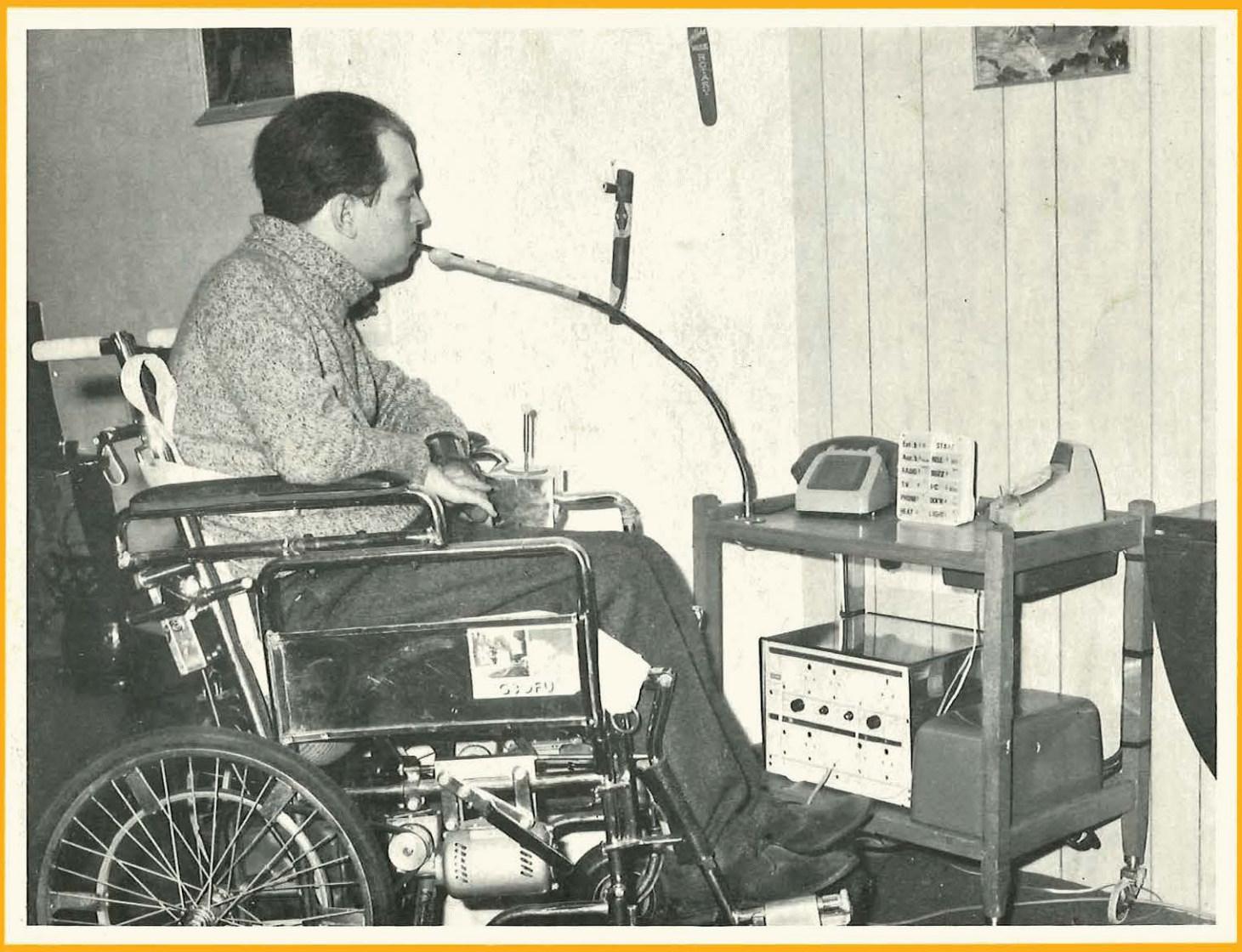
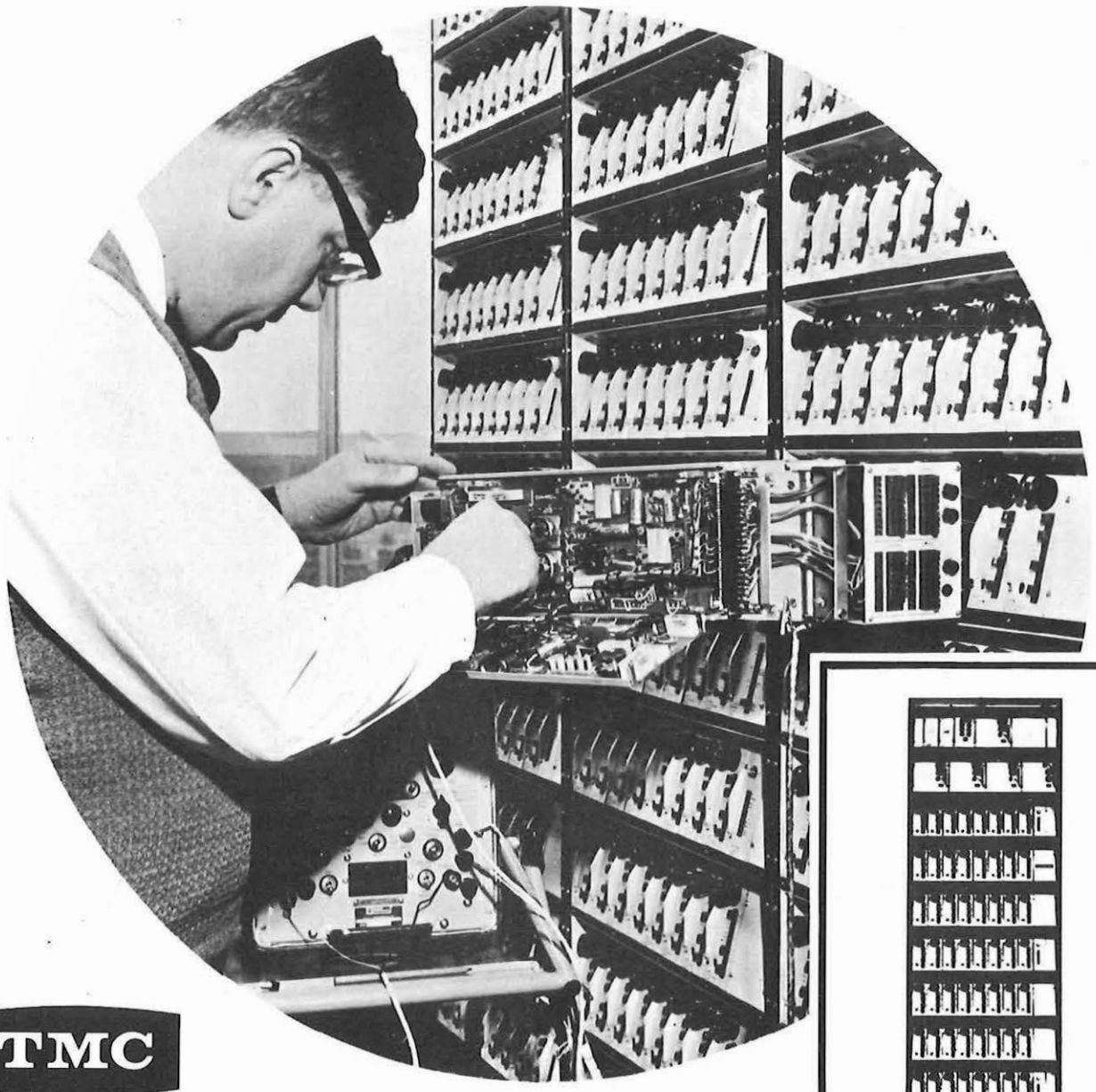
Post Office telecommunications journal

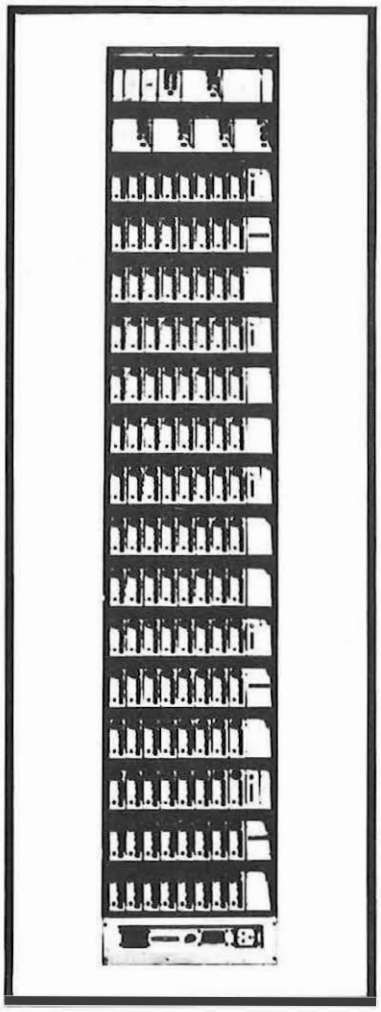
One shilling and sixpence

Summer 1969 Vol. 21. No. 2



Telegraph Internationally...





TMC

V.F. TELEGRAPH TYPE T24P

The G.P.O. International Telegraph Transmission Centre at St. Botolph's, London supplies a vital communications service by providing direct teleprinter links to all parts of the world. Current T.M.C. installation contracts provide 4,000 much needed duplex channels and the total will exceed 6,000 by 1971. This is but one of many G.P.O. stations in towns and cities throughout the U.K. where steadily increasing numbers of T.M.C. 24 Channel VF Telegraph equipments are being installed. The use of only one stage of modulation permits high and low speed telegraph circuits on one system: channel cards of 50/85 and 100/110 bauds being available.

