since it was set up in 1969.

Shipping in all parts of the world, like the liner in tropical waters and trawlers fishing in icy seas, are kept in touch with Britain through the Post Office long-range radio services. Maritime



Calling ships of the world

services are now being reconstructed in an extensive plan to keep all services provided by Post Office coastal stations in line with recent international developments in radio communication.



JL Hyatt

THE LONG-RANGE radio services provided by the Post Office for world-wide shipping are undergoing extensive reconstruction to meet both the present growing demand and forecast future requirements in this field. Paradoxically expansion of these high-frequency (HF) maritime systems is taking place against the background of a declining demand for HF circuits in fixed communication services between land-based radio stations in Britain and other countries in the face of competition from satellite and submarine cable links.

Although it is likely that a satellite service for ships will eventually be introduced, it will be many years before the present terrestrial maritime services are no longer required. Very many ships make little use of radio communications and these are unlikely to opt for satellite equipment until it is absolutely necessary or until costs become competitive with those of terrestrial systems.

Ordinary wireless telegraphy (Morse) is still by far the most widely used method of long-distance maritime communication and demand is increasing at an annual rate of 7–8 per cent. At the same time radiotelephony is becoming increasingly important, with demand growing at a rate of about 30 per cent each year. The Post Office is also introducing radioteleprinter facilities for use by ships. To meet these requirements a three-phase programme is being undertaken to reconstruct the entire long-range service.

Phase 1: An interim programme, begun in 1971 and now nearing completion. This was planned to give additional transmitter and receiver capacity when the Long Range Area Communication scheme, operated jointly by the Post Office, Ministry of Defence (Navy) and some Commonwealth countries, came to an end in the summer of 1971. Under this scheme the Post Office long-range station at Burnham-on-Sea dealt with telegraph messages for British and Commonwealth ships in the Atlantic and Mediterranean but messages for British ships in the more remote areas were relayed over land lines for transmission through overseas radio stations run by the Navy.

The ending of the naval scheme meant that British ships had to be worked direct by radio from the UK. So as to meet this requirement 11 redundant transmitters at Dorchester radio station hitherto used for the fixed services were fitted with omni-directional aerials suitable for working to ships in all parts of the world and commissioned for the maritime service. Twelve additional receiving positions, installed in a prefabricated building, were brought into use at Burnham.

Phase 2: Long-term transmitter provisioning programme. Phase 1 gave immediate relief but did nothing either to meet the growing demand for long-range radiotelephone and radioteleprinter circuits and the continuing development of wireless telegraphy, or to provide adequate spare and reserve transmitters in an era of generally unattended transmitting stations. Many of the existing transmitters were also obsolescent and had reached the end of their economic lives. A programme was therefore drawn up to meet the longer term requirements using as far as possible transmitters in the fixed service made redundant by the introduction of satellites.

The proposed development will be met in part by making use of 12

An operator sets up a radiotelephone call between a ship and a subscriber.

transmitters at the Leafield fixed-service station for maritime radiotelephone and teleprinter operation. Other requirements will probably be met by transmitters at the Ongar or Rugby transmitting stations. In any event it will be necessary to replace the existing aerial systems associated with these transmitters, which were designed essentially for working to one destination, with types more suited for working to ships whose location might be anywhere in the world. Both high-performance omni-directional aerials and rotatable directional types (the latter remotely controlled by the operator at the receiving station) will be used. Remote control of basic transmitter functions will also be extended to the operating position at the receiving station.

Selective calling facilities, similar to those being installed at the medium-range stations and which allow the long-range station to contact a selected ship on demand in much the same way as a telephone number is dialled, will be provided. Calling procedures will be somewhat more complex and it will be necessary to transmit the calls simultaneously in several frequency bands to ensure reliable contact regardless of the location of ships. Ships will be fitted with special receivers having facilities for monitoring several calling frequencies simultaneously.

Phase 3: Reconstruction of the receiving station. This final part of the reconstruction programme is the most complex and is still in the planning stage. The present facilities available at the Burnham long-range station have to be considerably expanded to meet the growing requirements of the service. In view of the age of the equipment and poor accommodation standards of the existing station, both a new building and new equipment will be required.

At the same time the site at Burnham is restricted and its value as a receiving station is being threatened by housing development in the vicinity. Plans are therefore being considered to transfer the whole operation to Somerton Radio – a receiving station in the fixed services – some 25 miles away which has ample accommodation for expansion and is not threatened by housing development. Somerton already has a highly efficient aerial system that with very little modification will provide improved performance for the maritime services.

In the new station it is proposed to take advantage of computerised message handling techniques, and an in-depth feasibility study is at present being carried out. It will still be necessary for radio operators to send and receive Morse transmissions to and from ships. The initial proposals envisage the use of a visual display unit (VDU) at each operating position linked to a central computer store which will hold messages, shipping position information, etc, as required and which will also route automatically incoming messages into the inland network. The present use of conveyor belts and messengers for cross-office movement of hand telegram copy to the radio operators in contact with ships would be discontinued.

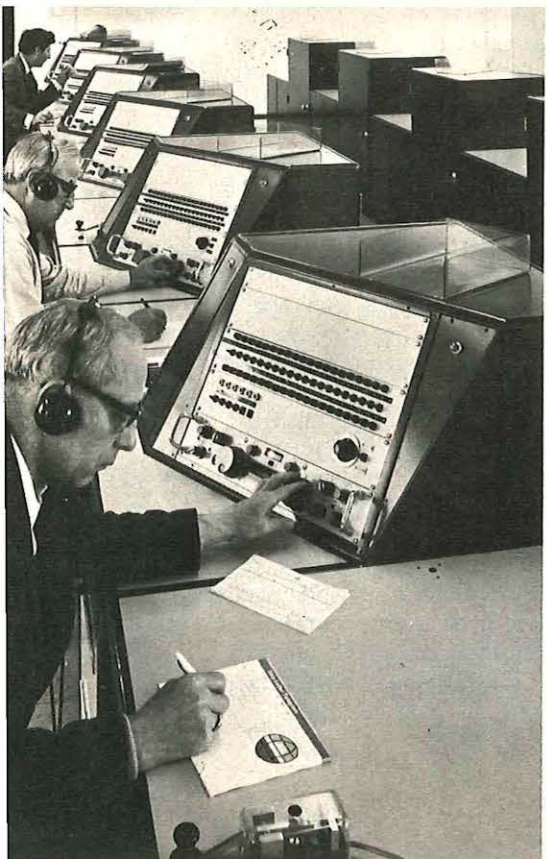
The new station would have a total of some 70 positions of which about 60 would be for wireless telegraphy and fitted with VDUs. Ultimately the service would probably make use of a central computer, in London or elsewhere, as part of a national telegraph switching system. Accounting data for the automatic preparation of customers' bills would be a feature of the proposed system.

An attempt has been made in this survey to give an indication of how the Post Office International and Maritime Telecommunications Region's services will develop in the decade or so before satellite systems make a significant impact in ship communications.

During this period it seems likely that radiotelephone working followed by radioteleprinter operation will increase significantly. Nevertheless a significant demand for Morse operation is almost certain to remain as long as the Safety and Distress services use this form of transmission and it is obligatory for ships of over 1,600 tons gross weight to carry qualified Morse operators.

● *Modernisation of the medium-range maritime radio services, which serve ships and offshore oil rigs within 200 to 300 miles of the British Isles, was described in the Autumn 1972 issue.*

A radiotelegram is received at Burnham from a ship which could be anywhere in the world.



Mr J. L. Hyatt is responsible for the planning and development of maritime radio services in the International and Maritime Telecommunications Region.

DROPPING IN ON THE CUSTOMER

EN Harcourt

Telephone poles heavily laden with wooden arms carrying insulators which supported spans of bare wires were once a prominent feature of most roads. These symbols of a bygone era are no longer so much part of the everyday scene, and new techniques are being used to connect telephone lines to the customer's house.

IN THE DAYS when bare, uninsulated overhead wires were the standard means of providing telephone service in rural and residential areas many faults were caused through these so called open wires coming into contact with each other. Considerable expense was incurred by the Post Office in pruning trees to keep the wires free from contact, but it was not practicable to check all those pairs of wires – the customers' drops – that branched off the main pole route to serve individual properties. Another way was therefore sought to prevent faults on customers' drop routes and this led to the development of pairs of insulated wires incorporated in a single cable, known as dropwire.

In 1961 the standard type of dropwire used today went on trial. It was thinner than earlier types and therefore a great improvement on aesthetic grounds, but like its predecessors it could not be tensioned in the same

Using a special dispenser an installer erects a "customer's drop" – the telephone line between the distribution pole and the customer's premises.

way as open wires when erected. For this reason it was necessary to have considerable space between adjacent dropwires to prevent them knocking against or twisting around each other. Also, because of the difficulty in locating faults when long lengths of dropwire were erected in line of route, their length was limited to four spans, each span normally being about 60 metres.

During that early trial it became apparent that these restrictions would make full exploitation of the dropwire's potential advantages impossible unless it was used only on single customers' drops and alternative methods of construction were found for multi-wire routes.

Two factors gave an answer to the difficulties. First, increasing demand for telephone service made the available methods for providing underground cables more economic. It therefore became practicable in many cases to take underground cables nearer to the customers and use radial type distribution poles to serve small groups of properties within a radius of a single span. Second, where underground cables would have been uneconomic, a lightweight aerial cable was introduced. This cable could be

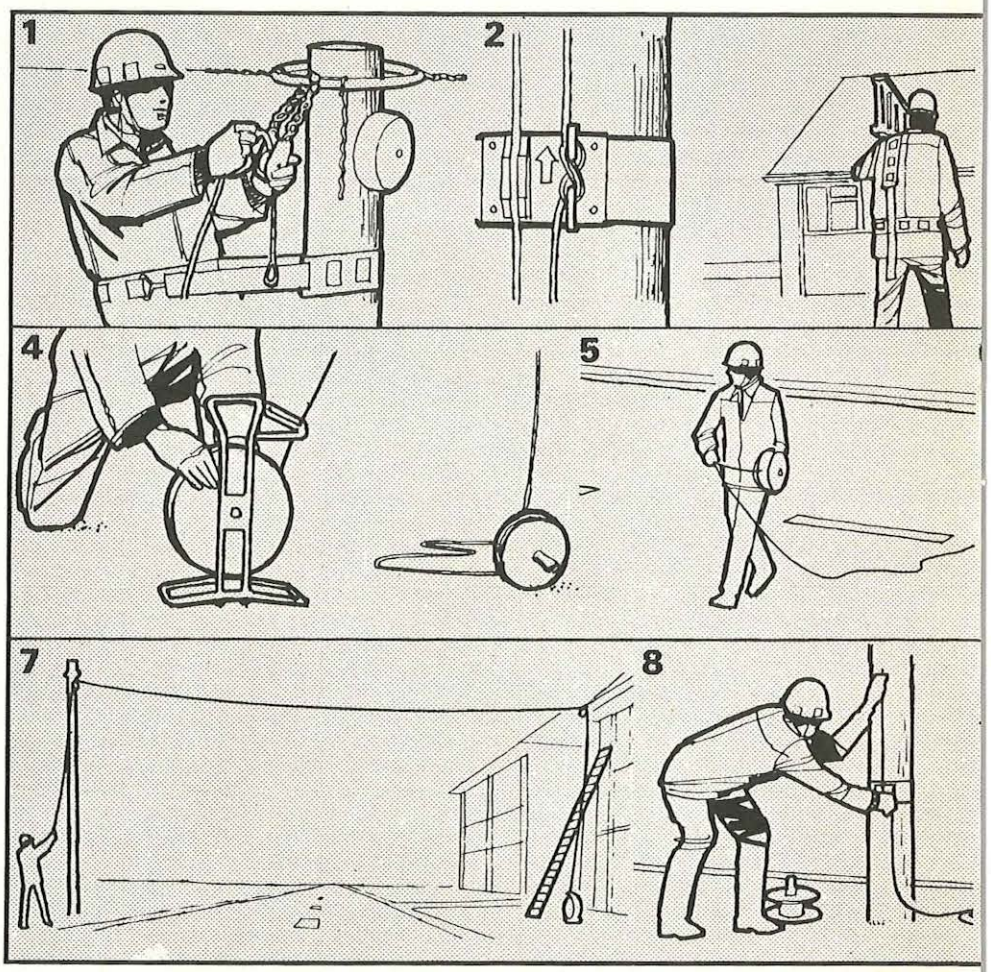
ONE-MAN SHOW

One man working alone can fit a customer's telephone line during a single visit. To provide the link between the distribution pole and the customer's premises he uses an insulated cable, known as dropwire, which incorporates the pair of telephone wires. With the aid of pulleys, sashlines and a special dispenser that holds the dropwire under tension, an installer can erect the dropwire single-handed even where it crosses a road. Using similar techniques and equipment, faultsmen will soon be able to replace damaged or faulty dropwire without assistance.

Illustrated here is one way of installing a telephone line where the dropwire crosses a road. (The numbers refer to the drawings.)

Having determined where the telephone and lead-in to the customer's premises will be located, the installer first attaches a pulley to a fitting at the top of the distribution pole **(1)**. A short sashline is suspended through this pulley and both ends of the line are secured at the bottom of the pole **(2)**.

The installer next fixes a bracket to the customer's premises at a height to provide the dropwire when erected with sufficient clearance from traffic passing underneath. He then attaches a pulley to the bracket and suspends a long sashline through the pulley **(3)**. One end of the sashline is tied to



erected on existing pole routes to replace open wires – or on new poles – with dropwires radiating to customers' premises from any pole as required.

Open wire construction of telephone lines was finally abandoned in 1966. Since that time radial type distribution poles and, where necessary, lightweight aerial cable with single span dropwires have been the predominant methods of overhead construction. (See colour picture).

The amount of external work required when fitting a telephone served by the new forms of overhead construction indicated that worthwhile improvements in productivity could be achieved if an installer, working alone, could erect the customer's drop and fit the telephone during a single visit. Many drops crossed roadways so it was essential that the technique developed should enable the installer to erect the dropwire across most types of road in residential areas.

The primary requirement was for a device that would support a drum of dropwiring cable and permit the dropwire to be pulled off steadily. At the same time the device had to maintain the dropwire at sufficient tension so that it would be held high enough when erected to avoid impeding traffic. A suitable dispenser was introduced in 1969 together with techniques that enable the installer to erect up to three spans of dropwiring cable provided not more than one road crossing is involved. Assistance is always provided if the installer is not satisfied that he can complete the road crossing in safety.

Electricity power lines present a potential fault hazard to customers' drops, and where there is a possibility of contact a dropwire with thicker and stronger insulation is used. Two men are usually needed to erect or renew this type because of its heavier construction.

Another problem sometimes arises when shared service telephones are being fitted. This type of installation requires an earth connection close to the customer's premises but the modern tendency to lay concrete paths adjacent to the walls of houses on some estates makes it difficult to obtain earth connections. To overcome the problem a three-wire dropwire is now being used in some locations. The third wire is connected to a common earth system provided at the distribution pole for a number of lines. Although the use of dropwire has reduced the number of faults on overhead circuits it has presented maintenance staff with a new situation. With open wire construction most faults were either broken wires or wires in contact. These faults were often visible from ground level and comparatively easy to clear.

Faults on dropwire present a different problem. In many cases the fault may be due to broken insulation and corrosion of one wire, the other wire continuing to support the span. This damage is often impossible to see and the faultsman may decide that the most satisfactory method of repair is to renew the complete length of dropwire. This is a difficult task without assistance, particularly as faultsmen are not yet equipped with dropwire dispensers. They therefore often ask for renewal work to be handled by a working party, which results in greater repair costs and a longer out-of-service time for the damaged line.