This is another tribute to the already world wide reputation of T.M.C. Transmission Equipment.

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STC Telecommunications

And that's the best place, of course, for submarine cables, repeaters and equalisers. We reckon they should stay down there for at least 25 years without attention. Which is why we make them to incredibly high standards of reliability, with nothing left to chance.

And the shore terminal equipment too, generally duplicated with automatic changeover to ensure utmost reliability, is made to compatibly high standards.

In collaboration with the British Post Office we've been in the forefront of submarine systems developments since the early 1950's. And have unsurpassed practical experience – STC engineers have participated in 34 major projects worth £137 million.

First with deep-water systems of 160 and 360 circuits, STC will also be first with a 640 circuit deep-water system.

STC innovations include the master-slave power feeding system, and a special test lead which makes equaliser laying that much easier.

STC cable, too – simultaneously carrying intelligence and feeding power to the repeaters – is of optimum performance/cost design and cannot be bettered anywhere in the world. For the very first system to use the new 1½-inch diameter lightweight cable STC was selected to provide all of the cable.

We don't stop at manufacturing the equipment for submarine cable systems. Add an overall capability for systems planning, project management installation of complete systems including civil engineering works and services – and you have a unique organisation able to meet any requirement, anywhere – on time! All this, just to drop things in the sea.

Standard Telephones and Cables Limited,
Submarine Systems Marketing, North Woolwich,
London, E.16. Tel: 01-476 1401. Telex: 21645.

1968

Standard Telephones and Cables Limited

Heidi hasn't heard of STC– but she loves us all the same

Because STC and the Austrian Post Office have made it easier than ever for her boy friend Hans in Salzburg to telephone her in Bischofshofen.

How?—By completing the first, all solid state 2700 circuit, 12 MHz coaxial cable telephone link in Europe, and so increasing the capacity of this major local and international trunk route by 450%.

Installation of line equipment and the twelve dependent repeaters, over the 60 km route, took a mere six weeks, and the very successful test period lasted three months—So successful in fact that the next stage, Salzburg to Linz is almost completed, and the conversion of the Graz–Vienna route to the 12 MHz system is well in hand.

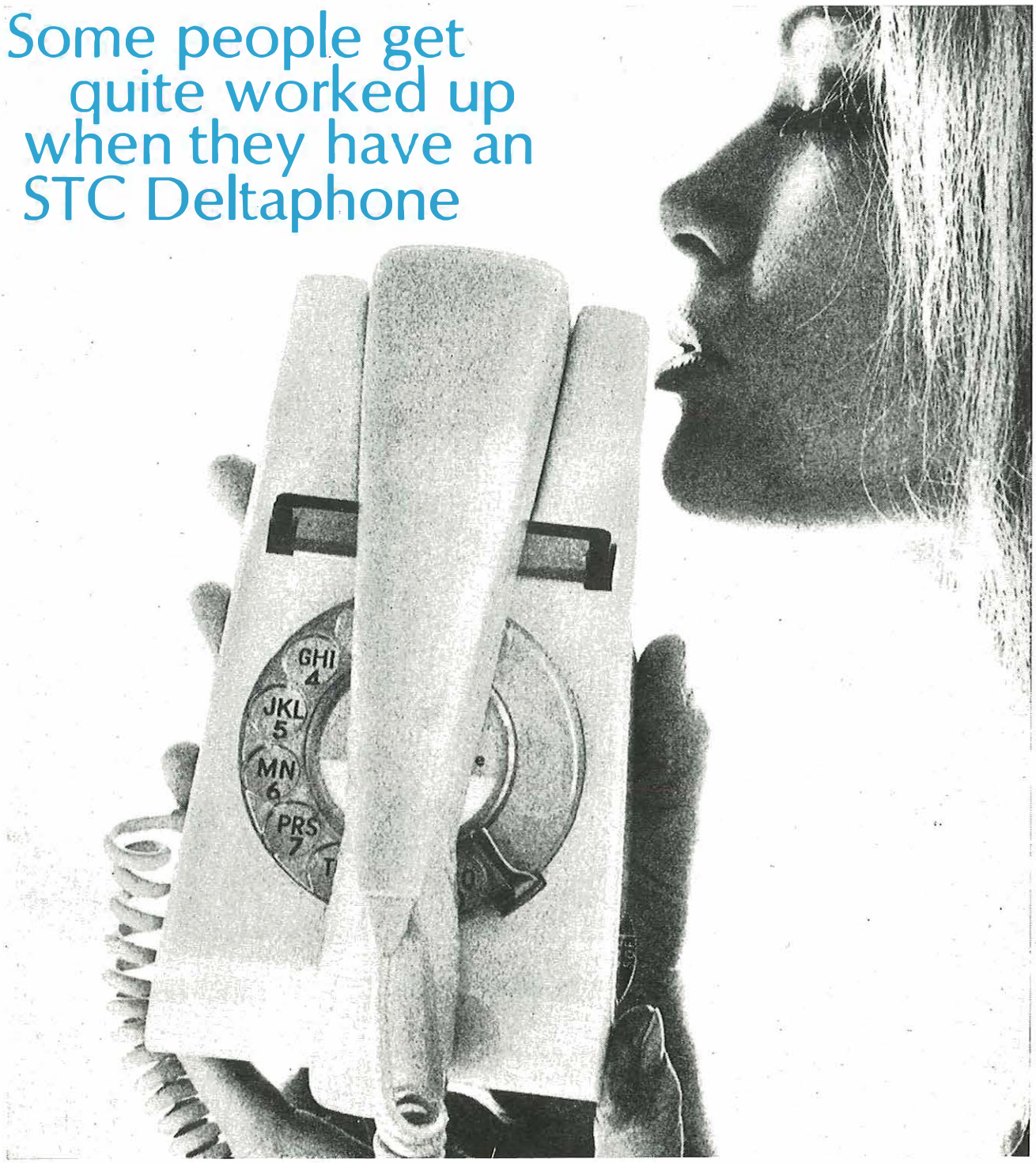
In addition, one of the three 900 circuit major groups used in the Bischofshofen–Linz route will be through routed to Villach on the Italian/Yugoslav border on the new 4 MHz coaxial system.

And so STC can look forward perhaps to being loved by lovers internationally.

Standard Telephones and Cables Limited, Project and Field Services Division, Basildon, Essex, Telephone: Basildon 3040. Telex: 99101

Standard Telephones and Cables Limited

Some people get quite worked up when they have an STC Deltaphone



STC's Deltaphone is pretty exciting, after all.
And it does things other telephones don't.
For instance, it can glow in the dark. There's an optional luminescent dial which lets you dial without turning lights on.
And nobody gets disturbed when the Deltaphone rings. Mainly because it doesn't ring. It just *warbles* – at the volume you set.
In fact, the Deltaphone is very sociable. People like it because it's slim – at 4·3 inches it's only a fraction wider than the dial.
And the 4-ounce handset is only half the weight of a conventional one. So it's twice as nice to hold.
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Telephone 01-368 1234.
Telex: 21917

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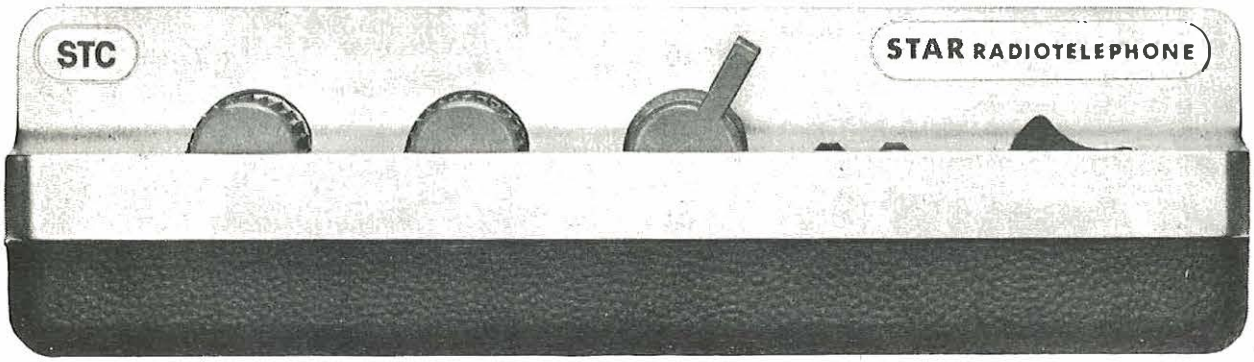
69/2D



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20 good reasons why STAR UHF Mobile Radiotelephone is the best radiotelephone in the world

★ Elegantly styled.
★ Designed for safe use in vehicles.
★ Excellent range and penetration of built-up areas.
★ Crystal-clear speech quality.
★ Noise cancelling microphone.
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Telephone: 01-368 1200. Telex: 261912.

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69/3 EM

In 1934 you could phone from one end of the country to the other for 1/-

You still can

Money went further on most things in 1934. You could buy a pint of bitter for 5d, a newspaper for a penny. That's all changed. But you can still make your money go as far on the phone.

Any evening after six, and all day Sunday, a call right across the country which you dial direct from your home costs only 2d for each 30 seconds. Belfast to London, Glasgow to Cardiff – however far the distance, the most you'll pay is 1/- for a full three minute chat. Just like 1934.

And nowadays you get through faster and easier by dialling direct. Have a go. Call up your furthest and dearest and have a bob's worth. Even if you have to go through an operator, a call after six or at weekends will still cost less.

GPO
TELECOMMUNICATIONS

The phone service is moving forward

The Dash Mounted Westminster has created a lot of talk

(the reasons are simple)

This front mounted solid-state radiotelephone operates in the VHF band from 25–174 MHz. Both AM and FM versions are available.

The transmitter power output of the series ranges from 5–15 watts (AM 5–8 watts; FM 12–15 watts) with 1–10 channels. Various other features include anti-flutter squelch, and an illuminated channel indicator.

The units have been designed as a 'family' and much of the circuitary is common to both base stations and mobiles.

The equipment meets all relevant specifications, including G.P.O. specification W677●, and is in use in many G.P.O. radiotelephone systems throughout the U.K. Rugged all-weatherproof universal versions are also available.

The W30AM

The W30AM is an extension of the Westminster range and being one of the most powerful VHF radiotelephones available in this country it will overcome problems of reception from vehicles in weak signal areas. 10-channel capability with solid-state switching.

rely on PYE

the vital contact

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DEAC ANNOUNCE A NEW STANDARD RANGE OF NICKEL CADMIUM RECHARGEABLE BATTERIES

EX STOCK

DEAC announce a new range of batteries using the well known hermetically sealed cells manufactured by Deac (Great Britain) Limited and Varta A.G.

This range of batteries has been introduced to enable an off the shelf service to be provided. The range is in voltages of 6 v. and 9 v. with capacities of 0.5 Ah, 1 Ah, 1.5 Ah, 3.5 Ah and 5 Ah.

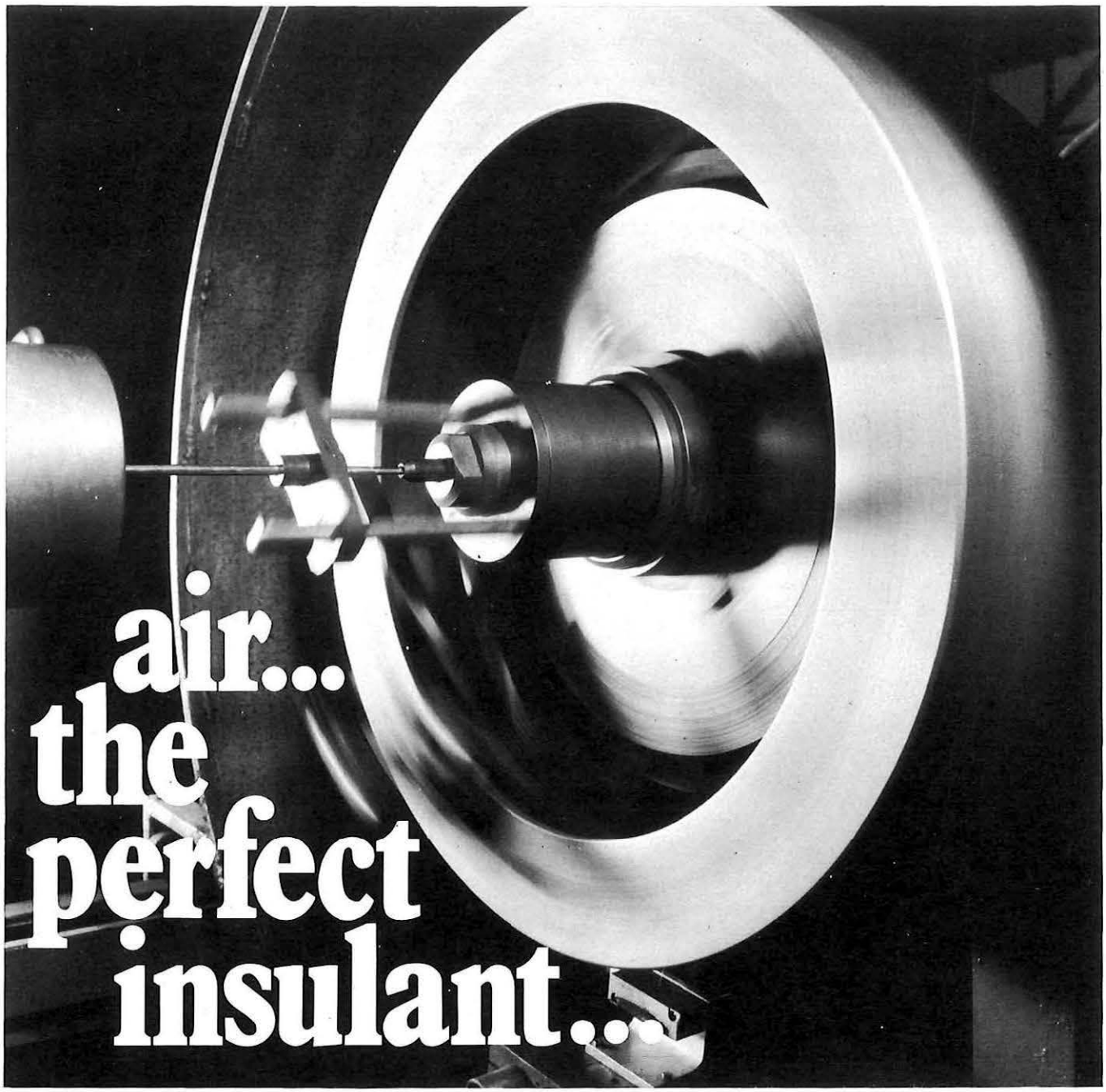
The cases are high impact polystyrene and are fitted with polarised male connections of the push on type. Each battery is supplied with mating female connectors and plastic insulating sleeves.

The design of these batteries has been kept as slim as possible to enable them to be series connected for higher voltage units. For example, two 6 v. packs can be simply interconnected where 12 v. is required and two 9 v. packs where 18 v. is required. Other combinations of the 6 v. and 9 v. standards are of course possible.

DEAC

Deac (Great Britain) Limited,
Hermitage Street, Crewkerne, Somerset.
Telephone: Crewkerne 3366

Deac manufacture button cells and their batteries — import Varta cells for distribution and for battery construction.



the clever part is how you use it!

Making co-axial cable calls for advance production and engineering techniques. In an automatic process, TCL takes copper wire, moulds plastic discs at critical distances along its length, wraps it with plastic foil, and applies a copper strip longitudinally to form a tube.
Two laps of steel tapes followed by two laps of paper tape—and the tube is made and protected with a speed and precision hitherto unobtainable. Each tube is then subjected to searching electrical and mechanical examinations.

Air . . . plus care. These are the ingredients that give TCL co-axial cables their renowned performance standards.

TCL—the largest company in Europe exclusively concerned with the manufacture of telecommunications cable—makes *all* types of dry core and plastic cables and as well as being the major supplier to the British Post Office also exports to over 70 countries throughout the world. A world-wide technical advisory service is provided.

TCL
put **more** into telephone cables

Telephone Cables Limited Dagenham, Essex. Tel: 01-592 6611. Cables: Drycore Dagenham. Telex: 896216
The organisation with 135 years' experience.

Post Office telecommunications journal

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

Vol. 21 Summer 1969 No. 2

PLANS AND PROSPECTS

WHAT may be the last "Post Office Prospects" White Paper* presented to Parliament by a Postmaster General makes some telling forecasts of telecommunications expansion and activity in 1969–70.

Growth of traffic, already high, is expected to be even greater. Inland trunk and local calls, which went up last year by 11.5 and 7 per cent respectively, are expected to go up this year by 14 and 8 per cent respectively. For inland telex calls the corresponding figures are 11 and 19 per cent. The expected increase of Continental and inter-Continental calls is 15 and 25 per cent.

Telephones should reach 14 millions in March, 1970—a net growth of about a million in the year. Exchange connections are expected to reach 8.2 millions. With 1,350,000 new orders to meet, and allowing for cessations and take-overs, the net increase is put at over half a million connections.

These rates of growth, together with renewal and modernisation, are to be met by a capital investment of £358 million, of which about £190 million will be drawn interest-free from income.

In parallel with expansion of the system on this impressive scale the White Paper forecasts a slight fall in the total staff numbers as the result of mechanisation and greater productivity resulting from improved working methods.

One notable advance reported in the White Paper is in the service given to new customers by the appointment scheme. Last year half the appointments made were for completion within a week and a further 20 per cent within two weeks. Ninety-seven per cent of appointments were kept within time and the scheme is to be extended during this year to take in more complicated installations.

On the other hand, the White Paper clearly reflects Post Office concern on two aspects of the service. Although, it says, the quality of service improved last year, congestion in the system through plant shortages continues but some relief is hoped for soon by the arrival of more equipment. And, although the waiting list for telephones fell last year by 15 per cent, it was still around 100,000 of which some 85 per cent were waiting for additional exchange equipment.

A further reduction in the waiting list is forecast for the current year—in fact, as the *Journal* went to press it was announced that at the end of March, 1969, the figure stood at just over 87,000. This is a reduction of about 50,000 in a year, and the biggest drop for more than a decade. At the same time it was revealed that the number of new telephone exchange connections supplied during the year ended 31st March this year was a record 821,000.

But, warns the White Paper, there are still delays in the delivery of new exchanges and additions to existing exchanges and a better performance in the present year are earnestly looked for.

It is clear from the White Paper that the Post Office does not regard its huge growth figures as providing excuses for inadequate service, but rather as an opportunity to take on a formidable challenge. However, the vital influence on the service to the customer of timely and adequate supplies of additional plant is self-evident.