Steps are being taken to improve the situation by introducing a technique in which solo faultsmen will be able to locate disconnection faults in dropwires and renew one or two spans unaided. A field trial held in the Middlesbrough and Peterborough Telephone Areas has demonstrated that a faultsman equipped with a dispenser and ancillary equipment can safely renew up to two spans and recover the original dropwire by using it as a drawline. The method can also be used to replace open wires if one of these can be used as the drawline.

This year all staff dealing with dropwire faults will be trained in the new technique and equipped with dispensers. When trained they will also be able to erect dropwire in those situations where the original cable or wires are down by using the technique adopted by solo installers.

Use of dropwire and a reduction in the average length of the overhead portion of a customer's line have produced savings in installation and maintenance costs and have played a major part in reducing the number of external faults. Further reduction in both faults and maintenance costs will be possible when sufficient line plant is provided to ensure that all customers' drops are fed from radial type distribution poles and line of route overhead construction is abandoned.

the dropwire which is on the dispenser at ground level below the bracket **(4)**.

The remainder of the sashline, which is on a reel, is laid out flat across the pavement and road to ensure that it does not impede pedestrians or traffic **(5)**. At the base of the distribution pole the free end of the sashline is tied to one end of the sashline suspended from the pole **(6)**.

When the road is clear of traffic the installer pulls the joined sashlines through the pulley at the pole top, raising the line over the road **(7)**. He continues pulling until the dropwire is fed from the dispenser through the pulley at the customer's premises, across the road and through the pulley at the pole top. The sashline is then secured at the foot of the pole to maintain tension on the span of dropwire **(8)**.

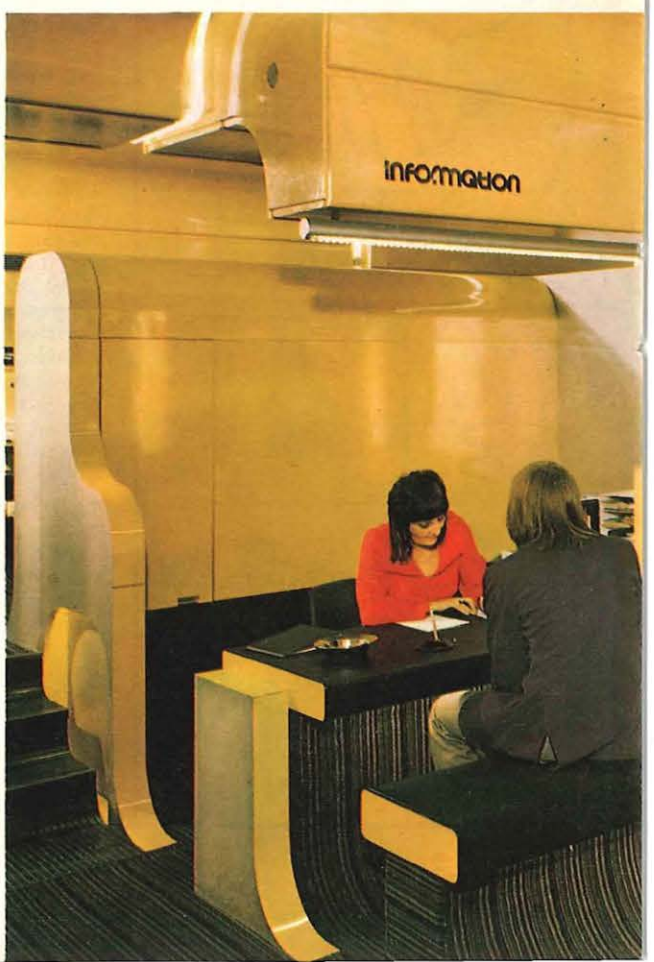
Returning to the customer's premises the installer secures the dropwire to the bracket by means of a wire fitting before completing the lead-in to the premises. Final tension is applied to the suspended dropwire at the pole top **(9)**, where it is secured by another wire fitting and linked to a terminal.

The installer can erect the dropwire from the customer's premises if this provides a better view of road traffic. Techniques have also been developed for the solo erection of dropwire where it has to cross low-voltage power lines and for multi-span jobs.

It is not always possible to erect dropwire single-handed, however, and the installer has to take account of standard safety regulations. For example, help should be sought if the ladder footing is insecure or if the ladder issued to the installer is not adequate for the job. Solo installation is also ruled out in heavy road traffic conditions.

Mr E. N. Harcourt is head of the local external plant maintenance group in Service Department at Telecommunications Headquarters. The group has been responsible for the introduction of dropwire renewal techniques using the special dispenser.

A splash of colour in a sad city

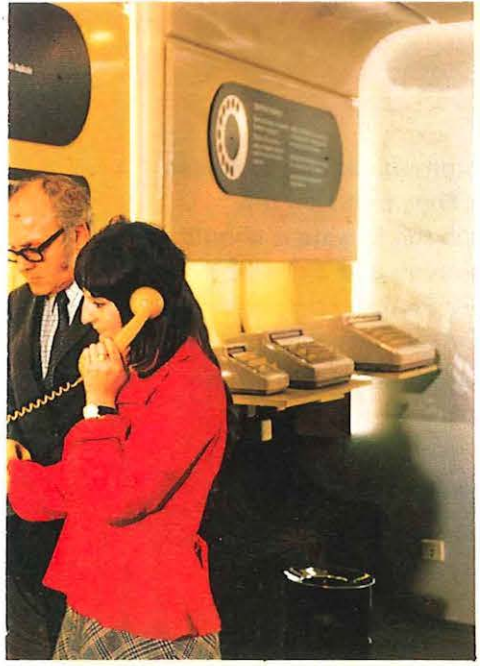


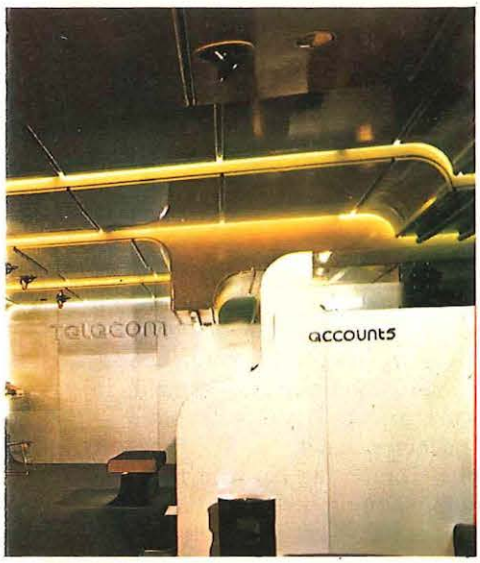
Right: Sales staff help customers at the Telecom Centre.

Top: The complete range of telephones and other facilities are on show.

Centre left: The shop with a locked door. Customers' hand luggage is examined before entry.

Centre right: The Centre is "divided" into sections by hoops of light along its length.





In the commercial heart of bomb-torn Belfast the Post Office's colourful telephone "shop" is open for business as usual. Or almost as usual. The sign of the times is that all customers must agree to have handbags and cases examined at the locked front entrance before they can enter.

This showroom for telecommunications facilities – called the Telecom Centre – was conceived and designed in happier circumstances. Now it provides a welcome splash of colour in a sad city. The design is an attempt to escape from the traditional line of desks and shelves of telephones.

"We wanted to go into the market place and reflect a more commercial approach" says Mr Eric Jones, Head of Sales in Belfast Telephone Area. "So we decided to move into the main Belfast shopping area, and to do it boldly and in an excitingly modern way."

A young local architect Ian Campbell who had not worked on Post Office buildings before was briefed for the project – this ensured that there would be no pre-conceived design ideas. A close working arrangement was set up between architect and Post Office staff and the result was an exciting design, but also a practical one.

The walls are coloured in silver and telecommunications yellow and there are very few straight lines; a grey-striped carpet sweeps away from the floor to become part of the furniture; and series of hoops of light across the Centre have the effect of dividing it into a number of areas of different shapes and sizes.

Inside the Centre customers can see the complete range of telephones and available facilities. There is also a section where accounts can be paid – in the hope that the customer popping in to pay an account will find something in the shop he may wish to buy.

The Centre also houses one of the three telex call offices in the UK.

The name of the Telecom Centre was chosen to reflect the ever-widening Post Office interest in all forms of telecommunications and not just the telephone.

"Present conditions considerably inhibit its sales function," says Mr Jones "but in better times the Centre is expected to make a really worthwhile contribution to business."

Despite all the difficulties the Centre is a morale booster for Belfast staff. "People like to work here – the atmosphere cheers them up," says Mr Jones.

Two articles in this issue continue our series describing how the Telecommunications Business plans to meet the challenge of growth and technological change. They focus on the development of strategic guidelines – setting the broad course to which the Business should be directed. The first article outlines the techniques of corporate planning and describes how they have been applied to the preparation of a strategic Business Plan. A companion article describes the development of mathematical models of the Telecommunications Business system which enable planners to assess alternative strategies rapidly and more easily with the aid of a computer.

THE BUSINESS PLAN

P Reevey

THE BUSINESS PLAN is the means of determining and setting out the strategy of the Telecommunications Business. It is the vehicle used by the Managing Director to present to the Post Office Board, for its approval, the broad strategic guidelines within which detailed operational plans may be formulated. It has the standing of a comprehensive corporate planning document, and together with other Business Plans (from Posts, Data Processing, Giro) forms the Post Office Corporate Plan.

Corporate and business planning reverse the traditional principles of building up forecasts and planning assumptions from an extrapolation of past trends, and projecting them to some point in the future to decide where the organisation is going. By defining basic objectives the corporate planner determines first the direction the organisation would like to go, or in the case of a Nationalised Industry must go, to meet its statutory obligations. The planner then draws up plans to achieve the defined goals.

The concepts and practical application of corporate planning are still evolving and the constraints under which a Nationalised Industry operates (for example Government imposed price restraint) also limit the practical application of the theoretical concepts. Nevertheless the process of corporate planning is already making an important contribution to the formulation of business strategy in three respects: first, by introducing an element of targetry, that is reflecting in forecasts and planning assumptions an improvement on past performance; secondly by enabling the Business to respond to, rather than simply to react to, internal and external changes of all kinds; and thirdly, by identifying the changes necessary in short and medium term plans to meet long term objectives.

The Business Plan presents those concerned in its preparation with many chicken-and-egg type problems. A solution is sought by the repeated process of working through a programme from a series of basic assumptions; determining from the picture that emerges whether the original assumptions are valid; making adjustments where necessary; and then going through the whole exercise again. The Business Planning Division has available to it a computerised Business Planning Model (which is the subject of a companion article) enabling otherwise long and tedious processes to be completed quickly and relatively easily. The model also plays an important part by helping to identify in the Business Plan the most crucial forecasts and planning assumptions through comprehensive sensitivity analyses which measure the effects of varying these assumptions by small amounts.

It is worth emphasising at this point an important characteristic of one of the techniques used to prepare the Business Plan. The Plan is built down from the apex of the organisation (by first determining objectives) and is broad based; within these guidelines other plans and programmes are then built up from the base of the organisation, that is, from detailed Area and Regional forecasts.

There are a number of benefits deriving from the preparation of a Business Plan:

1. It is an extremely good and worthwhile discipline. It brings together all operational and departmental plans in one document, and this alone helps to identify inconsistencies, inadequacies and duplication, all of which may exist to some degree in any large and complex organisation. The production of a Business Plan is also a good test of the planning machinery: if the planning machinery produces a Business Plan with deficiencies and areas of activity inadequately provided for, this reflects badly on that machinery. Thus the Business Plan can make a positive organisational contribution, particularly in the planning field, in drawing attention to weaknesses in the machinery itself.

2. The relationship between forecasting and planning becomes more clearly established. This has been blurred in the past and there may still remain some confusion about the two functions. At this point (and particularly in view of the prominence given in this article to planning) it is worthwhile emphasising the importance of the role of forecasting. The forecasting function becomes no less important with the application of the corporate planning concept: indeed, a forecast is often the starting point for developing sectors of the Business Plan. Experience has brought out the need for more rather than less sophisticated and soundly based forecasting techniques. The existence of a Plan does not mean that the Business no longer need seek to predict the future. It must continue to watch for incipient departures from the assumptions on which its strategic planning is based.

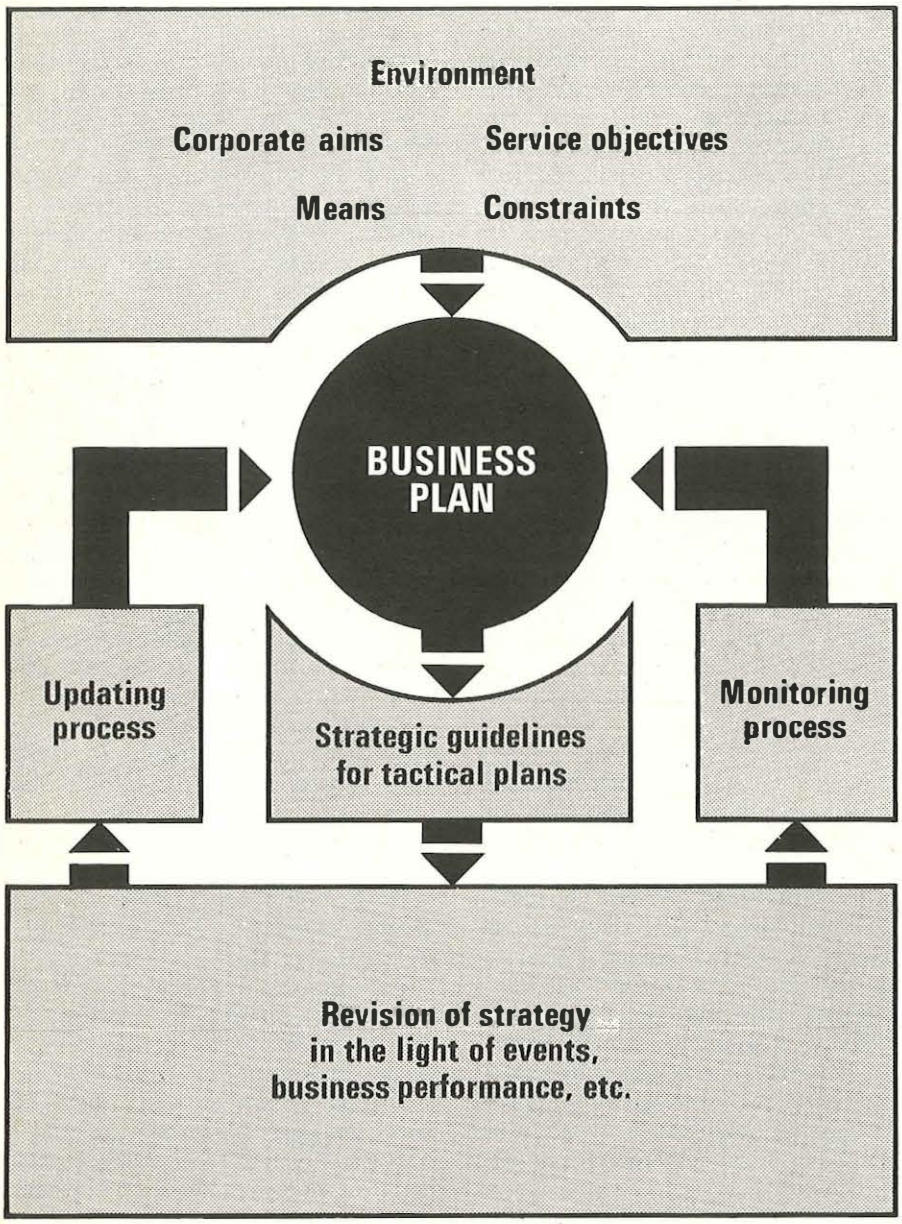
3. The crucial issues and critical achievements of the Business to fulfil its objectives are identified. Through the sensitivity analyses of forecasts and planning assumptions and by the evaluation of alternative strategies – both essential parts of the Business Planning process – it is possible not

only to isolate the factors that are most important in planning, but also to determine the extent to which those factors are likely to influence future Business performance. The Plan thus provides management with specific priorities on which to concentrate its attention.