**Post Office Prospects 1969-70, Cmnd 3959, presented to Parliament March 1969.* *See full report on pages 2-6.*

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STOP PRESS: THE NEW TOP TEAM (see pages 10 & 11)

. . . and praise from the Press

The Press does not often praise the Post Office and even more rarely one of its publications. It is particularly pleasant, therefore, to reproduce the following comment from the "Dog Watches Dog" column of the *UK Press Gazette*, the weekly paper for Britain's journalists:

"Anyone whose paper calls upon him to give specialist cover to science—a field now so wide that it might just as well be labelled 'living'—should see the Telecommunications Journal *put out by the Post Office for 1s 6d. Its spring issue has a new and bolder look which, apart from anything else, enables a reporter-reader to look at and describe 'the works' of, say, the Goonhilly aerial, without a magnifying glass.*

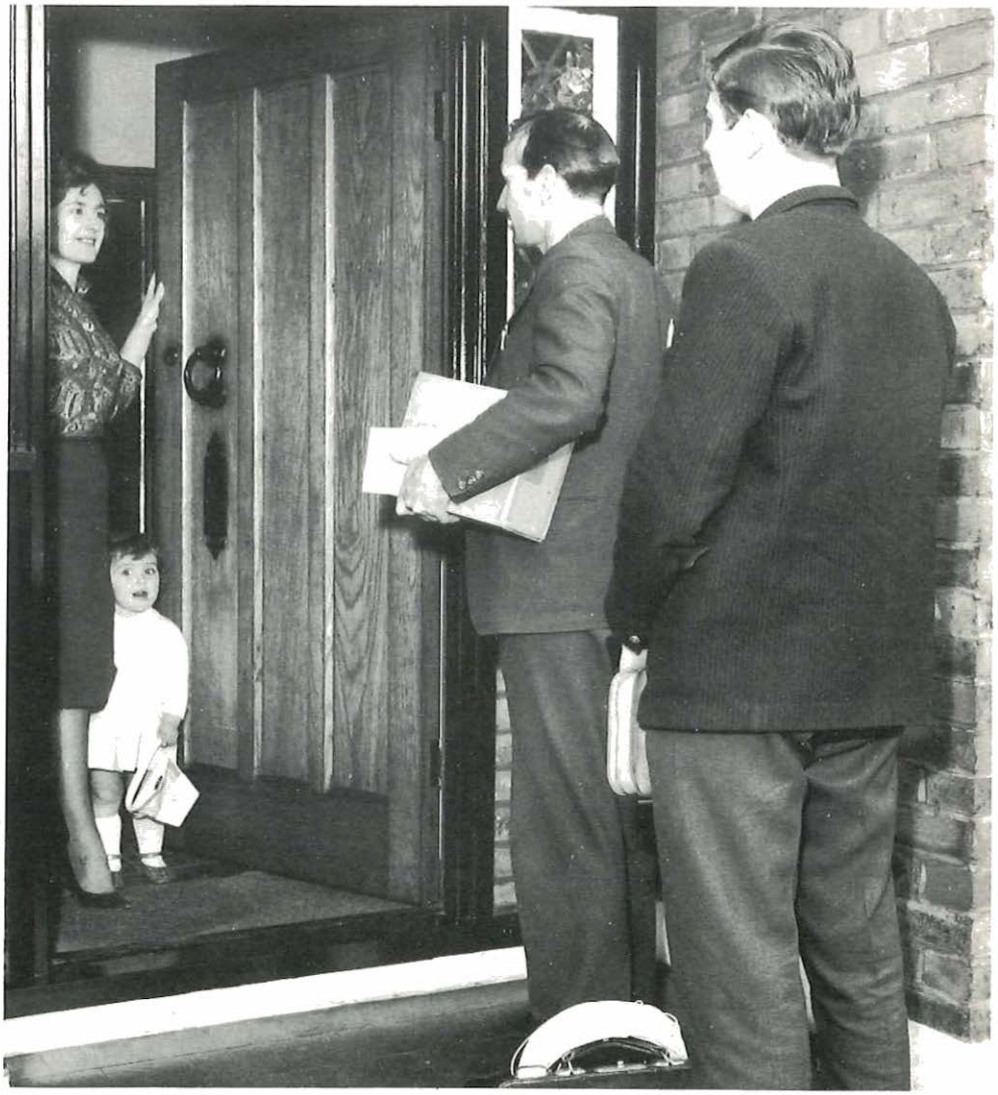
"Every by-line in the Journal *is a contact and, without wishing to cause a run on the resources of the editor, it might usefully be mentioned that the mystery of what goes on inside Intelsat III, the largest and newest of the commercial satellites, is displayed in an exploded drawing difficult to reproduce legibly in the* Journal's *old pygmy size.*

"This was going to be a discussion on when and why to change a journal's size. One example from a journal has proved better than a stick of precept."

Thank you, Dog.

A Government White Paper takes a look at the prospects of the telecommunications business in the coming twelve months and forecasts . . .

A Bright Year Ahead



A fitter, accompanied by a youth-in-training, keeps an appointment to install a customer's telephone. The new installation-by-appointment scheme has proved a great success, 97 per cent of the appointments being kept on time by the Post Office.

BRITAIN'S telecommunications system and the traffic it handles will grow rapidly in the coming year.

- By the end of March, 1970, the number of telephones, including extensions, should reach about 14 million—a million more than at the end of March, 1969.
- Customers will make about 1,342 million trunk telephone calls—165 million more than in 1968–69; and 7,420 million inland local calls—550 million more than in the current year.
- New telephone exchanges, or extensions to existing ones, will be opened at the rate of almost three a day and by March, 1970, nearly 99 per cent of customers will have local dialling service and 86 per cent will be able to dial their own trunk calls.

These are some of the predictions made in the recent White Paper *Post Office Prospects, 1969–70* which also forecasts significant improvements and expansion in data transmission services, a reduction in the telephone waiting list and expansion of the overseas services, particularly in satellite communications.

Here are the full details of the White Paper:

Growth of the System

The trunk network: It is planned to increase the trunk network in 1969–70 by about 12,000 circuits (a growth of 16 per cent). About 63,000 shorter-distance junction circuits will be provided (increase of 9 per cent). These circuits will meet the expected growth in traffic and reduce present shortages.

Telephone exchanges: The output of exchange equipment continues to increase but there are still delays in completing new exchanges and extensions. However, the rate of completing work in progress has been stepped up and this will be reflected in a reduction in delays.

New exchanges or extensions to existing ones will be opened at the rate of almost three a day in 1969–70. Examples of the exchanges included in the list are major trunk works at Birmingham, Liverpool, Manchester and local exchange works at Aberdeen, Bolton, Brighton, Cardiff, Croydon, Doncaster, Oxford and Swansea.

About 380 new telephone exchange buildings, including extensions, will be started, among which are schemes at Cambridge, Colindale, Coventry, Gravesend, Hayes (Middx.), Lairg, Middlesbrough, Newcastle-upon-Tyne and Pontypool.

Local lines: About 750,000 lines will be added to the network connecting subscribers' premises with exchanges.

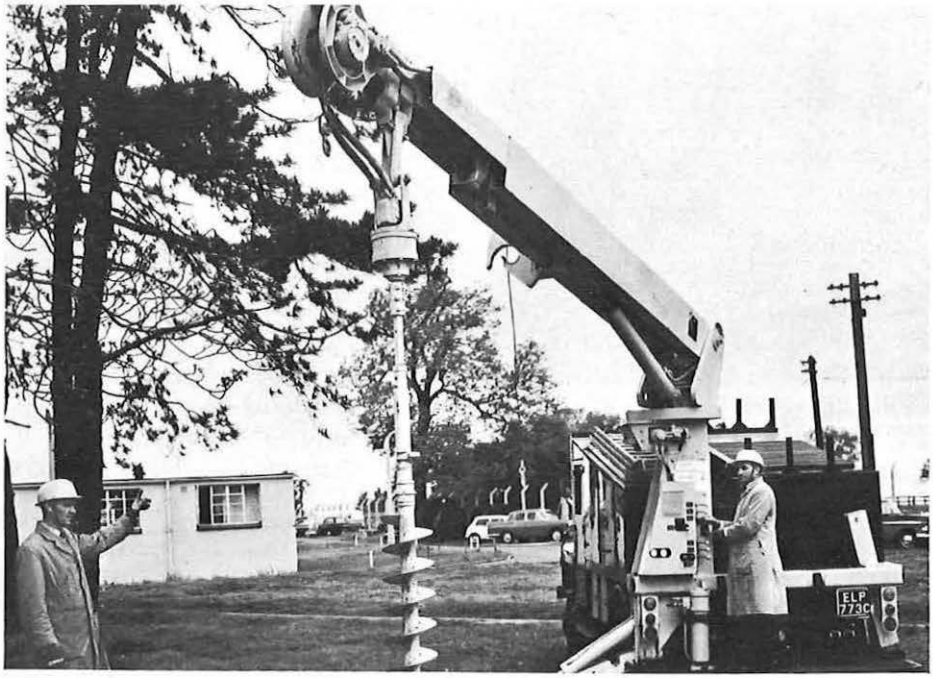
Subscribers' circuits: Orders for about 1,350,000 connections will be met. Of these, 900,000 will be new connections and 450,000 will represent the "take-over" of existing installations by customers moving into new premises.

TABLE A

	Business subscribers	Residential subscribers	Total
Orders for connections to be met in 1969–70	370,000	980,000	1,350,000
Less cessations	270,000	550,000	820,000
Net increase	100,000	430,000	530,000
Connections on 1 April, 1969	2,390,000	5,300,000	7,690,000
Connections on 31 March, 1970	2,490,000	5,730,000	8,220,000

TABLE B

	1968–69		1969–70	
	Calls (million)	Growth	Calls (million)	Growth
Inland trunk calls	1,177	plus 11.5 per cent	1,342	plus 14 per cent
Inland local calls	6,870	plus 7 per cent	7,420	plus 8 per cent



Modern machinery helps the Post Office boost productivity. This King Tel-E-Lect pole erection unit can carry up to nine poles, uproot old poles, and bore and lift new poles into position.

An engineer fitting a lead into a customer's house.

Preparing cable for terminating on a box connection in a vertical duct.

The forecast increase in connections is shown in Table A.

By the end of the year the number of telephones, including extension instruments, should reach about 14 million, compared with nearly 13 million on 31 March, 1969.

Plant is available to enable 86 per cent of orders to be met within eight weeks. The efficiency of meeting these orders has improved considerably. Fixed appointments to meet customers' wishes are offered on all uncomplicated orders (for example, simple exchange lines and straightforward extensions) which account for about half the total. About half the appointments are for completion within one week and a further 20 per cent for completion within two weeks of the order being placed. Ninety-seven per cent of appointments are kept on time by the Post Office.

The appointment scheme will be extended to more complex installations in the coming year.

Waiting list: By the end of 1968 the waiting list totalled 101,000, compared with 118,000 at the beginning of 1968 and a peak on 1 April, 1968, of 138,000. The December, 1968, figure was made up as follows:

Orders awaiting exchange equipment 81,000
Orders awaiting lines to the exchange 13,000
Orders awaiting both equipment and lines 7,000

A further 122,000 applications for service were in process of being negotiated or met. Further reductions in the waiting list are expected in 1969–70.

Telex: The telex service is expected to grow by about 5,000 lines to 31,000 by the end of 1969–70.

International circuits: About 500 additional international circuits will be needed for the increased telephone and telex traffic in the coming year. Facilities to cope with European traffic will be provided in submarine cable and microwave links. More distant countries will be served by satellite and cable networks.

Growth of Traffic

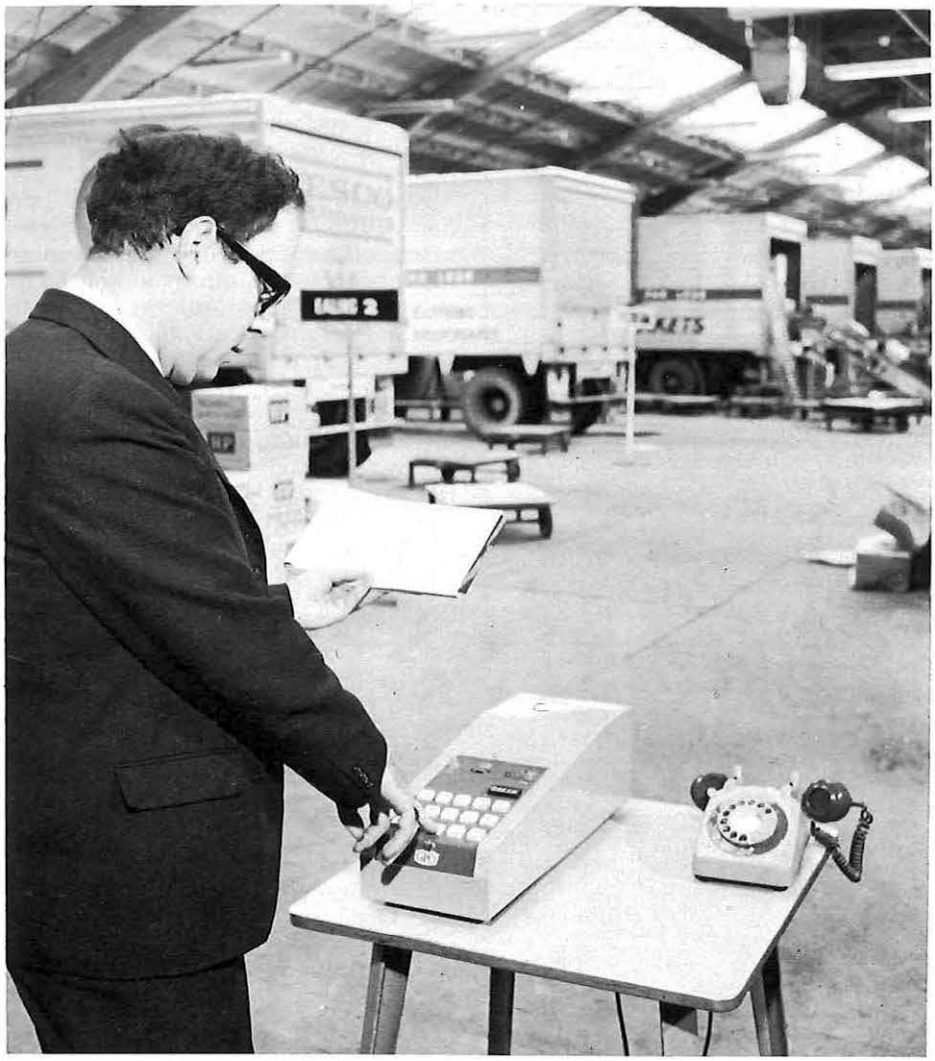
Telephone traffic continues to expand rapidly. Growth expected in 1968–69 and forecast for 1969–70 is shown in Table B.

Special efforts are being made to stimulate off-peak inland telephone traffic.

Corresponding growth rates for other types of traffic are, respectively: Inland telex calls, 11 per cent in 1968–69 and 19 per cent in 1969–70; international telex calls, 22 per cent and 26 per cent; telephone calls to the Continent, 15 per cent and 15 per cent; inter-continental calls, 25 per cent and 25 per cent.

Productivity

Further substantial improvements in productivity are expected in the



This is a Datel 300 outstation at Tesco House providing touch-of-a-button information for the efficient operation of Tesco stores and transport.

Electronic equipment installed in the Empress exchange in London (shown below) has put the British Post Office ahead of the rest of the world in the use of pulse code modulation.

coming year and work study will have a growing effect on stabilising staff numbers. Consultation with staff associations has been further developed by setting up additional joint committees specifically to discuss productivity. In addition to benefits from technological advances and further mechanisation, significant staff savings are expected from simplified operating procedures and the reorganisation of the engineering force engaged on telephone and line maintenance. More use will be made of computers for data processing and most telephone bills will be processed by computers by the end of the year.

Service

In general the improvement in the telephone service in 1967–68 was continued in 1968–69. There is still congestion in the system because of plant shortages but more equipment will be available in the coming year which should reduce overloading and improve service. Improving service to existing customers will continue to have priority.

Development

Automatic service: During the coming year 70 of the 140 manual exchanges still in service in March, 1969, will be converted to the dial system. By March, 1970, nearly 99 per cent of customers will have local dialling service and over the same period a further five per cent of customers will be provided with STD facilities, enabling 86 per cent to dial trunk calls themselves.

Data transmission: Datel services continue to grow rapidly in range and numbers of customers. Three new developments will be introduced in the coming year—the "midnight line" service which enables subscribers to have unrestricted access to the whole of the United Kingdom STD network for data or voice transmission between midnight and 6 a.m. on payment of a single annual fee; a trial service on the London-Birmingham-Manchester routes which could be the forerunner of a national city-to-city public network handling data at 48 kilobits a second; and the extension to Australia, Canada and South Africa of data communication through Datel 600, the medium-speed service already widely in use in Britain and available to the United States and a number of European countries.

Steps are being taken to assess the longer-term market needs and to plan the technical means of meeting them. A wide-ranging market survey has been commissioned and three development contracts have been placed with the computer and telecommunications industries to back up the Post Office's own extensive research and development work. The results of these studies will be available in 1969–70.

Technological Developments

Micro-circuits: The Post Office continues to take advantage of the most up-to-date developments in micro-circuitry. Micro-electronic devices offer promise of increasing the reliability of the service at no extra cost and occupy much less space than the equipment they replace. For example, a single device the size of a pinhead used in micro-circuitry contains the equivalent of 600 separate components.

In addition to the experimental electronic exchange at Empress, London, which is now switching speech in digital form from one route to another, the Post Office is increasing the use of micro-circuits in conventional exchanges to reduce the risk of customers obtaining wrong numbers.

High capacity transmission systems: Forecasts of increased traffic on the public and private networks (including data transmission) over the next decade indicate the need for very high capacity systems on the main routes linking principal cities. Development studies are now in hand to ensure these needs are met.

Overseas telephone service: International Subscriber Dialling, already available between six large cities in Britain and Belgium, France, West Germany, Luxembourg, the Netherlands, Norway and Switzerland, is planned for extension in the coming year for London customers to parts of Canada and the United States (including New York).

London is an important centre for connecting telephone calls between other countries. In 1969 equipment will be introduced to enable these calls to be connected automatically without the aid of an operator in London. As a result, the Post Office's costs will be reduced and countries using the facilities will enjoy a faster service.

International telex: More switchboards and equipment will be provided at Fleet (London) exchange in 1969 which, with progress in overcoming staff shortages, will permit much-needed improvements to the existing operator-controlled services and improve the facilities for subscriber-dialled calls. A second international telex switching centre handling subscriber-dialled calls is due to open during the coming year at St. Botolph's House, Houndsditch, London, to cater for traffic growth up to 1975.

Submarine cables: The new cable to Portugal will be in service in the summer of 1969. It will connect with the recently-completed cable from Portugal to South Africa and, a year later, with a new cable from Spain to the United States.