4. The Plan provides a strategic planning backcloth against which to conduct general Business Planning exercises and examine the effects of variations in detailed operational planning assumptions. The machinery now exists for individual Departments to see how changes in areas of activity for which they are responsible will affect overall Business performance. The Plan also provides the opportunity for people everywhere in the Business to ensure that all planning is consistently based on the same set of fundamental assumptions.

5. There is one further important aspect of Business Planning that could make a most valuable contribution to the Business. Through its analysis of performance the Business Planning Division develops a concern for overall Business efficiency, what might be called macro work study. It identifies those elements of Business performance in which improvement would result in the greatest benefit overall; it then has the somewhat harder task of focussing attention and encouraging and influencing operational plans to convert the potential into reality.

The Business Plan is the logical start of the planning cycle, deriving from the aims of the Corporation a framework of objectives and strategies for the next 10 years within which decisions will be taken and more detailed plans formulated. The approval of the Plan by the Managing Director's Committee (MDCT) and the Board confirms the main strategies and planning assumptions consistent with the programme to be pursued by the Business. The Plan, for example, provides the broad guidelines within which the Investment Review is compiled. (A previous article on investment planning explained how forecasts of capital expenditure are presented to Government in the Investment Review.)



The aim is to submit the Plan for Board approval or annual confirmation before the Investment Review. At the present early stage in the application of corporate planning this has not been easy. Both exercises are complex and take a long time to complete, and to some extent they have proceeded simultaneously. Difficulties have been minimised however by establishing the key assumptions and starting the Business Plan in advance of the Investment Review. The sections in the Business Planning Division responsible for the two exercises work extremely closely together during the stages leading up to the presentation of the Plan and the Investment Review. They agree, for example, the planning assumptions for long lead items that are included in the Investment Review guidance letter which sets out the broad investment guidelines at the beginning of the Review cycle.

By preceding the Investment Review, the Plan provides MDCT and the Board with the opportunity to discuss fundamental strategic matters before the time-critical Investment Review enters its final stages. Having established the guidelines in broad terms MDCT and the Board are able to concentrate on the more immediate detailed issues when the Investment Review is considered. The Business Plan as it becomes firmly established will be the starting point and broad base from which all reviews and plans stem.

The development of the Plan is started by the Business Planning Division agreeing at the appropriate level Business objectives, environmental factors, forecasts and planning assumptions on which the plan will be based. Given these basic data the Telecommunications Headquarters Departments produce contributions to the Plan which are considered first in some detail at Head of Division level (by the Business Planning Liaison Group) and then at Director level (by the Business Planning Committee) with greater attention to the broader strategic issues. During this formative stage of the plan the Business Planning Division concentrates on getting the shape of the plan right, on developing an overall strategy, and in influencing Departmental plans to en-

sure consistency between them and the stipulated Business objectives, finally co-ordinating and presenting the plan for approval.

It is important to remember two fundamental constraints of strategic planning. First, an organisation as large and as complex as the Telecommunications Business has a momentum and direction that cannot be changed overnight; secondly, there are in existence at any time strategies and plans already developed to a stage where the scope for radical change in the short and medium term is limited. At the same time this demonstrates how necessary strategic planning is. Without some attempt to determine and plan towards long term objectives there is a danger that an organisation – particularly one with long lead times – will drift aimlessly rather than be steered purposefully.

Although the application of corporate planning is still evolving, the Telecommunications Business already has well developed expertise in and a healthy practical experience of the technique. It will take time for the full potential of Business Planning to be realised. But its value as an approach to overall Business management is becoming increasingly apparent and it is having a growing influence. Specific imminent developments include the establishment and maintenance of monitoring machinery, for initiating and co-ordinating the follow-up action necessary after identification of the issues in the Plan crucial to the achievement of Business objectives; and the extension of the corporate planning concept to Regions with the production of complementary Regional Business Plans.

A description of the Business Plan would be incomplete without two particular comments about the document itself. Although the end product of the exercise is important, it is no more so than the work that goes into producing it and the consequent influence on Business activity; the document is more than a plan, it is a coherent set of plans representing the corporate strategy of the Telecommunications Business.

The article is perhaps most appropriately concluded by mentioning a role that is at the heart of the strategic planning function and exemplifies its relationship with and contribution to the organisation it serves: that is in acting as a catalyst in providing the means by which others in the Telecommunications Business can plan effectively.

MODELS AID THE PLANNERS

P Gottlieb

THE ARTICLE about the Business Plan has explained how strategic planning looks at a range of possible futures and in this way tries to steer the Business on to a chosen path selected according to its likelihood and desirability, while mindful of targets and constraints. The more complex a business the greater the number of assumptions built into the forecasts. The more complex the accounting system, the more difficult it becomes for management to assess quickly changes in these assumptions. Clearly management must be given tools which enable it adequately to assess the key questions facing them, and for this purpose a number of computerised models have been developed within the Telecommunications Business. The models – mathematical representations of reality – help those concerned with Business Planning to explore and evaluate the variety of alternative strategies open to the Business.

In this country the Post Office has been at the forefront of developments in the modelling field and over the course of the past three years has built a number of business models now used by the planning system. The models so far constructed are representations of the interrelationships of Business activities, comprising sets of mathematical equations derived from close analysis of the present manual methods of providing the information used for planning purposes.

The centre piece of this family of models simulates the main elements of the calculations involved in the Business Plan and Investment Review.

An outline of the structure of the interrelationships contained within this main model – The Telecommunications Business Planning Model – is shown (right). It was constructed on a modular basis and comprises the six distinct calculation processes indicated: income, manpower, current expenditure, capital expenditure, depreciation and financing. It is an off-line computer model and requires punched card input derived from input forms completed by users. In normal use the model will provide answers overnight, but quicker turnround can be given if particularly urgent response is required. Two elements of this total structure are also available as separate on-line models, one dealing with overall financial calculations and the other concerned with the complex set of depreciation and asset calculations. All of these models are programmed to provide results for up to twelve years ahead.

The on-line models, though limited in application, are extremely valuable and are used extensively within the finance function. The main model has much greater potential and best demonstrates both the particular benefits and the implicit rationale of modelling techniques. Where the number of variables in a planning calculation (eg price indices, wage rates, capital costs, etc) is large, possible permutations become almost infinite and it becomes increasingly difficult for large numbers of the variations to be calculated by manual means. Furthermore use of the model ensures that a change in an initial assumption is carried right the way through the financial system and that all the various effects are recognised. An example of this is a change made in a forecast demand for calls or a change in the balance of traffic between trunk and local calls. The model not only calculates the new value of income in each year, but automatically provides revised figures for income due from customers and calculates the consequential effects on current assets, mean net assets, variations in working capital, capital requirements, interest payments, profit, borrowing, return on capital, etc.

In the same way when given a revised capital expenditure forecast in any sector the model revises contingency estimates, calculates new depreciation provision, new values of assets and goes on to give the effect on cash flow and the changed self-financing ratio, etc. Both these exam-

ples have effects which are cumulative from year to year. The model will take these effects into account and, for little cost and no effort, can provide schedules of results showing all the effects in detail from a change in only one variable. Moreover a number of changes can be tested and results produced simultaneously.

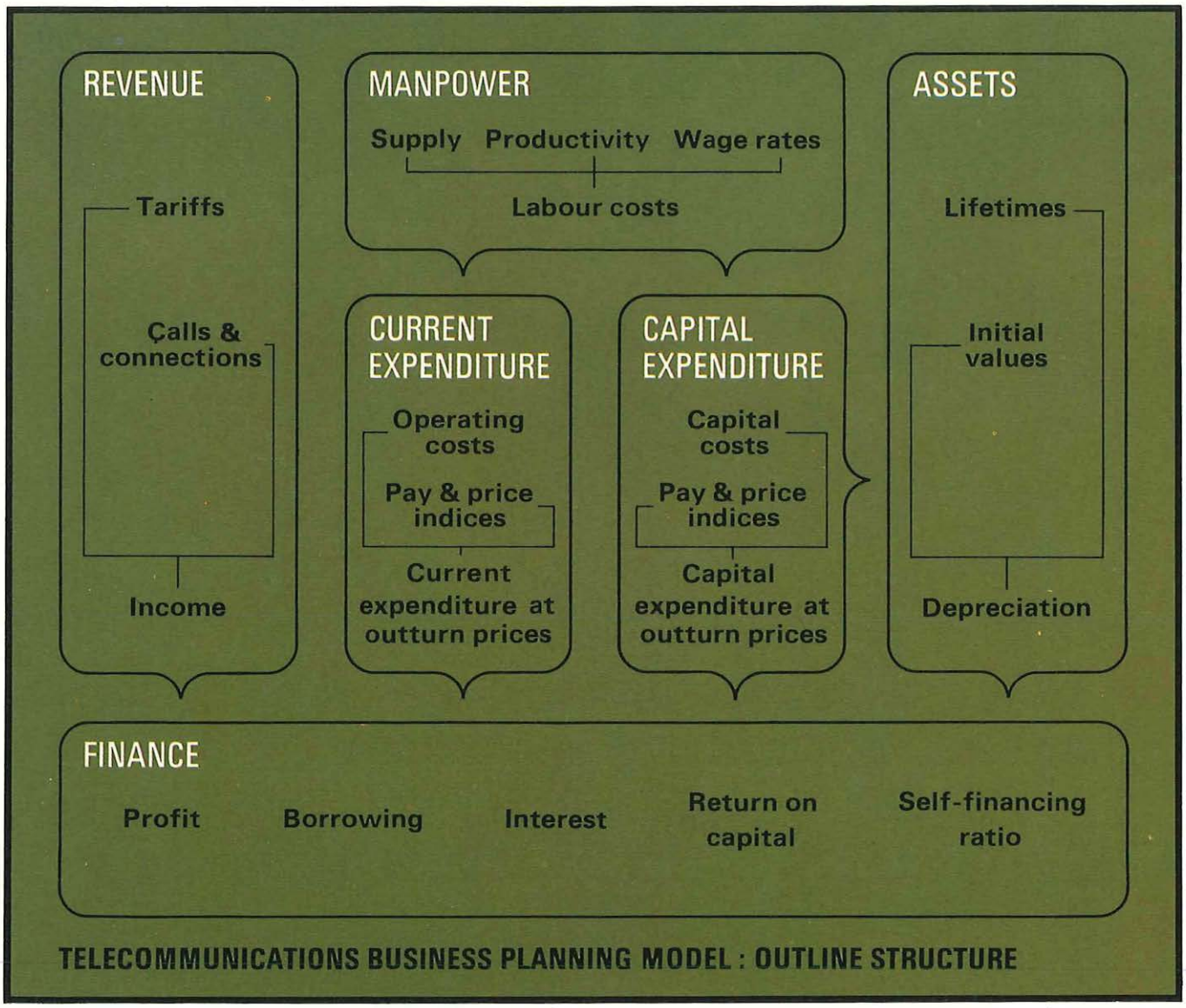
The model is specifically designed to facilitate sensitivity analysis on fundamental assumptions. A forecast can be varied up or down and the impact of these changes can be gauged. The model is able to indicate from results produced in this way which factors are crucial and where it is important to limit the probability of error in forecasts. The problems of prediction are not likely to be overcome easily, but the modelling approach may reduce these difficulties. The model brings the Business system into the planners' laboratory and consequently provides a rapid means of examining the effects of experimental changes. By testing the sensitivity of the financial profile of the Business to variations in forecasts, by testing the effects of changing assumptions, the key areas of the Business are pinpointed as are the crucial issues which may require more detailed investigation.

As the model is used by a number of planning sections it also provides a ready common reference for the assumptions built into any particular Plan or Review and so is a useful common benchmark for analysis. The amount of basic data required for calculation is large, comprising about 6000 items. A major element of this total however is composed of historic records of asset acquisitions, some going back to the turn of the century. These and a number of other items are not changed other than for annual updating. The key assumptions, such as rates of inflation, productivity, system size, system growth, cover a limited number of approximately fifty variables which can be readily changed. For further ease of use all input data and all sets of results are channelled through one point in the Business Planning Division of Telecommunications Headquarters.

Business planning models are as yet in the early stages of development. The models described here are first generation models, but all have been and are currently being used in planning exercises. The results of such active operational use are extremely promising. There is little doubt of the evolutionary potential of models in the Business Planning field; it is an area of activity in which demands for information are growing. In an environment of increasingly rapid change, business models will come to play an important role in the evaluation and analysis of the future direction of the Telecommunications Business.

Mr P. Reevey is head of the section responsible for preparing the Business Plan in the Business Planning Division of Telecommunications Headquarters.

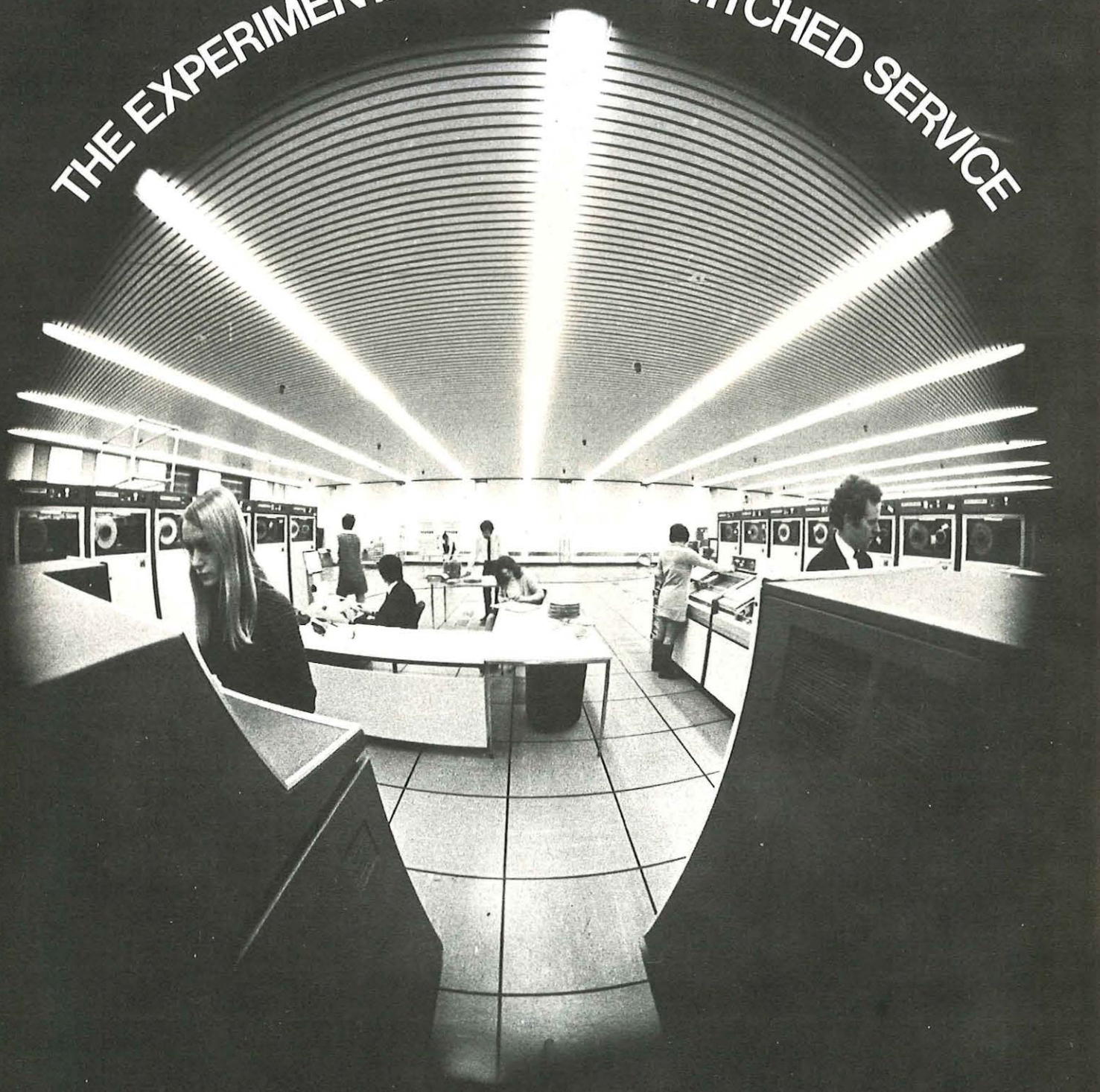
Mr P. Gottlieb is the Model Liaison Officer in the same Division.



TELECOMMUNICATIONS BUSINESS PLANNING MODEL : OUTLINE STRUCTURE

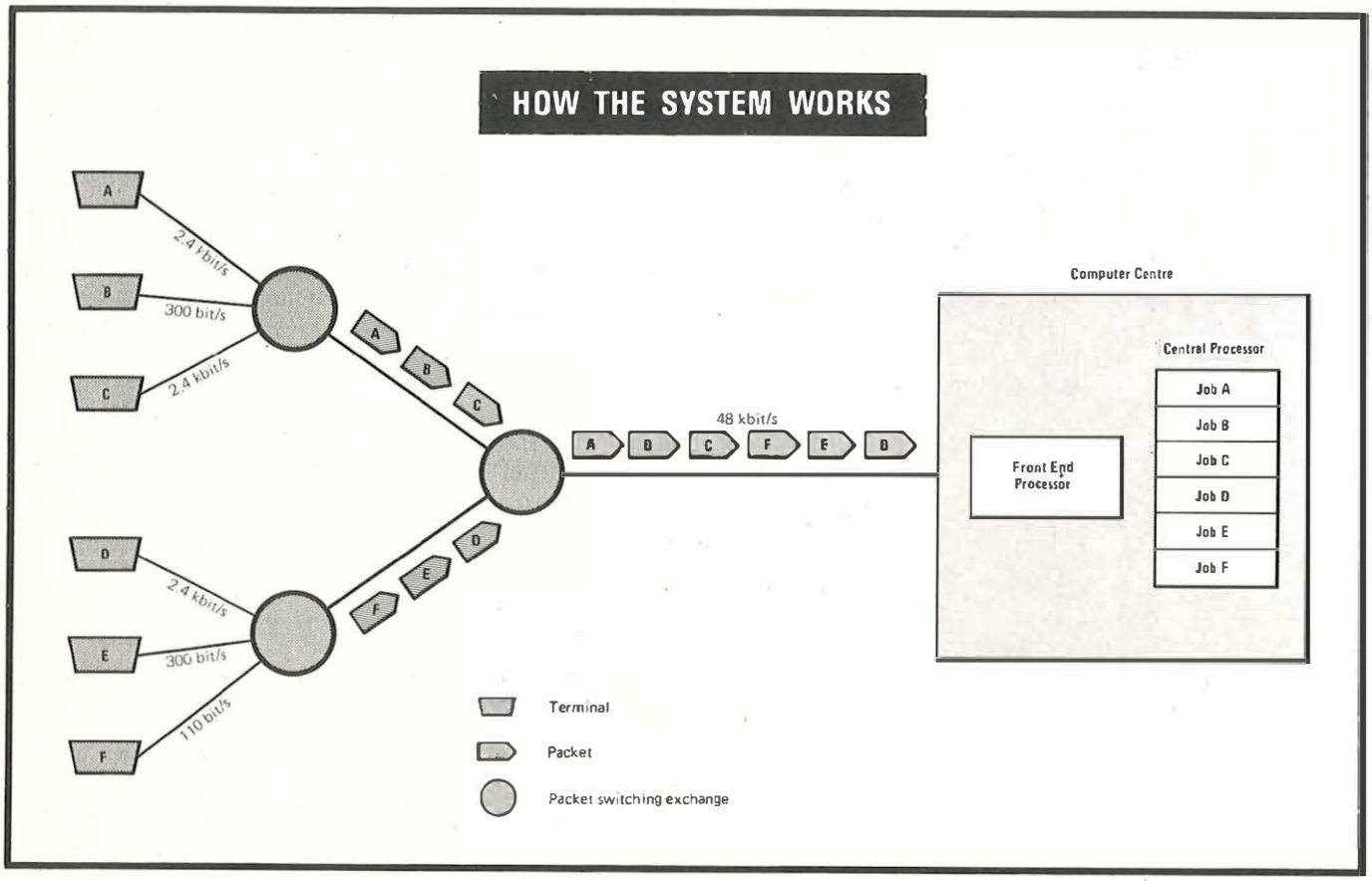
EPSS

THE EXPERIMENTAL PACKET SWITCHED SERVICE



The Midland Bank computer centre. The bank is among those taking part in the experimental service.

GR Dodds



THE POST OFFICE is to introduce in 1974 an experimental public service designed specifically for the transmission of computer data. It is to be operated in co-operation with computer users and manufacturers.

The new service will use for the first time on a public system packet switching techniques by which data will be routed as separate blocks of electrical signals. These self-contained blocks (or packets) of information traverse the network one after the other at high speed. This has the advantage of providing a more efficient use of the transmission links. Packet switching also makes possible the economic interworking of terminals operating at different speeds of transmission. A large number of low-capacity connections to a computer can be replaced by a single high-capacity link.

Elsewhere in the world only a few such services are in operation and all are private systems, the largest being a coast-to-coast university network in the United States. Packet switching is therefore very much in its infancy and the new service, to be known as the Experimental Packet Switched Service (EPSS), will enable the Post Office, the computer industry and data communications users to gain experience in the technique. It will also allow comparisons with other methods of operation which are now being looked at with a view to determining the ultimate nature of the country's national switched digital data service proposed to come into operation near the end of this decade.

At present, when data is transmitted over the public telephone network a continuous two-way path is set up between a terminal and its central computer for the duration of the call, irrespective of the actual data flow. In practice, however, customer data is usually generated intermittently, leaving periods in which no data is transmitted at all. Relatively inefficient use is therefore made of the total data transfer capability of the communications link.

The EPSS provides an opportunity for a totally new approach, while still making maximum use of plant and facilities planned and used for the generality of telecommunications services. As data will be transmitted in individual packets there will be no need for a continuous path between the two communicating parties. Each packet will contain coded information which will include the network address of the terminal to which it is destined, thus enabling the Packet Switching Exchanges (PSEs) to route it through the network. It will also be possible to take advantage of the spasmodic nature of data communications by interleaving packets – that is slotting the signals from one sender into the intervals between the signals of others. In this way the communication channels within the network will be used very efficiently.

Each packet will contain a maximum of 255 bytes of data information (each byte consists of eight binary digits and may be equivalent to a character, such as a letter of the al-

Two different concepts for providing a switched digital data communications service are being examined by the Post Office. One is circuit switching, similar in principle to current telephone and telex switching methods, but able to achieve the faster call set-up times and greater reliability appropriate to data services. The second is packet switching, a new technique which is to be used in an experimental Post Office service next year. This experiment, described here is part of intensive market and technical studies which will help to point the way for future developments.

phabet). The packet also has a "header" (a maximum of nine bytes) containing information such as the network address of the destination terminal and the amount of data in the packet, and a two byte error checking code at the "tail" of the packet. This check code will enable a very high proportion of transmission errors caused by electrical interference to be detected and remedied.

The technique of interleaving packets from a number of sources is also likely to result in simplification of control equipment at computer centres. Moreover, considerable cost savings should be made possible with the replacement of the large number of low-capacity connections and the complex associated control equipment currently needed by a single, high-capacity connection. This method of operation has another inherent advantage: data from all sources, irrespective of the nature of the terminals, arrives at the computer at the same speed and in a constant format, thus simplifying the communications control aspects of the computer system. Using this technique, it will be possible for a computer to be in simultaneous communication, via one channel, with several hundred terminals.

The main links – that is those interconnecting the Packet Switching Exchanges – make use of conventional wideband transmission facilities and will operate initially at 48 kbit/s. However, the Packet Switching Exchanges will also be able to accept information from and transmit data to local terminals at much slower rates. Links from exchange to customer terminal will also make use of conventional plant facilities. Thus a wide variety of terminals and computers will be able to communicate with one another. At present the variations in operating speeds, differing codes and disparate transmission methods limit terminals and computers to talking only to closely related units.

For the Experimental Packet Switched Service the Post Office intends to set up three Packet Switching Exchanges. Present plans are for these to be located in London, Manchester and Glasgow, but accommodation has also been reserved at Birmingham, Bristol, Leeds and Edinburgh to provide planning flexibility.

Customers using the new service will have a choice of two different methods of terminal operation. They can make use of "intelligent" terminals which will be capable of assembling data into packets before inputting it to the network and of unpacking received data. Alternatively they will employ the simpler type of keyboard-printer terminal which will transmit a message character-by-character to a Packet Switching Exchange where the characters will be assembled into packets before onward transmission. In a similar manner, the Exchange will disassemble packets addressed to character-by-character terminals.

To set up the experimental service the Post Office will be able to use standard equipment except for switching which will probably use commercial computer equipment with specially developed software. Each Packet Switching Exchange would serve up to about 150 character-by-character terminals operating at 110 bit/s or 300 bit/s and a maximum of 24 packet terminal devices. Up to 20 of these could be connected by four-wire circuits typically operating at 2,400 bit/s and up to four by wideband circuits operating at 48 kbit/s. Low-speed access to the Packet Switching Exchanges would be either by dedicated connections or over the public telephone network using existing Datel 200 modems. Additional data transfer rates may become available as the development of the new service proceeds.

An interesting facility which will be made available by the experimental service is that of closed and partially closed user groups which will, in effect, enable customers to have a private network within a public switched service. In other words it will be possible to plan that a company's central computer complex will be accessed only by that company's own terminals and by no others. This will be achieved by a coding procedure controlled entirely by the Packet Switching Exchanges. The Exchanges will hold a list of interlock code numbers, each of which will be unique to the circuits serving particular computer centres or terminals within its area. The Exchanges will transfer a packet between a given terminal and computer centre only if they can relate the respective interlock codes held within the Exchanges for the particular terminal and computer centre. In this way the service will provide a closed user group facility.

The partially closed user group, while allowing computer access to a limited number of specified terminals, will also enable a computer centre itself to communicate with another similar centre. A good example would be one of the big five clearing banks. Clearly, a bank will want to plan that no one outside its own organisation could gain access to its own central computer. At the same time, however, to keep its current accounts up to date it may require to transfer data between its own computer and that operated by the central cheque clearing organisation. In that case, it could make use of a partially closed network.

During the first year of the new experimental service customers cooperating with the Post Office will be asked to pay only for access to the appropriate Packet Switching Exchange, transmission over the main highways between PSEs being free. During this initial trial period the Post Office will announce charges for continuing use of the service. A minimum of 12 months' notice will be given of major alteration or withdrawal of the service.

The EPSS could be the forerunner of a national public switched packet service and as such for the first time offers participants an opportunity to try out new concepts in both the transmission and processing areas of the system. As with any new public service, there is a need for users to accept defined operating procedures and possible hardware/software modifications. However, on balance there is little doubt that this unique opportunity offered by the Post Office will justify for many users the additional investment involved in participation.

With a view to assisting potential users even further, the Data Communications Division intends to form a Customer Co-ordination Group through which those organisations taking part in the experiment will come together to review matters of common interest in the implementation of the service. Already Univac, Olivetti, Burroughs, Midland Bank, Computer Aided Design Centre, several universities and polytechnics as well as a number of other users have agreed to take part.

It is anticipated that a number of meetings of the Co-ordination Group will be held over the next 12 months or so, thus providing ample opportunity for discussion before the opening of the Experimental Packet Switched Service in 1974.

Mr G. R. Dodds is a Senior Sales Superintendent in the Data Communications Division of Telecommunications Marketing Department. He joined the Post Office from Burroughs Machines in 1970 and has been concerned with planning the marketing aspects of the packet switching trial.

A cable pan is lifted by crane while undergoing trials at Woolwich.

Canned cable for ships

DF Malcolm

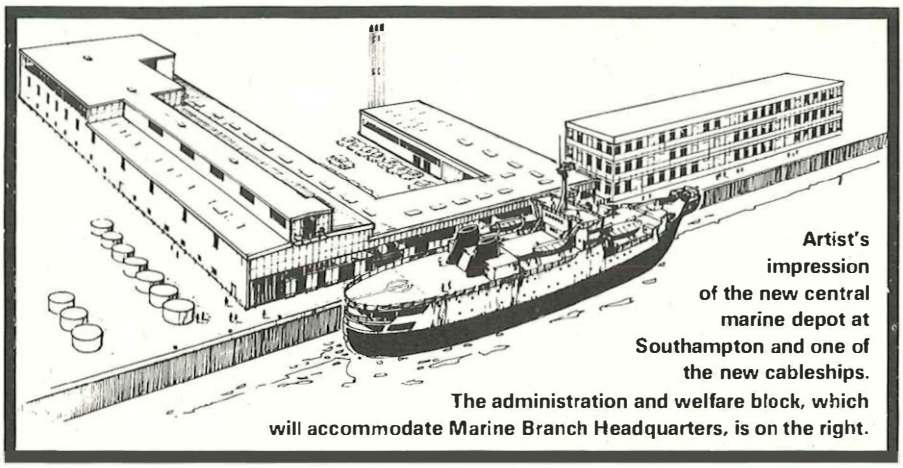
Containerised loading techniques will be used at a new depot at Southampton for the Post Office cableship fleet. The depot will store large pans filled with undersea telephone cable ready for quick loading into two cable repair ships now being built. The cable pans will be moved around the depot on miniature hovercraft.

MANY UNDERSEA telephone cables providing international services carry more than 1,000 calls at once, and others now being planned will have nearly four times this capacity. It is therefore vital that faults and damage to cables are located and repaired as quickly as possible.

A new central marine depot being built at Southampton for the Post Office will enable its cable ships to deal more rapidly with repairs. The depot will be equipped with modern facilities and employ new techniques to provide more efficient storage and handling of cable, to speed the turn-round of ships, and to meet future needs created by increased workloads and more sophisticated cable systems.

Post Office cable ships currently maintain more than 15,000 miles of submarine cable linking Britain, the mainland of Europe and America. Locating the depot at Southampton will give quick passage times to the major cable routes of the southern North Sea and South Western Approaches – areas that will have more submarine systems in the future.

In addition to conventional facilities for storing and handling stock cable, the depot will use a technique known as pan loading – a form of containerisation. Developed for the two new cable ships (described in the Autumn 1972 issue) which will replace the older ships *Iris* and *Ariel*, this high-speed system uses huge cylindrical pans, loaded with cable.They will be moved around the depot by specially designed transport based on hovercraft principles, and can be lifted into and out of the ships' cable tanks by heavy-duty crane. A ship can be loaded in as little as four hours by this method, compared with four days or



Artist's impression of the new central marine depot at Southampton and one of the new cableships. The administration and welfare block, which will accommodate Marine Branch Headquarters, is on the right.

more by conventional techniques which involve manual handling.