Satellite communications: Goonhilly is being equipped to work with satellites over the Indian Ocean and the Atlantic. The first Indian Ocean

Above: **A technician aloft.**

Right: **A Datel De la Rue teletype 33 in operation.**

Below right: **A technical officer checks the equipment at an electronic exchange.**

Below: **An engineer tests a cable pair for faults.**

satellite was launched in May and from this will stem satellite communication services—telephone, telegraph and television—with all those eastern countries with the necessary ground links, including Australia, India, Japan, Malaysia and the Persian Gulf.

In the next two years more than half the telephone traffic between Britain and countries outside Europe will be relayed by satellite.

Purchasing Policy

The last Bulk Supply agreement, for exchange equipment, ends on 30 September, 1969, and future purchases will generally be made as a result of competitive tendering. These new purchasing arrangements are designed to ensure continuity of business to contractors whose performance and prices are satisfactory. At the same time they will provide opportunities for new suppliers who may be able to contribute to development and efficiency.

Another major development involves a new approach to specifications. Unlike many previous Post Office specifications which defined everything down to the last nut and bolt, the new specifications will merely specify overall performance requirements for new telecommunications apparatus and equipment. This policy, which is being developed in full co-operation with industry, will give industry the opportunity to exploit its inventiveness in design and production to the benefit of both home and export markets.

Charges for individual services: The White Paper which reviewed the economic and financial obligations of nationalised industries stressed the desirability of making individual services pay their way. Some services provided by the telecommunications business are currently running at a loss. The loss on telephone kiosks taken as a whole is now £2.8 million a year. In particular, the Post Office provides many rural telephone boxes which cannot be made profitable. Inland telegrams is another unprofitable service, losing £2.6 million a year. A public duty willingly assumed by the Post Office is the free 999 Emergency Service, the loss on which is £500,000 a year.

National Data Processing Service

NDPS at present has a London Headquarters and six computer centres—three in London and one each in Derby, Edinburgh and Portsmouth. Two more centres will be opened in the coming year—in Leeds and London. The computers at these centres will be used mainly by the Post Office but there will also be some capacity available for commercial work.

NDPS is providing a full range of services for the Post Office and consultancy, training and processing services for other customers. Its major assignment so far in the non-Post Office sphere has been examining and quoting for operating a real-time, on-line computer system for handling import procedures at London Airport for Customs and Excise, airlines and forwarding agents. Proposals are being made to other non-Post Office customers for a wide range of services, from systems consultancy to comprehensive systems development and operation.

The NDPS has been set a financial target to achieve a net return of 8 per cent on net assets averaged over the period 1968–69 to 1971–72. It is expected to make a profit of £100,000 in 1968–69 and in 1969–70—a net return of 7 per cent and 6 per cent respectively.

Engineers feed in a main underground cable.

TRUNK CALLS UP AGAIN

Telephone users in Britain made 302,600,000 trunk calls during the quarter ended 31st December, 1968. This was 12.2 per cent more than the calls made during the same period in 1967. The proportion of calls dialled direct by subscribers was 69 per cent (compared with 58 per cent in the last quarter of 1966 and 64 per cent in the same period in 1967).

THE PROFIT AND RETURN WILL GO UP

The White Paper says that the estimated results for the telecommunications services on current account are a profit of £39 million (representing a return on capital of 7.5 per cent) in 1968–69 and a profit of £71 million (return of 8.8 per cent) in 1969–70. Income in 1968–69 is expected to be £558 million and expenditure £519 million. In 1969–70 estimated income is £639 million and expenditure £568 million.

The profits for this year and the coming year allow for certain accounting changes, the main effect of which is a net transfer of expenditure from capital to current account. The most significant change is the charging to revenue of certain overhead expenses formerly charged to capital. The effect of these changes, recommended by consultant accountants as being in line with current good commercial practice, is to reduce profit by £8 million in 1968–69 and by £10 million in 1969–70.

Estimated capital expenditure for 1968–69 is £334 million and for 1969–70 £357.7 million. The biggest items of expenditure are for exchange equipment (£101.3 million in 1968–69 and £112.3 million in 1969–70); trunk and junction circuits (£62.6 million and £64.6 million); subscribers' circuits (£50.5 million and £57.5 million); local lines (£50 million and £49.6 million); and accommodation services (£41.7 million and £49.2 million).

Capital requirements for 1968–69 are £350 million and for 1969–70 £367 million.

The Challenge of Global Communication

This article, reproduced by permission of *The Times*, tells why the Post Office has set up the Advisory Group on Telecommunications Systems Definitions, how it will operate and what it aims to achieve

by Professor JAMES MERRIMAN

As part of the progressive change of policy in procurement towards competition the Post Office has set up an Advisory Group to help in the difficult and complicated job of preparing specifications for telecommunications systems of the mid-1970s and 1980s.

These systems must be planned to match the changing needs of the community. They must keep abreast of rising demand. They must be flexible so as to meet the changing pattern of domestic and industrial growth. They must be capable of bearing an increasing variety of new services—voice, vision and data.

Their planning must not stifle technological innovation; indeed, it must give proper opportunity for its early application both in products and in manufacturing processes.

But at the same time the planning of the United Kingdom telecommunications system has increasingly to be undertaken as a whole and not as a series of separate independent parts. For the techniques and practices, hitherto distinct and separate, of transmission and switching are already merging (as in, for example, the field-trial integrated pulse code modulation exchange/transmission system at the Empress telephone exchange in West London, opened by the Postmaster General in August, 1968); and the progressive application of computer-like control systems to electronic exchanges is already merging signalling, switching and transmission technologies and practices.

Increasingly, also, system changes that may be planned for one area affect others, even at remote points of the country; and, with growing global awareness, telecommunications system planning must think in international and in global terms, since the essence of communications is compatibility.

As if this were not enough, the "new" cannot be introduced overnight. The sheer size of the £300–£400 million annual Post Office investment programme and our present assets of nearly £2,000 million means that change has to be introduced progressively over a decade or more. The "new" must therefore co-exist with the old—at least for a while.

So the task of reconciling national and global compatibility with service, technical and innovative flexibility is indeed a difficult one.

It is one for which the Post Office must take responsibility and decide for itself. But it has decided to seek the advice of established telecommunications suppliers (currently GEC/AEI, Plessey and STC) and to create, with their help, an Advisory Group on Telecommunications System Definitions to provide this advice.

The Group has, in fact, been set up under the leadership of the Post Office and consists of five senior Post Office engineers working in full-time collaboration with two or three senior colleagues from each of the firms concerned. Support from and active involvement by other specialists, e.g. market research, economic studies, is arranged as necessary. The Group hopes to begin to offer advice on the specifications for systems of the future in 1970.

The job of the Group is not going to be easy. It must involve itself, in a true sense, in the creation of imaginative and yet validated and viable plans for the future. Yet it must avoid taking its studies to that degree of detail that stifles innovation and blunts competition. In a sense, its advice must be given with as much confidence as it can, but with as little attention to detail as it dares.

Its advice will take the form of definitions that will be no more than are necessary to ensure technical compatibility and inter-working between sub-systems of the telecommunications service. They will be in the broadest possible performance-based terms; the objective is to give contractors the widest possible scope to prepare for and to meet Post Office requirements in their own way.

And, at the same time, through the active participation of its industrial members, it must, as far as it can, act so that both home and export requirements are recognised.

The setting up of the Group does not imply the creation of another bulk supply agreement by another name. The Post Office will be free to seek or receive advice from any supplier or potential supplier outside the Group who may wish to become an established supplier or who may have a contribution to make. And, of course, the Post Office will be free to have bi-lateral discussions in commercial confidence with individual established suppliers to supplement Group discussions.

The Post Office will, in due course, publish specifications and definitions based on the work of the Group, which will then form the basis for competitive purchasing.

By this means, the Post Office, with the ready co-operation of those from industry who are sharing with it in the work of this Group, hopes to be able to create a series of performance-based specifications for the telecommunications systems of the future that will liberate the innovative powers of industry, yet strike a right balance between compatibility and competition.

They should also result in the Post Office being able to provide itself with systems—both hardware and software—that will give its customers services matched to the needs of the 1970s and 1980s.

POST OFFICE'S FIRST PROFESSOR

Mr. James Merriman, Senior Director of Development in Telecommunications Headquarters, has been appointed by the University of Strathclyde, Glasgow, as Visiting Professor in the Department of Electronic Science and Telecommunications.

Prof. Merriman, a member of the Council and immediate past chairman of the Electronics Board of the Institution of Electrical Engineers, joined the Post Office at the Research Station in Dollis Hill in 1936 after graduating in Honours Physics and following post-graduate research at the University of London. While at Dollis Hill he worked principally on engineering research and later the development and management of international telecommunications. From 1955–59 he was seconded to the Treasury as Deputy Director of Organisation and Methods.

Appointed Assistant Engineer-in-Chief in 1963 and Deputy Engineer-in-Chief two years later, Prof. Merriman became Senior Director of Engineering in March, 1967, and Senior Director, Development in August of that year.

The telecommunications industry has a vital part to play in making sure that Britain gets the communications systems it deserves and must have. This was the main theme of the Postmaster General's message to the industry when he forecast. . .

Ten years of wonderful opportunities

Thumbs up for the industry from the Postmaster General Mr. John Stonehouse.

THE need for the telecommunications manufacturing industry to sharpen its prices and improve delivery dates in supplying exchange equipment was emphasised by the Postmaster General, Mr. John Stonehouse, when he addressed the recent annual dinner of the Telecommunications Engineering and Manufacturing Association.

He also announced the setting up of an Advisory Group on Telecommunications Systems Definitions to help prepare specifications for telecommunications systems in the years ahead.*

After reminding his audience that the Bulk Supply Agreement for exchange equipment was due to end in September this year, the PMG said: "Although initially there will be problems, I believe that we shall develop a relationship which will be healthier for us both. The fact that your share of the business will depend on your success in quoting keen prices, meeting our required delivery dates and providing plant of the highest quality, can only increase the efficiency of the industry . . . as our programme continues to grow there will be increased business for those who can win it by keen prices and good performance."

Mr. Stonehouse said that the new Post Office Corporation due to come into being on 1 October, 1969, will present within the next ten years many wonderful opportunities for the use of communications between computers, facsimile printing and the linking up of most homes in Britain with all kinds of communication by wire. But it was only through the fruitful co-operation between the supplying industry and the Corporation that these opportunities could be realised.

The old Bulk Supply Agreements had regulated the commercial arrangements between the industry and the Post Office for the past 41 years and the activities of each had become tangled together in a major sector of British industry. This had produced a lot of criticism and dis-satisfaction and tensions as well as opportunities. It had, for example, produced a complete inter-changeability of parts—at the price, however, of minutely-detailed specifications which carried a risk of hindering inventiveness and cost reduction.

"Although we have made changes over the past few years to meet the criticism of the system which was, perhaps, rather too cosy," the PMG went on, "the criticism has continued to grow. We have, therefore, agreed with you that it is better that this system should be changed for something else in the interests of the Post Office and the suppliers. We shall be able to continue the close contacts that have been established and which have been of very great help to the Post Office.

"During the period of the Bulk Supply Agreements a great deal has been achieved, technical developments have been enormous and, above all, there has been growth. We have made striking advances in technology and got the extensive use already of Pulse Code Modulation in our junction network, PCM switching at Empress Exchange and the success of our small electronic exchanges. The performance of the standard products the industry has supplied has been extremely good. Had it not been, the Post Office would not, without the collapse of the service, have got through the decades of inadequate investment due to World War Two and post-War restrictions in investment suffered by the Post Office.

"In addition, if the design and quality of the products had not been so good they would not have provided the basis for the sustained achievements of the industry, particularly in recent years in transmission and microwave equipment.

"We are supplying a telephone service which is among the cheapest in Europe to the subscriber and certainly the cheapest for off-peak dialled calls—as cheap as 30 years ago—despite devaluation of the currency. And the service is growing more rapidly than any other comparable system.

"The doubling of the industry's production of exchange equipment in the past two years is an outstanding achievement. Last year, just under 300 exchange contracts were completed—rather less than one a day. By September of last year the figure was rising towards one-and-a-half exchanges a day and in November it was two a day for a seven-day week.

"Before the end of this financial year (March, 1969) we expect to be taking over from you at the rate of three completed exchanges and extensions a day and getting well on the way towards clearing the backlog that has arisen in recent years. As a result, the delays which have been growing steadily for the past two years will start to reduce. But, despite this improvement, we are still being promised completion dates which slip seriously at the last minute.

"The industry should bear in mind the importance of satisfying its most important customer—the Post Office. This delay has prevented us from giving the public the service they are entitled to and leads to criticism of

*See article on page 7.

the industry and the Post Office. We shall not be satisfied until all the promised dates are achieved. In the competitive situation which is coming the importance of this will be enhanced.

"Communications equipment cannot just be bought off the shelf and connected to the system . . . It is essential that all the complicated pieces of equipment should fit together to form a harmonious whole.

"This would not be a problem if the pace of technology was not so fast and furious. New ideas and devices are being created year by year, not only in Post Office laboratories but also in the laboratories of industry and the research establishments of the Ministry of Technology . . . It will be the duty of the Post Office to see that the results of this new competition are brought quickly into our system so that the improvements we need in service, speed and efficiency can be secured. This requires a nice judgment as to the extent of the co-operation that must be, if the specifications for the various parts of the system are to be such as to enable a progressive complete overall system to emerge, without stifling the vital inventive spark.

"The industry will now be on its mettle to make the most of the new challenge but the Post Office has to make the essential decisions that reconcile service needs for compatibility with industry's inventive and competitive posture.

"To help the Post Office draw up these specifications we have established an Advisory Group on the Definition of Systems and have invited members of TEMA to join us in the work of the Group.

"The Group's job is to create the definitions required to ensure compatibility and inter-working between the various parts of the system . . . The work of this Group will be done in public in the sense that the Post Office will be free, from time to time, to publish its decisions based on the Group's advice.

"The setting up of this Group will not transform our specifications overnight, but I have every confidence that within a few years the framework specifications which we shall be producing on the advice of the Group and the interested parties will be of vital importance, not only to our business in Britain, but also to the export business. The advice we expect to receive will take into account not only our view of domestic requirements but industry's view of the export potential of the systems that are being devised.

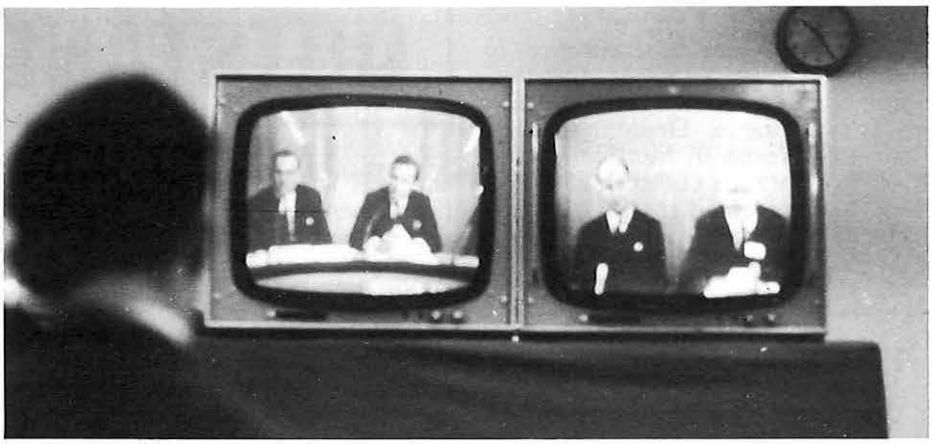
"We hope that in establishing long production lines for export customers, you will also be able to reduce your prices and amortise your development costs over a wider production line to reduce your prices for the Post Office."

A MAJOR EXPANSION FOR ULSTER

CONFRAVISION, the Post Office's experimental system which allows groups of people many miles apart to take part in business conferences and meetings with the aid of two-way vision and high-quality sound, was recently used to launch a symposium in Belfast on "The new Post Office in the new Ulster".

It was the first time Confravision had been used for such an occasion and allowed the Postmaster General, Mr. John Stonehouse, in London, and the former Ulster Prime Minister, Captain Terence O'Neill, in Belfast, to see and speak to each other.

Joining them in the talks were (in London) Mr. A. W. C. Ryland, Managing Director: Telecommunications; Mr. A. Wolstencroft, Managing Director Posts, and Mr. D. Wratten, Director of Giro. In Belfast with Captain O'Neill was Mr. G. H. Coates, Director, Post Office, Northern Ireland.



In action on the Confravision screen, Mr. Stonehouse and Mr. Ryland (left) talking to Capt. O'Neill and Mr. Coates.

The occasion, attended in Belfast by 150 of Ulster's leading industrialists and local authority representatives, was marked by the Postmaster General's announcement of a major expansion programme for Northern Ireland. "Of the expansion programme by the Post Office of £2,000 million in five years 1968-1973 a very large part has been allocated to Ulster," he said.

More than £35 million is to be spent up to 1973 on telecommunications in Ulster and more than 140,000 extra telephones provided. This compares with the £15½ million spent during the past five years when 56,000 telephones were added to the system.

Mr. Ryland said that 99.9 per cent of Northern Ireland customers already had automatic telephone service and were one year ahead of the rest of the United Kingdom.

Eighty-four per cent of telephone subscribers in Ulster were on the STD system compared with 80 per cent in the rest of the UK. The first three electronic exchanges in Ulster would be ready by the end of the year.

Of the £35 million total expenditure over the next five years, £10 million will go on exchange equipment; £7½ million on trunk and junction circuits; £5½ million on accommodation; £5½ million on customers' apparatus; £4¾ million on local lines; and £1¾ million on other items.

The number of trunk and junction circuits in 1973 will be more than double the existing number. A microwave link between Belfast and Dublin is also under construction in collaboration with the Irish Republic Department of Posts and Telegraphs. This link will provide capacity for double the present number of circuits and enable both administrations to introduce STD between their two capitals at the beginning of 1969.

Among the major projects which will go ahead under the five-year plan are:

Belfast City Exchange—a new exchange to serve the central area and to replace old equipment in Telephone House. It will be of the STC cross-bar type and cost about £2½ million.

Londonderry—a major reconstruction of the existing exchange incorporated in a new building and a new exchange at Waterside, together costing £500,000.

Belfast Transit Switching Centre—new trunk switching equipment at Telephone House costing £140,000.

Craigavon—a new telephone exchange and cable network to serve the centre of the new city of Craigavon at a total cost of £500,000.

'A BRILLIANT AND OUTSTANDING TEAM'

The Postmaster General with the new top team during the Press Conference. Left to right: Mr. Whitney Straight, Lord Hall, the PMG, Mr. A. W. C. Ryland and Mr. E. Fennessy.

THE best-kept secret in the Post Office for many years was revealed by the Postmaster General when he announced to a bumper gathering of pressmen the identities of the first Chairman of the new Post Office Corporation and his top three team. He described them as "brilliant and outstanding men."