The present method of cable handling is to feed one continuous length into the cable tanks where it has to be stowed by hand. This is a very slow and laborious task and expensive in terms of manpower required. The average speed of handling heavy armoured cable is about one mile per hour, and the rate with lighter types is not significantly faster. Speed of handling cable recovered from the sea can be as low as one mile per day.

Constant handling over the years of the same section of cable in the ships or depot tanks reduces its mechanical condition from new – its recorded condition – to something which under certain circumstances may have to be scrapped. This applies particularly to certain modern coaxial cables which can only withstand a limited number of reverse bends.

Ideally then a repair length of cable should be stored in a container and not handled again until it is laid in the sea. The new method chosen for the Southampton depot is to cut repair lengths – normally five nautical miles – from stock cable temporarily stored in 40-ft diameter tanks within the main depot. The cut lengths will be stored in cable pans, initially 25 in number, and left in the open adjacent to the quay until required by a ship.

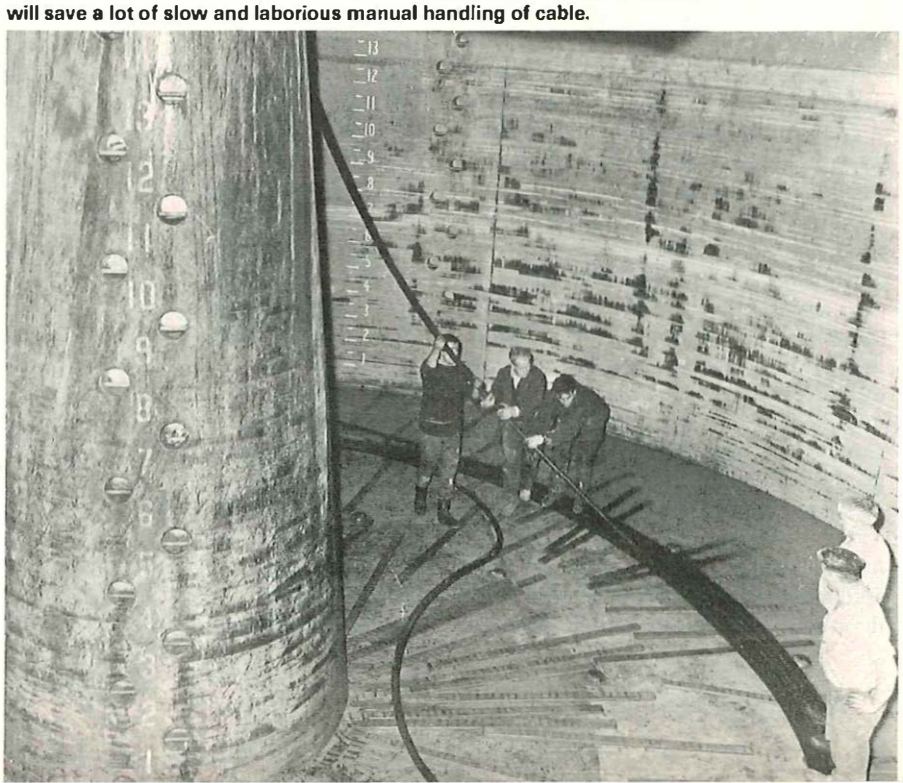
Ships not designed for carrying cable pans can be loaded or unloaded by conventional means using a simple cable gantry and span system from the cable tank house within the depot. Handling of pans into or out of a cable tank in the new ships can proceed at the same time as another of their tanks is being loaded or unloaded by conventional means.

None of the existing cable depots – at Dalmuir (Glasgow), Dover, Shandon (Dunbartonshire) and Woolwich – are capable of pan loading. Apart from Dalmuir they are also unable to expand, and the Woolwich depot will become difficult to operate with the construction of the Thames barrage immediately upstream. Movements to and from the Dover depot are hampered by the activities at adjacent berths of the cross-Channel ferry services, which also restrict access to the port.

Faced with these problems the Post Office felt that a new, central depot would allow for improved operation and manning of its cable ships and give the opportunity for more effective maintenance of the fleet. In addition to providing a base for the new cable ships, which are essentially coastal water repair vessels but capable of deep-sea work, the Southampton depot will service the deep-water repair ship *Alert* at present based in Dalmuir. The Woolwich, Shandon and Dover depots will be closed, but Dalmuir will be retained as a cable store.

The concept of a central depot eliminates the need for duplication of

Undersea telephone cable is loaded by hand into a tank. Containerisation will save a lot of slow and laborious manual handling of cable.



The underside of a platform, showing its flexible bag. Four platforms will be used to move a cable pan, which may weigh up to 80 tons when fully loaded.

A NOVEL method of transport, based on the air-cushion principle of hovercraft, is being adopted to handle cable pans at the Post Office's new central marine depot in Southampton. These cylindrical pans are 18 ft in diameter and 12 ft deep, and will be loaded with lengths of cable.

Moving the pans from the depot to their storage area, then to the quay and finally into the ships' cable tanks poses special problems. Each pan weighs eight tons empty and as much as 80 tons when fully loaded – nearly twice as heavy as normal containers handled by ships. Further, the depot site is on reclaimed land and this created surfacing problems. It was decided to follow the Docks Board example and "tile" the storage area with Stelcon rafts, which are two-metre square slabs of reinforced concrete.

Early tests showed that the use of air-cushion transport was practicable over this type of surface, and in September last year full-scale tests were carried out on a prototype pan using Aero-Go casters. These are small "hovercraft" platforms on which the pans are lifted from the ground and held suspended – in effect

a number of activities. At existing depots cable stock has to be duplicated to ensure that a ship can call at any depot to load the required type of repair stock. A central depot will therefore enable the amount of cable stored to be reduced.

Testing of cable repair stock can be carried out more effectively at Southampton by a Central Testing Unit, now at Woolwich depot, and the provision and repair of ships' cable testing equipment will be simplified. The Cable Jointing Unit will have purpose-built facilities to carry out the special jointing requirements of submarine cables. Repeaters, ships' radio and electronic maintenance units will all be provided at the central depot.

Location of the new depot had to take into account trends in the development of new submarine telephone cable systems. These trends showed that not only was the southern North Sea likely to be an expanding and important area in this respect, but that cable landing points in the south-west of England and Western Europe were now favoured. For any deep-water ship to be fully utilised with a minimum of passage time it would be better for it to be based at a port close to the developing cable network, and at a site that would allow the Post Office to make better use of its whole fleet.

In the search for a new site it became obvious that the most attractive location for a deep-water berth would be one serving developments in the South Western Approaches as well as those in the southern North Sea. The only location meeting this requirement was the Southampton/Portsmouth area, and finally a site in Southampton Docks was selected.

The deep and broad estuary of Southampton Water is one of the finest natural harbours in the country. With the Isle of Wight forming a breakwater at its entrance it has sheltered deep-water approaches right up to the quayside, and with a tidal range of only 13 ft there is no need for enclosed docks with their attendant delays to shipping owing to locking operations. Further, with four hours of slack water each day, when there is little or no tidal movement, navigation in and out of harbour is made easier.

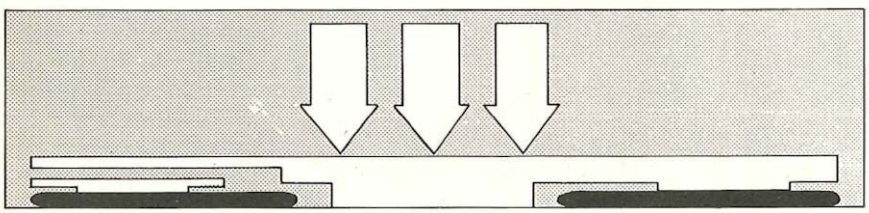
Southampton Docks are at present undergoing rapid development, with 98 acres of land having been reclaimed from the River Test for dock use. This area is being used mainly for container handling and marshalling facilities. Early in 1972 the Post Office leased five acres of the reclaimed land for its new central marine depot, and building started in August of the same year with a target date for completion in April 1974.

The site has been planned to meet as fully as possible the operational requirements of a depot and will have a single wharf 900 ft long which will allow two ships to be berthed alongside the quay. There will be sufficient depth of water alongside the quay to berth the largest cable ship afloat at all states of the tide without the need for special dredging, and wharfside services to the ships will provide adequate electric power, fresh water and communications.

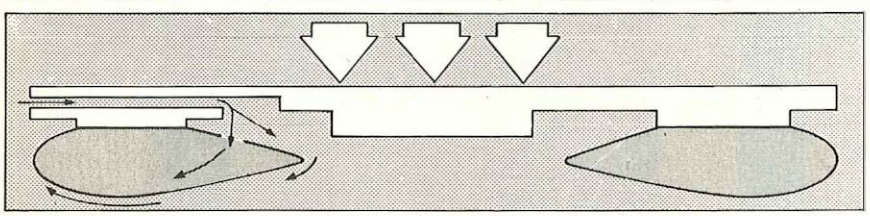
Complementary to the depot building will be an administration and welfare block to provide a canteen, rest room, luggage rooms and office space for ships' crews and office staff. Having accepted the concept of a central depot and ships' base it would no longer be efficient for the Post Office's Marine Branch Headquarters to be situated in central London, and staff will be transferring to the new location in addition to ships' crews and depot staff.

In late 1974, with the advent of the two new cable ships and completion of the new depot, Marine Branch will be better equipped to carry out its function than at any other time.

80 TONS FLOATING ON AIR



The Aero-Go "hovercraft" caster is basically a 48-in square platform with a flexible bag (similar in shape to a tyre inner tube lying on its side) attached underneath. It requires nothing more than a supply of air and a flat surface on which to operate.



When the air is turned on the platform and its load elevate slightly as the "inner tube" inflates. At the same time air is forced into the hole in the middle of the tube and pressure builds up until a thin film of air seeps out under the "inner tube". The platform and its load are now floating on a cushion of air – ready for free and easy movement.

"floated" – on a thin film or cushion of air, enabling them to be easily moved.

Four casters will be used to handle each cable pan. The bases of the pans have been specially designed to allow casters to be slotted underneath without lifting the pans off the ground. A modified Tugmaster, a vehicle normally used for towing container trailers, will be fitted with a compressor to supply air to the casters and used to move the pans about the depot storage area and quayside.

Once a pan has been brought to the quay edge it will be lifted into the cable ship by a Docks Board 150-ton floating crane. At a later date, when knowledge and experience has been gained in handling pans into and out of the ships' cable tanks, the economics of installing a fixed crane will be investigated.

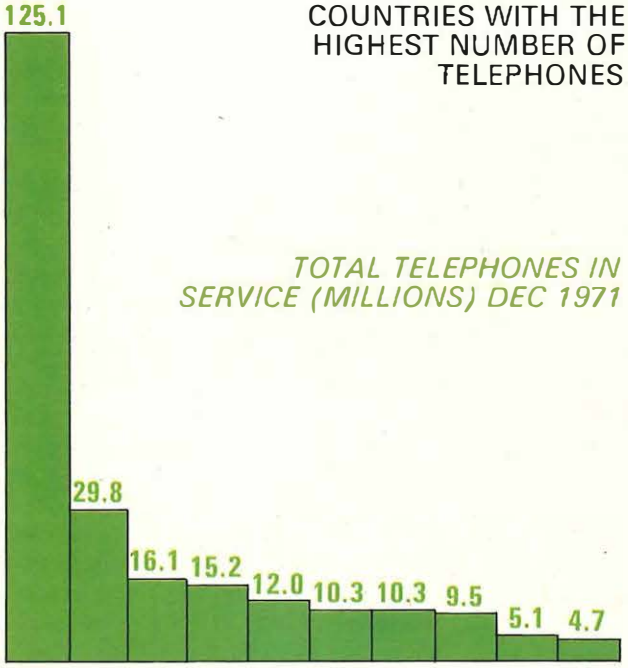
Mr D. F. Malcolm is an Executive Engineer in Marine Branch at Telecommunications Headquarters. He is project engineer and planning officer for the Southampton depot project.

Telephones around the world

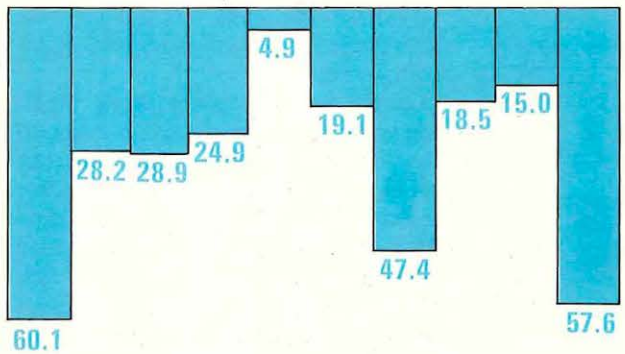
We show here our annual international comparison of telecommunications statistics. The figures indicate, for example, that telephones are very thinly spread among the huge population of the USSR; and that compared with other European countries the Swedes are very telephone minded. The source of the figures is the American Telephone and Telegraph Company.

COUNTRIES WITH THE HIGHEST NUMBER OF TELEPHONES

TOTAL TELEPHONES IN SERVICE (MILLIONS) DEC 1971

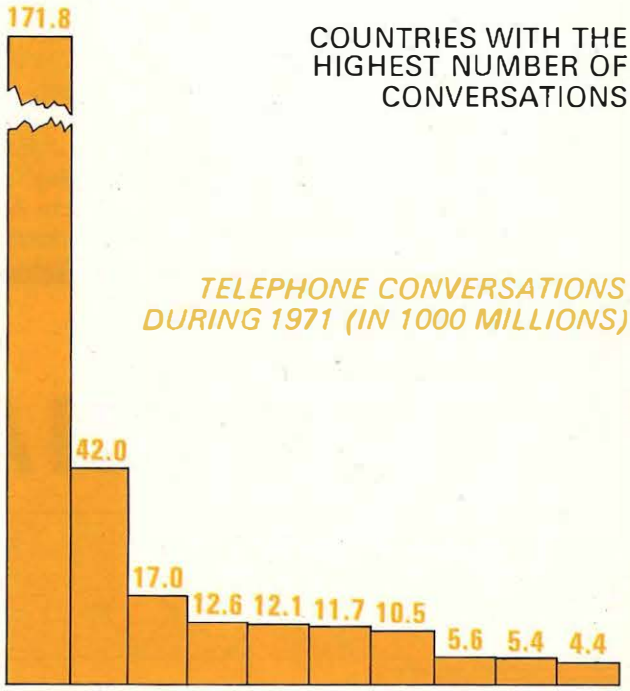


TELEPHONES PER 100 POPULATION DEC 1971

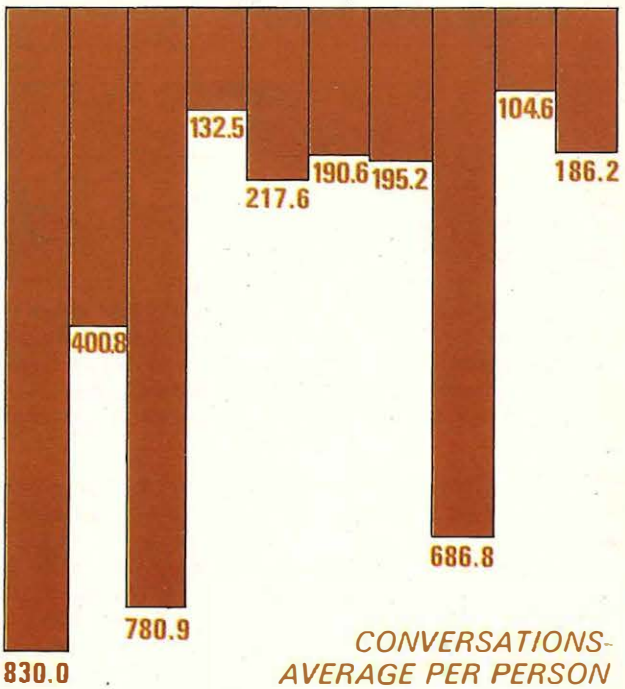


COUNTRIES WITH THE HIGHEST NUMBER OF CONVERSATIONS

TELEPHONE CONVERSATIONS DURING 1971 (IN 1000 MILLIONS)



CONVERSATIONS- AVERAGE PER PERSON



**Figures quoted are as at 31 March 1972
*Relates to the year July 1971 to June 1972
UK figures include Hull Corporation Telephone System

VAT and telecommunications

RL Spencer

SO MUCH literature has been disseminated from various sources over past months on the characteristics and method of operation of VAT that any further attempt to define it may seem superfluous. Nevertheless it is necessary, before outlining the impact of VAT on the Post Office and, more particularly, on the Telecommunications Business, to give a brief indication of how VAT works.

As most readers will know, VAT has come into operation at the standard rate of 10%. Tax law provides, however, that the rate may at any time be increased or decreased by Treasury order by a percentage not exceeding 20% of the rate at the time in force if the Government should so decide. All goods and services supplied in the United Kingdom and goods imported into the United Kingdom are taxable at the standard rate unless specifically relieved by zero rating or exemption.

Put as simply as possible, and without regard to certain exceptional provisions, VAT operates in the following manner:

1. When a trader buys a product or service to which the standard rate of VAT applies, he pays his supplier tax at 10% on the purchase and this tax – known as "input tax" – is separately identified on the invoice. When he in turn supplies to his own customers goods or services to which the standard rate applies, he charges them tax at 10% on his sale price. This tax – known as "output tax" – must similarly be separately identified on his invoices.

2. At regular intervals – usually once every quarter – a supplier will be required to account to HM Customs and Excise for VAT on his transactions. In this account he will summate, on the one hand, all the tax he has paid to his suppliers in the period (input tax) and on the other hand all the tax he has charged his customers (output tax) on his sales in the same period. The difference between the totals, which will usually be an excess of output tax over input tax, he will pay to HM Customs and Excise. If, however, in any period, his total of input tax exceeds that of output tax – for example, because he has been laying in large stocks to meet seasonal demands – he will be entitled to a refund of tax in respect of that period.

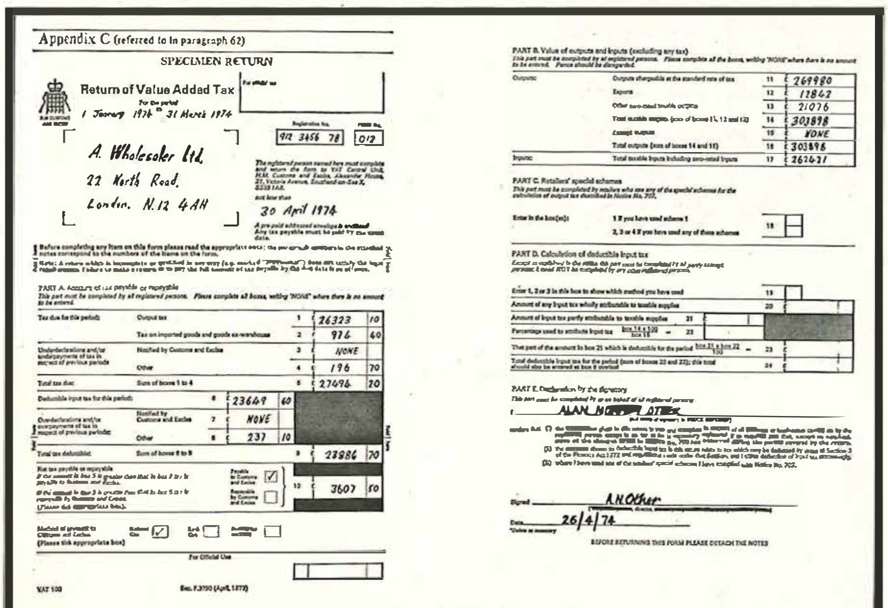
3. The effect of zero rating or exemption of some goods or services is to vary this formula slightly. A trader selling only zero rated goods or services will not charge any output tax on supplies to his customers, but he will still be entitled to reclaim of input tax which he has paid on supplies bought in. This situation can apply, for example, to an exporter, and will mean that he will consistently be due for refund of tax from HM Customs and Excise.

4. A trader selling only exempt goods or services, however, is in a less favourable position. He does not charge output tax on his supplies, but neither can be reclaim input tax paid on his own purchases – this will become a charge against his profits and may eventually lead to increases in the prices he must charge. He does not, however, need to register, nor does he have to maintain the detailed tax records required of a registered taxable trader.

5. Where a trader supplies partly taxable (standard or zero rated) goods or services and partly exempt goods or services, his reclaim of input tax on his own purchases is limited to the proportion of input tax appropriate to his taxable outputs.

Businesses engaged in the supply of taxable goods or services which have an annual taxable turnover of more than £5,000 are known as taxable persons and have been required to register with HM Customs and Excise. The Post Office as a Corporation consisting of four businesses has been registered as a single taxable entity for VAT purposes. (As such it ranks as a partially exempt supplier, since inland postal services and Giro banking services are classified as exempt services. This condition has repercussions on the extent to which the Post Office as a whole may reclaim input tax, but does not affect the Telecommunications Business directly.) The VAT registration number is an important feature of the tax system and must be shown on documents as required by VAT law.

The services we provide to United Kingdom customers are, in general, liable to VAT at the standard rate of 10%. This includes telephone and telex calls and telegrams to other countries, originating and billed in the United Kingdom; and most ancillary services, such as the hire and sale of equipment and loan of staff. There


Appendix C (referred to in paragraph 62)

SPECIMEN RETURN

Return of Value Added Tax

1 January 1974 – 31 March 1974

912 3456 78 | 012

A. Wholesaler Ltd.
22 North Road,
London. N.12 4AH

30 April 1974

Output tax	1	26323	10
Tax on imported goods and goods ex-warehouse	2	974	40
Notified by Customs and Excise	3	NONE	
Other	4	196	70
Total tax due — Sum of boxes 1 to 4	5	27494	20
Deductible input tax for this period	6	23649	60
Notified by Customs and Excise	7	NONE	
Other	8	237	10
Total tax deductible — Sum of boxes 6 to 8	9	23886	70
	10	3607	50

For Official Use

VAT 100

PART B. Value of outputs and inputs (excluding any tax)

Outputs chargeable at the standard rate of tax	11	269980
Exports	12	12842
Other zero-rated taxable outputs	13	21076
Total taxable outputs (sum of boxes 11, 12 and 13)	14	303898
Exempt outputs	15	NONE
Total outputs (sum of boxes 14 and 15)	16	303896
Total taxable inputs including zero-rated inputs	17	262421

PART C. Retailers' special schemes

PART D. Calculation of deductible input tax

PART E. Declaration by the Signatory

Signed A.N.Other

Date 26/4/74

BEFORE RETURNING THIS FORM PLEASE DETACH THE NOTES

A specimen VAT return.

Here it is!

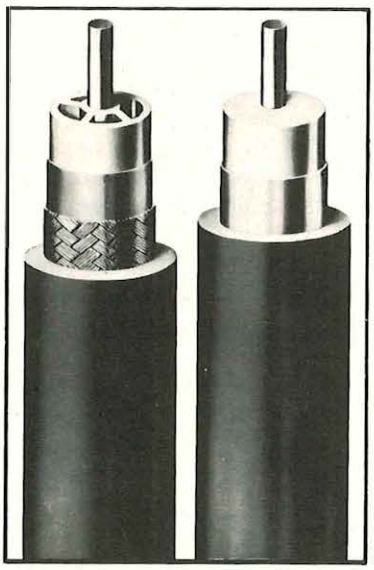
Our two new ranges of 75 ohm TV distribution cables are now made on an extrusion line unique in Western Europe.

We're one of the most technologically advanced cable manufacturers, using new techniques to produce TV distribution cables at a consistently high standard to tolerances much closer than previously possible. At very competitive prices.

The two ranges:

Aeraxial Semi Air Spaced Polyethylene dielectric copper taped braided and polythene sheathed television distribution cables. Five cables in the range, with inner conductor sizes from 1.27 mm to 3.05 mm.

Solid Polyethylene dielectric copper taped and polyethylene sheathed television distribution cables. Five cables in the range, with inner conductor sizes from 0.73 mm to 3.65 mm.



Aerialite will specially manufacture TV distribution cables for any special TV application—also, you can make use of the Aerialite free technical advisory service to help you in the selection and application of distribution cables.

For further information, send for Aerialite's new publication giving full technical specifications of the latest range of TV Distribution Cables.

Aerialite

Aerialite Cables Limited,
Castle Works,
Stalybridge, Cheshire SK15 2BS.
Telephone: 061-338 2223
Cables: Aercables, Stalybridge.
Telex: 669902

To Aerialite Cables Limited:
Please send me your brochure entitled Aerialite Television Distribution Cables.

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

_____

POTJ3

VAT and telecommunications

are a few exceptions to this general rule. An example is the sale of directories (but not advertising matter and special entries contained in them) which is zero rated in the category of books. Receipts from other administrations for the use of United Kingdom facilities for connecting incoming traffic from abroad are zero rated as services to overseas authorities, but payments to administrations for use of their facilities for connection or onward transmission of traffic from the United Kingdom to destinations abroad are classified as imports of services and outside the scope of the tax.

In general, tax will be collected as a percentage addition to bills which now have to meet the legal requirements for "tax invoices". This means that, in addition to the normal bill details, invoices must show the Post Office VAT registration number (this identifies the Post Office as a registered taxable person under VAT) and, – separately from the VAT-exclusive charge – the rate and amount of tax charged (this is to enable our customers who are themselves registered taxable persons – mainly our business customers – to reclaim input tax paid on telecommunications services).

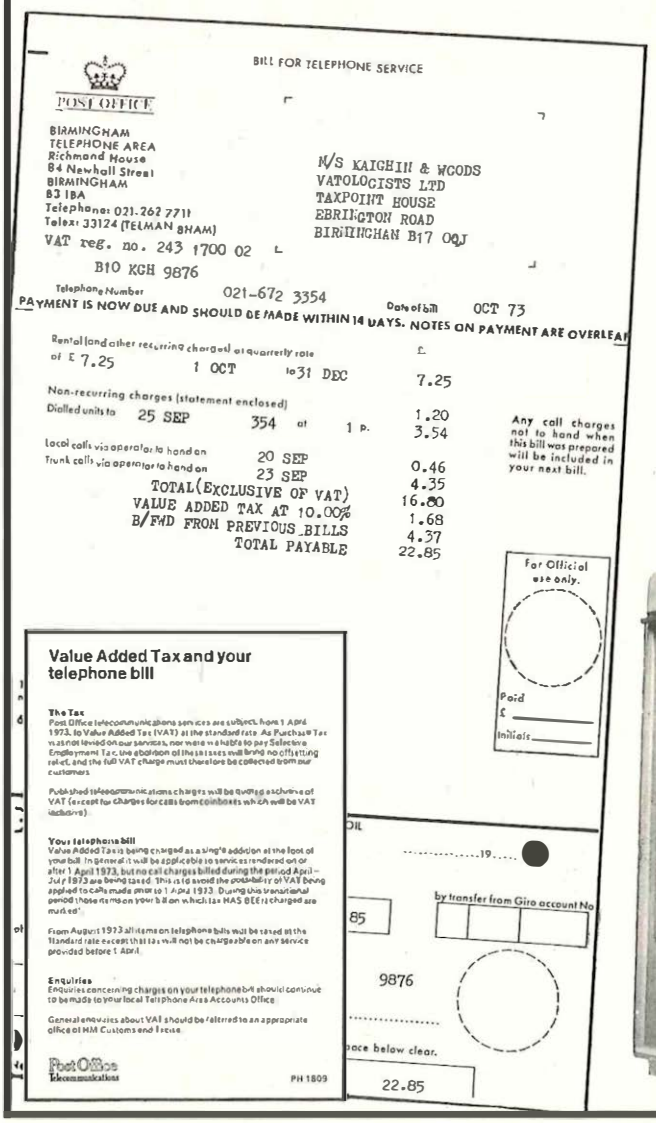
Legally we need to issue bills in the extended detail required by VAT law only to customers who require tax invoices because they themselves are registered taxable persons. A residential customer whose telephone is used purely for private purposes has no need of a formal tax invoice; he is the final consumer and has no entitlement to reclaim of tax. In practice, we have no certain means of identifying from among our customers those who are registered taxable persons and those who are unregistered. Although broadly the distinction is between business and residential customers, it is quite possible that some residential customers may qualify as registered taxable persons for VAT purposes, while some of our business customers may be exempt traders, for one reason or another. The most straightforward course, which we have adopted, is to issue bills as formal tax invoices to all our telephone customers. This will apply also to the telex service and private services although in these cases most if not all customers are likely to be in the registered category anyway.

There are, of course, certain services for which bills are not normally issued, and where, additionally, special arrangements have been necessary for raising the VAT charge. One obvious example is that of telegrams paid for at Post Office counters. Tax on telegrams paid for at the counter will be added by the counter clerk at the rate of 10% to the standard Post Office computed charge in order to arrive at the total amount payable. A considerable number of such telegrams are for purely private purposes, eg greetings telegrams, and no tax invoice is necessary. We do, however, have an obligation to issue tax invoices to customers who ask for them and a form of tax invoice has been designed for use at the counter for this purpose.

The second significant area of unbilled services is where customers pay for a telephone call or a telephoned telegram by the insertion of money into a coin box. The charges made must now be VAT-inclusive. So far as phonograms are concerned, the operator, who is essentially involved in every case, will add 10% to the appropriate standard Post Office charge and this total sum, rounded down to the nearest multiple of 2p, will be inserted in the coin box. For telephone calls from coin box lines, all charges are now at VAT-inclusive rates. No tax invoices are issued for calls made from coin boxes. This is acceptable under tax law for coin box and slot machines generally. Within certain monetary limits, if business calls are made from coin box lines by registered taxable persons, they will be able, without a tax invoice, to claim deductible input tax.

It will be clear that all Telecommunications customers will in some way be affected by the imposition of VAT on our charges. With the introduction of VAT, purchase tax and selective employment tax have been abolished. Businesses whose sales or activities were subject to these taxes may be ex-

VAT and the customer


BILL FOR TELEPHONE SERVICE

POST OFFICE

BIRMINGHAM
TELEPHONE AREA
Richmond House
84 Newhall Street
BIRMINGHAM
B3 1BA
Telephone: 021-262 7711
Telex: 33124 (TELMAN BHAM)
VAT reg. no. 243 1700 02

B10 KCH 9876

M/S KAIGHIN & WOODS
VATOLOGISTS LTD
TAXPOINT HOUSE
EBRINGTON ROAD
BIRMINGHAM B17 0QJ

Telephone Number 021-672 3354 Date of bill OCT 73

PAYMENT IS NOW DUE AND SHOULD BE MADE WITHIN 14 DAYS. NOTES ON PAYMENT ARE OVERLEAF

		£
Rental (and other recurring charges) at quarterly rate of £ 7.25	1 OCT to 31 DEC	7.25
Non-recurring charges (statement enclosed)		
Dialled units to	25 SEP 354 at 1 p.	1.20
		3.54
Local calls via operator to hand on	20 SEP	0.46
Trunk calls via operator to hand on	23 SEP	4.35
TOTAL (EXCLUSIVE OF VAT)		16.80
VALUE ADDED TAX AT 10.00%		1.68
B/FWD FROM PREVIOUS BILLS		4.37
TOTAL PAYABLE		22.85

Any call charges not to hand when this bill was prepared will be included in your next bill.

For Official use only.

Paid £ _____

Initials _____

Value Added Tax and your telephone bill

The Tax
Post Office telecommunications services are subject, from 1 April 1973, to Value Added Tax (VAT) at the standard rate. As Purchase Tax is not levied on our services, nor were we liable to pay Selective Employment Tax, the abolition of these taxes will bring no offsetting relief, and the full VAT charge must therefore be collected from our customers.

Published telecommunications charges will be quoted exclusive of VAT (except for charges for calls from coinboxes which will be VAT inclusive).

Your telephone bill
Value Added Tax is being charged as a single addition at the foot of your bill. In general it will be applicable to services rendered on or after 1 April 1973, but no call charges billed during the period April – July 1973 are being taxed. This is to avoid the possibility of VAT being applied to calls made prior to 1 April 1973. During this transitional period those items on your bill on which tax HAS BEEN charged are marked*.

From August 1973 all items on telephone bills will be taxed at the standard rate except that tax will not be charged on any service provided before 1 April.

Enquiries
Enquiries concerning charges on your telephone bill should continue to be made to your local Telephone Area Accounts Office.

General enquiries about VAT should be referred to an appropriate office of HM Customs and Excise.

Post Office Telecommunications

PH 1809

.....19.....

by transfer from Giro account No

85

9876

pace below clear.

22.85

Telephone bills: Individual charges are unchanged, but 10 per cent will be added to bills. The first bills will be accompanied by an explanatory leaflet.

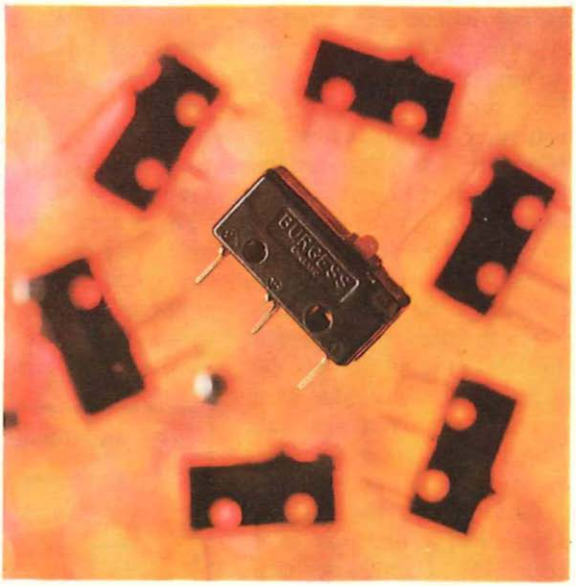
Coinboxes: The charges are now VAT-inclusive. It was not possible to increase each charge by exactly 10 per cent, but overall the new rates cover the tax liability.

How about this one?

V3 Miniature
Micro Switch

Or this one?

V4 sub-Miniature
Micro Switch



Or one of these?

Micro Switches differ in shape, size, enclosure, ratings, characteristics, actuators and terminals.
Our catalogue will introduce you to a wide choice – may we send you a copy?

Burgess Masters of Switchcraft

Burgess Micro Switch Company Ltd
Dukes Way, Team Valley, Gateshead NE11 0UB
Telephone 0632-877171 Telex 53-229
Eastbury House, Albert Embankment, London SE17TG
Telephone 01-735 7871 Telex 25553

VAT and telecommunications

pected to have some benefit to pass on to their customers in part, if not full, compensation for the new tax. This is not so for the Telecommunications Business which was, as most nationalised industries, in the position of having no liability for SET and of paying very little in purchase tax for its supplies. We have no choice but to pass on the full impact of VAT.

It is important to remember that, because VAT is a form of national taxation, imposed on services supplied by the Telecommunications Business as a matter of Government policy, the additional charges raised under VAT will in no way benefit the Telecommunications Business or enhance its profits. Output tax has to be paid to HM Customs and Excise. We shall, as explained later, be able to reclaim input tax paid.

In fairness to customers, considerable prominence has been given in recent weeks by the Business to the effect that VAT will have on charges for telecommunications services. However, to many customers, the appearance of VAT on their bills will bring the impact home for the first time. To facilitate understanding of the new bill, all our customers are receiving an explanatory leaflet with the first bills they receive after 1 April. As call charges are billed in arrears, bills will for some time include calls made prior to 1 April; these are not liable for tax and, in order to ensure this, VAT will not be applied to billed call charges until August 1973.

So far this article has dealt almost exclusively with the impact of VAT on our charges and our customers. It has concentrated, intentionally, on the principal telecommunications services; similar principles apply to the many subsidiary services which the Business supplies and there is no point in elaborating on them individually in the context of this article. But we must now look within the Business at the accounting aspects of this new tax. The billing arrangements in regard to output tax will enable us to record and summate, through normal accounting channels, the total of output tax invoiced. In the case of call office receipts and revenue from telegrams paid for at the counter, one-eleventh of receipts will be assessed as output tax.

Against output tax charged must be set input tax paid by the Business. Many purchases by the Business and much of the work done for it by contractors will be subject to VAT at standard rate; some supplies (eg fuel) will be zero rated; some items (eg rents) will be exempt supplies; while a very few (eg local authority rates) will be outside the scope of VAT. Registered persons supplying taxable goods or services to the Post Office will be required to furnish tax invoices identifying the rate and amount of VAT included in their charges. For local purchases it is necessary for the Business to ensure that a tax invoice (in the prescribed form) is obtained for each purchase. Since the whole activity of the Telecommunications Business is directed to the supply of taxable services, all the input tax which it pays to suppliers etc will be recoverable (with the exception of certain items which are non-deductible under tax law, mainly tax on business entertaining expenses and on the purchase of passenger cars). This applies to both capital and revenue account inputs and to stores purchases.

Details of tax inputs will be brought to account through the usual channel of the cash account, but this is not quite good enough for tax accounting purposes. Reclaim of deductible tax may be made by reference to the date of the tax invoice, rather than by the usually later date of payment. Where a significant time elapses between receipt of invoice and date of payment due to certification procedures, it is clearly of advantage to set up arrangements (generally termed Bought Ledger arrangements) to enable the bills and the VAT element to be recorded on receipt of the invoice. Arrangements of this nature have been made for recording central stores purchases by Purchase and Supply Department and of exchange equipment and some other contract payments. For other items the cash account record of expenditure has been amplified to indicate the value of inputs (at standard and zero rate as distinct from any exempt inputs) and VAT paid on standard rated purchases and supplies.

All these records of output tax and input tax will be brought together in Telecommunications Finance Department for inclusion in a quarterly summary return. The Telecommunications return will then be incorporated into a Post Office return covering the four businesses. Any balance due to HM Customs and Excise (and this is expected to be the normal pattern) will be paid over at the same time as the Post Office return is submitted. So far as the Telecommunications Business is concerned, it is estimated that on a full year's operations, some £40m net payment will be due to HM Customs and Excise.

This article has been able to do no more than outline quite broadly the impact of VAT on the Telecommunications Business. It inevitably oversimplifies it and omits many detailed points of application. In the course of planning, there have been many detailed practical points to look into, problem aspects particular to individual services or classes of customer to resolve, uncertainties regarding the exact interpretation, in telecommunications contexts, of certain aspects of VAT law to clear. While the main burden of implementation may be expected to be in the billing and accounting fields, all aspects of telecommunications operations and activity will to some extent be affected by VAT.

In fact no previous system of British taxation has penetrated so deeply into the day to day operational and accounting arrangements of the Business – indeed, this is probably true of business in general. Not only so, but VAT legislation reserves to HM Customs and Excise the right of verification of output tax raised and input tax reclaimed. This right may be applied, not only by reference to business returns, but by audit investigation at any point in the accounting chain. Moreover, the claim for recovery of input tax by one registered taxable person may be verified by cross reference with the supplier's records. These considerations explain the background to some of the meticulous operational requirements.

How VAT may develop in the future and how any changes may affect the Telecommunications Business is an interesting speculation. It seems unlikely that the basic system will or can be simplified – the British system is claimed to be one of the simplest systems of Value Added Tax in existence. The entry of the United Kingdom into Europe, where several forms of VAT are in operation may, however, be a significant factor in influencing the lines of its future national development. This, however, is in the first place a matter for the Government rather than the Post Office.

Miss R. L. Spencer is Head of the Accounts Branch of Telecommunications Finance Department and has been co-ordinating the work necessary for the introduction of VAT.

MISCELLANY

Telex at home . . .

Orders for exchange equipment worth nearly £8 million for the inland telex service will be placed by the Post Office over the next five years. During this time the number of telex machines in service is expected to reach 80,000 – double the present number.

The purchasing programme affects nearly all the country's 49 telex exchanges and includes new 400-line exchanges at Taunton and Lancaster. In London the existing Fleet inland exchange will get an additional 3,000 lines, and the new 5,000-line Houndsditch exchange recently ordered will get an extra 2,400 lines. The programme also includes the new London Keybridge inland exchange of 8,000 lines, which will be extended by 3,000 lines as the system grows.

. . . and international

A major extension to the St Botolph international telex exchange in the City of London has increased by 50 per cent the exchange's capacity for handling customer-dialled calls to countries outside Europe.

The Post Office will be further extending the international equipment in the exchange during this year and 1974. This will pave the way for the introduction of automatic services to many more countries. Britain currently has automatic telex links with 28 European countries capable of accepting automatic service, and a further 19 countries outside Europe.

Telex users in Britain now dial 97 per cent of all their international calls direct. The remaining calls to 110 countries are handled by operators. The busiest of these routes should be converted to fully automatic service within three years.

Study post

Dr Gerard White has been appointed by the Post Office to head the newly created Advanced Technology Studies Division of its Research Department. The division will study new technologies to see how they may be applied to telecommunication systems for data communication, facsimile transmission and vision-phones.

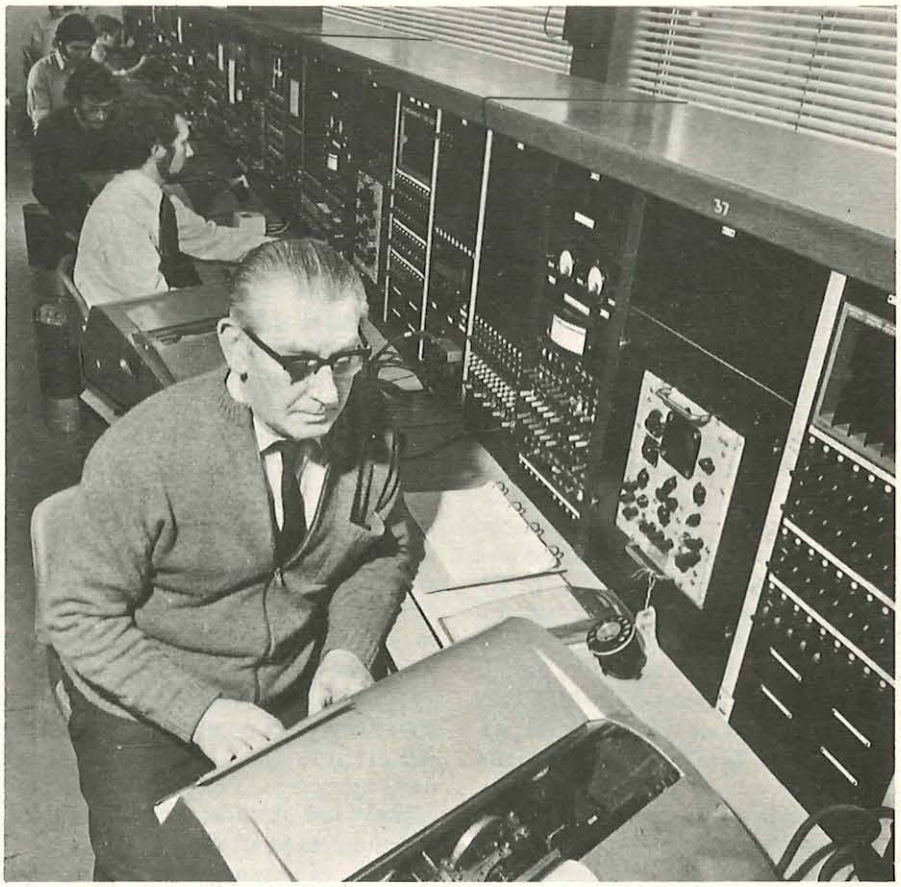
Dr White (33) was formerly with the Bell Telephone Laboratories Inc working in the Communication Principles Research Laboratory on address-attached data-switching systems and optical communication systems.

Installation records

A record 251,000 new telephone instruments were provided by the Post Office during January – the highest number ever installed in a single month and the first time that supply has topped a quarter of a million in one month.

January was also a record month for the provision of new exchange lines, which reached a new peak of 132,000 – an increase of more than 1,000 on the previous highest monthly total, which was in March last year.

This is seen as a positive indication that the Post Office's £60 million drive to speed provision of service, launched last year, is beginning to take effect.



Circuits are checked in the telex test room at St Botolph's exchange.

Successor

Mr J. F. P. Thomas, Director of Network Planning at Telecommunications Headquarters, has been appointed Chairman of the Council of the Institution of Post Office Electrical Engineers. He succeeds Mr N. C. C. de Jong, Director of Mechanisation and Buildings at Postal Headquarters, who has retired from the Post Office.

Professor J. H. H. Merriman, President of the Institution and Post Office Board Member for Technology, has also appointed Mr J. Piggott, Deputy Director of Engineering at Postal Headquarters, as an additional vice-Chairman.

Independence

The Post Office telecommunications monopoly in the Channel Islands has been transferred to the States of Guernsey and Jersey. From 1 January Guernsey took over responsibility for all telecommunication services formerly provided by the Post Office in Guernsey, Alderney, Sark, Herm and Brechou; Jersey is now running its own services.

Previously the Channel Islands were licensed by the Post Office to run their own local telephone services. All other telecommunication service within the Channel Islands and between the UK and the two States – trunk telephones, telex, private-wire and all international services – were run by the Post Office.

Telecommunication equipment in the Channel Islands owned by the Post Office is being purchased by the two States. Two submarine cables from the mainland to Jersey, and one to Guernsey, will be jointly owned by the two States and the Post Office under the new agreements.

Most international calls to and from the Channel Islands will continue to be routed through the international telephone exchanges in London.

Into the provinces

The first international telephone control centre outside London has been opened in Brighton North Road exchange. It is serving about 114,500 subscribers in the Brighton and Canterbury areas. Service will be extended later to cover Maidenhead, Reading, Portsmouth and other areas in the South Eastern Telecommunications Region.

The Brighton centre is the first step in a £1 million scheme to give telephone users in the provinces speedier connection on international calls placed through the operator. It is planned to open other international centres this year in Glasgow and Leicester. The Glasgow centre will eventually serve the whole of Scotland, Northern Ireland and Northern England, and Leicester will serve all the Midlands and East Anglia.

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Contributions:
The Editorial Board will be glad to consider articles of general interest within the telecommunications field. No guarantee of publication can be given. The ideal length of such articles is 750, 1,500 or 2,000 words. The views of contributors are not necessarily those of the Board or of the Post Office.

Correspondence:
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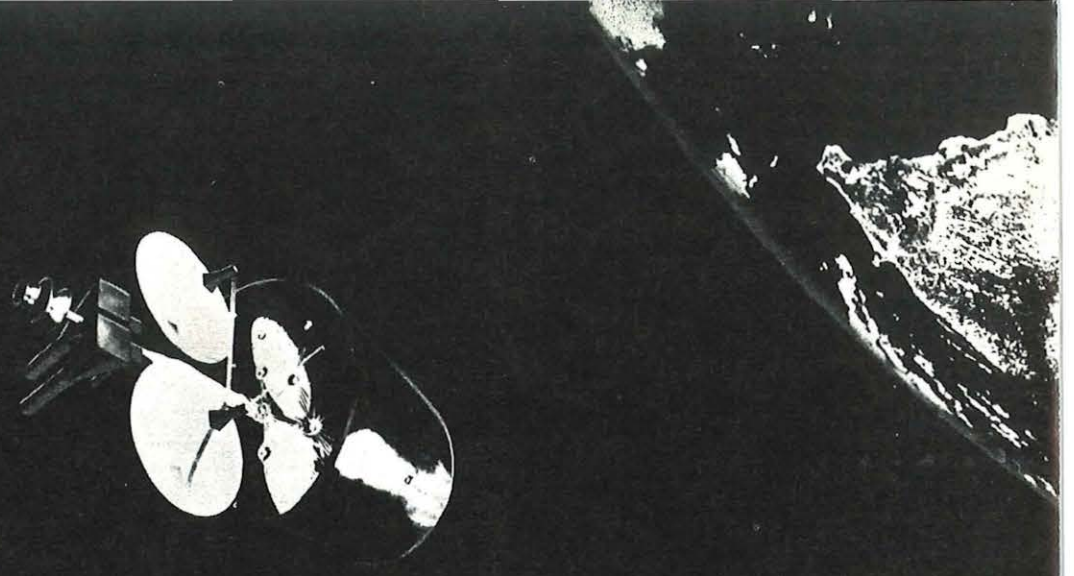

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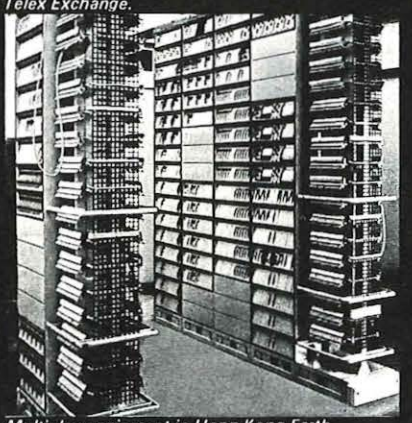

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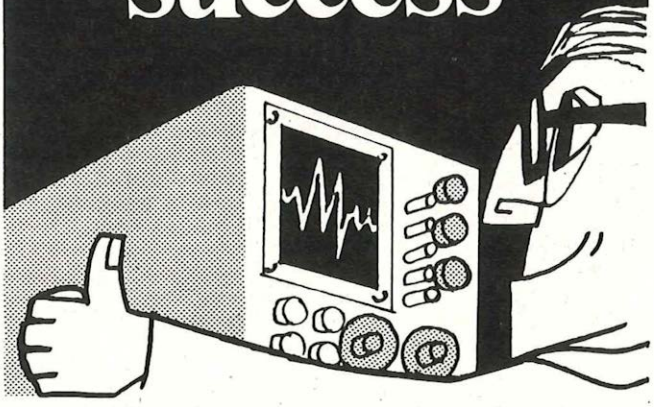

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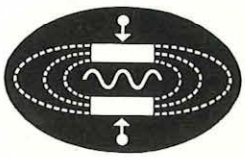

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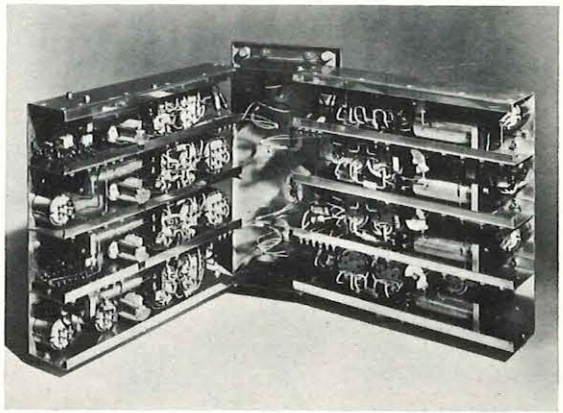

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40dB	+300Hz	–300Hz
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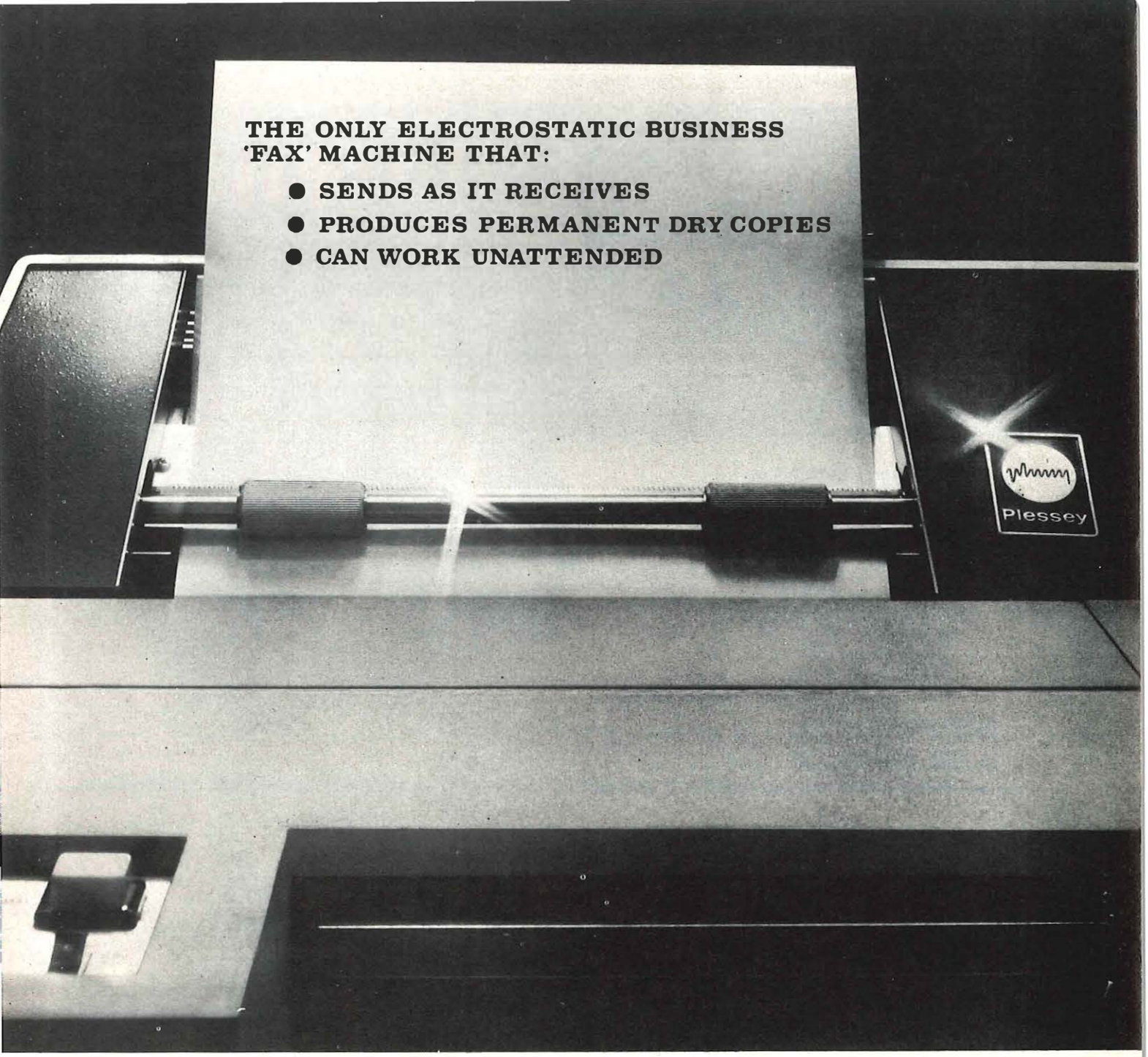

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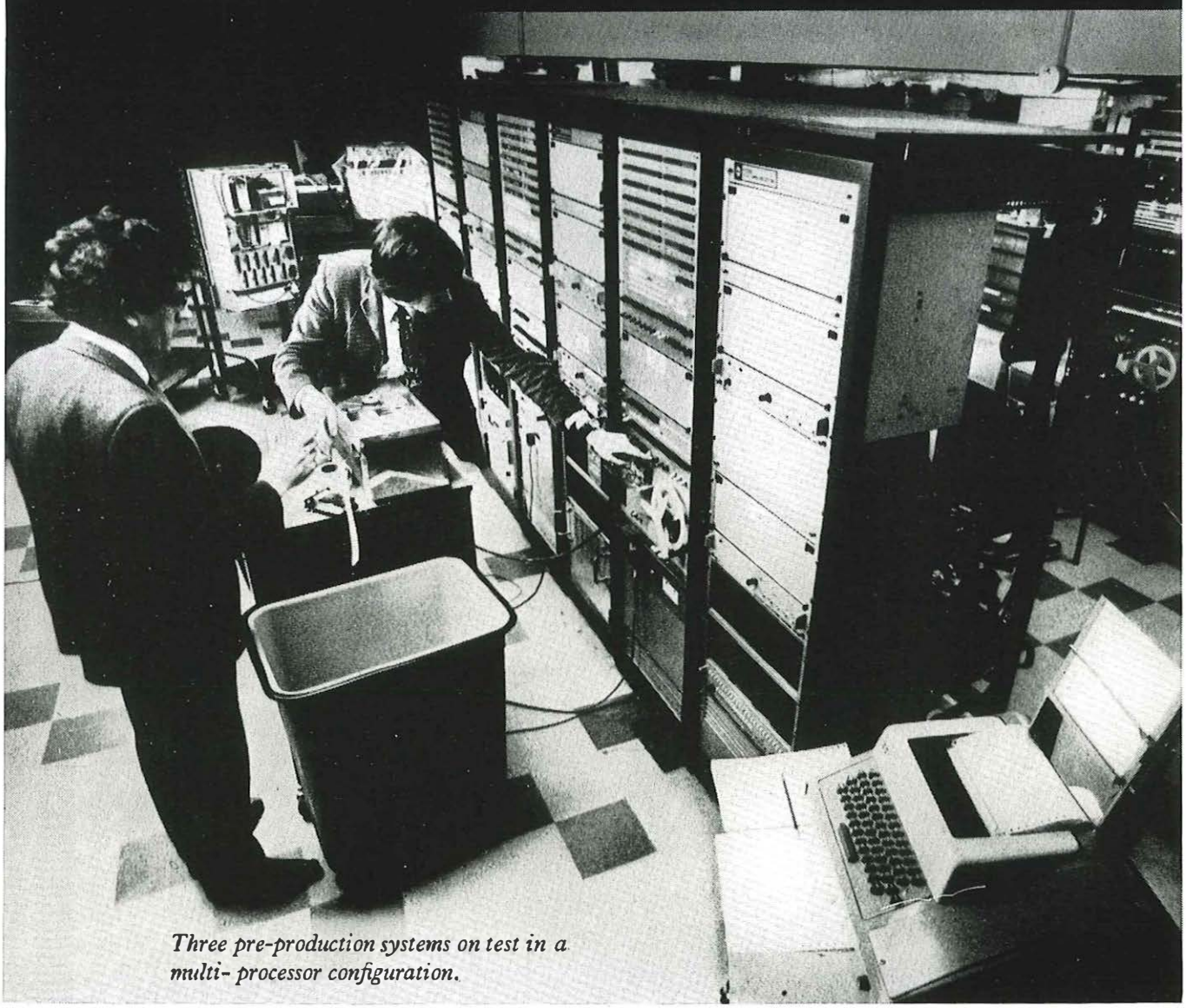

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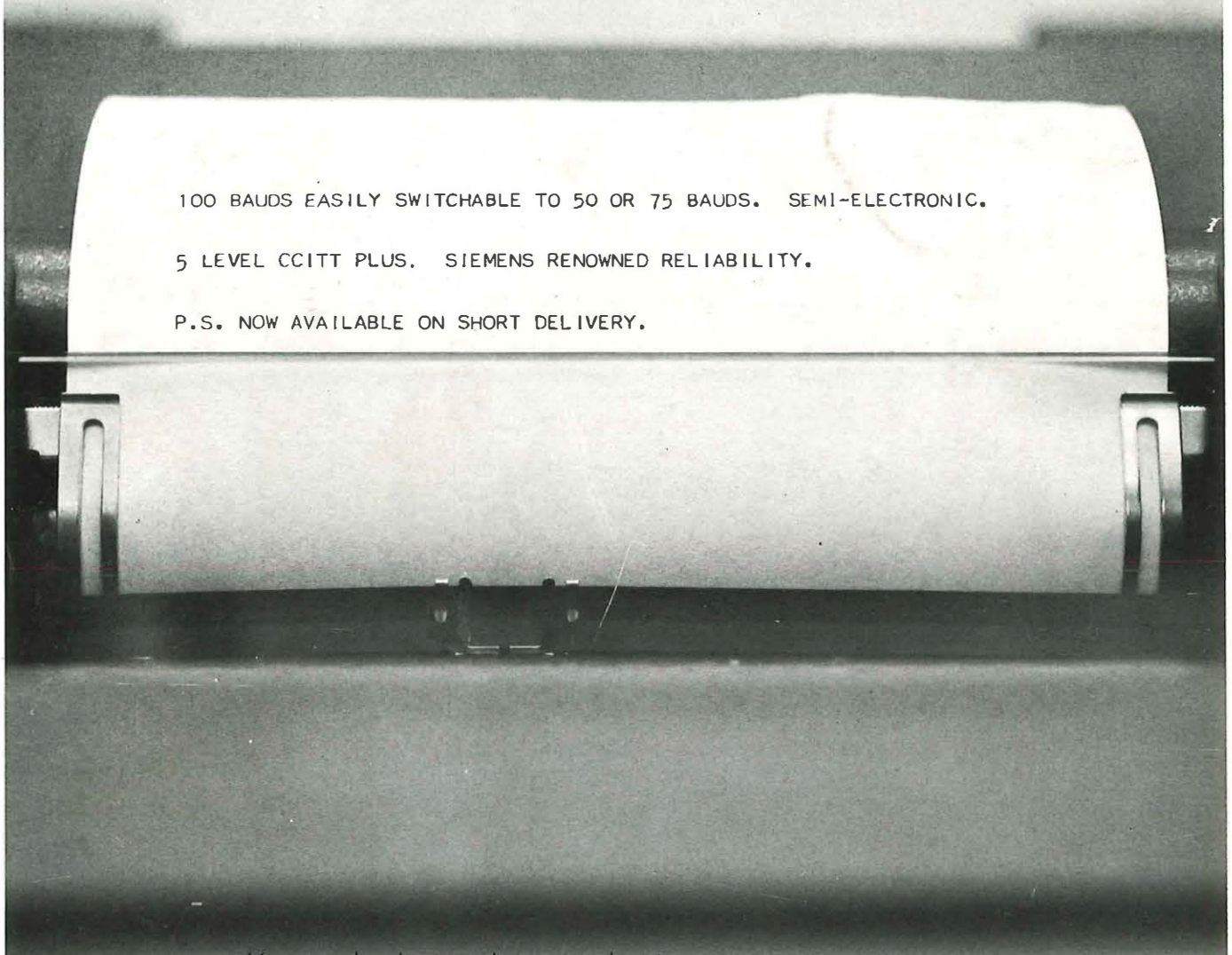

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