The name of the Chairman—**Viscount Hall of Cynon Valley**—came as a surprise for few had heard of this former pitboy, seaman, surgeon, medical officer of health and international financier who gives up the directorships of 15 companies to come to the Post Office.

Lord Hall rose literally from the bottom—hewing coal at Penrhiwceiber colliery, Glamorgan, in the same pit in which his father (later to become the first Viscount Hall) worked. Educated at Christ's College, Brecon, he matriculated at 14 and, to help out the family finances, went down the pit. Six months later he ran away to sea and spent the next 18 months as a cabin boy on a collier plying between Britain and South America.

At 17, Lord Hall entered the University of Wales to study economics and later went to University College Hospital, London, where he qualified as a surgeon. Advised to specialise later, he went into the administrative side of medicine and in 1938 became Deputy Medical Officer of Health in Merthyr Tydfil. Shortly before the outbreak of World War Two he joined the Royal Naval Volunteer Reserve as an Able Seaman and was later promoted to Surgeon Lieutenant, serving during the war in the Atlantic, Mediterranean and Indian Ocean. By 1941, he had become Surgeon Lieutenant Commander.

Lord Hall took the first steps towards becoming one of the world's leading financiers in 1945 when he joined a mining company as medical officer and a year later became an executive with the same organisation. Between 1950 and 1962 he was appointed chairman and director of various other companies and in 1962 Director of Investments, Africa, Asia and the Middle East, of the International Finance Corporation, an affiliate of the World Bank. In 1963 he became adviser on special projects to the International Finance Corporation and subsequently a member of the Advisory Committee to the Board of the Nuclear Power Group and British Director of the Chase Selection Fund of Boston, USA.

Married, with two teenage daughters, Lord Hall was described by the Postmaster General as a man with a tremendous range of experience who brought an equally wide range of qualities to the Post Office. He was "the ideal man to lead the new Post Office team in the years to come".

* * * * *

Joint Deputy Chairman and Chief Executive of the new Corporation Board will be **Mr. A. W. C. Ryland** (56), the present Managing Director: Telecommunications, who has spent all his working life in the Post Office.

Son of the Telephone Manager at Newcastle-upon-Tyne, Mr. Ryland was educated at the Gosforth County Grammar School and joined the Post Office in 1932 as a Youth-in-Training (Engineer Apprentice). Two years later he became an Assistant Surveyor Class Two in North Wales. On the outbreak of World War Two he joined the Royal Engineers (Postal Section), serving in the Middle East and Central Mediterranean Force and rising to full Colonel.

Mr. Ryland rejoined the Post Office as an Assistant Postal Controller in Midland Region in 1947 and in 1949 was appointed a Principal in the Postal Services Department in Headquarters. In 1953 he became Deputy Public Relations Officer and in 1954 Principal Private Secretary to the Postmaster General, first with Earl De La Warr and then Dr. Charles (now Lord) Hill.

A year later he was promoted Assistant Secretary in the Establishments and Organisation Department and in 1958 Director of that Department, a post he held until 1961 when he became Director of the Inland Telecommunications Department. In 1965 he was appointed Deputy Director General (Telecommunications) and in 1967 Managing Director: Telecommunications.

THESE ARE THE NEW TOP MEN

Chairman of the Board of the Post Office Corporation: Viscount Hall of Cynon Valley. Salary £15,000.

Joint Deputy Chairman and Chief Executive: Mr. A. W. C. Ryland, CB. Salary £12,000.

Joint Deputy Chairman (half-time): Mr. Whitney Willard Straight, CBE, MC, DFC. Salary £6,000.

Managing Director: Telecommunications: Mr. Edward Fennessy, CBE, BSc., FIEE. Salary within the standard range £7,700 to £10,450.

The appointments will take effect formally from the date of the Royal Assent to the Post Office Bill, but the designate Chairman and Board members appointed from outside the Post Office will join at various early dates to assist in the preparatory work leading to the establishment of the Post Office Corporation.

Other Board members will be appointed by the Postmaster General after consultation with the Chairman.

Lord and Lady Hall, talk to the PMG's Head Doorkeeper, Mr. Rice, on the first official visit to Post Office HQ.

Speaking at the Press Conference, the Postmaster General said Mr. Ryland had had experience of every aspect of work in the Post Office and had been responsible for developing and shaping the biggest investment programme in the history of the Post Office.

* * * * *

Mr. Whitney Straight, the new Joint Deputy Chairman who will serve half-time, is the former professional car racing driver and wartime air ace, who, said the Postmaster General, will be bringing great industrial experience to the Post Office.

Born in the United States and educated there and at Trinity College, Cambridge, Mr. Straight formed his first company—an aviation firm—before World War Two. During the war, in which he served with the Auxiliary Air Force, he rose from acting pilot officer to Air Commodore.

In 1946, Mr. Straight became Deputy Chairman of British European Airways and in 1947 Managing Director (Chief Executive) of the British Overseas Airways Corporation, being appointed Deputy Chairman in 1949 and serving in that capacity until 1955. In 1956 he joined Rolls Royce as Executive Vice Chairman and a year later was appointed Deputy Chairman, a position he still occupies and will combine with his new Post Office duties.

Since 1957, when he became a Director of the Midland Bank, Mr. Straight has taken on many other tasks, among them Chairman of the Arran Trust Ltd, Chairman of the Government Advisory Committee on private flying and Chairman of the Contemporary Art Society. He is a Fellow of the Royal Society of Arts, a Member of the Council of Industrial Design, a Member of the Institute of Directors, a Member of the Institute of Transport and Chairman of the Executive Committee of Alexandra Rose Day.

* * * * *

Mr. Edward Fennessy who takes over from Mr. Ryland as Managing Director: Telecommunications, comes to the Post Office from the Plessey Company, Electronics Group, of which he is Managing Director and from which he is resigning to take up his Post Office appointment.

Mr. Fennessy (57) has worked in telecommunications and electronics for the past 35 years. Leaving school at 16, he went into the British branch of a major Swedish electrical engineering firm where he served for two years as a works apprentice. He then went to the East London (now Queen Mary) College of the University of London and graduated in electrical engineering, specialising in communications and measurement.

From 1934 until 1938, Mr. Fennessy served with Standard Telephones and Cables Ltd, designing equipment and working on the early multi-channel carrier systems and on cross-talk and noise problems. In 1938, as a civilian he joined a special team at the Air Ministry Research Establishment at Bawdsey Manor, Suffolk, working on a secret project which set up Britain's World War Two radar defence screen. By the end of the war he was Group Captain, Engineer-in-Chief of RAF 60 Group, responsible for engineering the whole of the UK radar defence system. His team was responsible for planning and building the network of radar stations throughout Britain and the chain of static and mobile stations deployed across the Continent after the Allied invasion. His last wartime job was planning a complete navigation system between Britain and the Far East which would have been brought into use for flying troops to and from the Far East had the war continued.

After the war, Mr. Fennessy was appointed joint managing director of the Decca Navigator Company and in 1950 became Managing Director of Decca Radar Ltd. He joined Plessey Electronics as Managing Director in 1965.

THE NEW MD:T TALKS TO THE JOURNAL

"We are on the verge of an electronic communications explosion and clearly the new Corporation will be right at the centre of it," Mr. Fennessy told the *Telecommunications Journal.*

"In developing better facilities for linking people to people one asks oneself the basic question: 'What can we do, through telecommunications, to reduce the need for people physically to move themselves about in order to communicate?'

"The degree to which the development of telecommunications can make it easier for people to communicate fully is, I think, a great challenge to which the Post Office, in its new role and with its vast experience, will respond. I see the next decade as being a very exciting one, both technically and for the service which can be given to the public.

"I am very conscious of the tremendous work that has been done in the past in building up the national telecommunications system. That is the foundation on which anything that develops in the future is going to be built."

Of his new task as Managing Director: Telecommunications, Mr. Fennessy said: "The Post Office is the biggest engineering management task in this country and at this point in my career the challenge of such a task and responsibility appeals to me.

"I am moving from a responsible job to one of greater responsibility. The responsibility one has in helping to run the new Corporation is rather like that which one has in running a big business where the service to the customer has to be efficient and economic. The commercial fundamentals of providing that service are the same.

"In running a business of the size I run at present you must decentralise. You have to give people an adequate degree of responsibility, avoid the temptation to interfere if you think something is going wrong, but, equally, be prepared to move in—and firmly—if you think a point has been reached where your own personal intervention is necessary.

"It means having a good team and trusting a good team and providing leadership."

EUROVISION DEVELOPMENT

Britain is to support the development of a television satellite communication system to transmit Eurovision programmes for the European Broadcasting Union. The cost will be about £8 million.

The decision to join arises from settlement of terms for British withdrawal from the European Launcher Development Organisation.

A proposal for a television satellite has been approved in principle by the European Television Union.

Young people want more vividly-coloured telephones—Tangerine, Bright Gold and Chrome—but the middle-aged prefer White, Ivory and Grey. Black is bottom of the list and men want brighter colours than women. These are some of the results of a recent Post Office survey which suggests . . .

A COLOURFUL FUTURE FOR TELEPHONES

By W. J. PATERSON

THE Post Office has just completed a market survey seeking the opinions of telephone customers, and the public in general, about existing and suggested new telephone colours.

Coloured telephones have been available in this country for over forty years. Before 1930, requests for coloured telephones were met by spraying black pedestal instruments and the customer was charged the full cost of the work plus the estimated cost of recovering the instrument and reverting it to black!

Following the introduction of moulded telephones, a standard colour range of Ivory, Walnut, Old Gold, Oxidised Silver and Jade Green was offered to the public in 1930 and Chinese Red was added to the range four years later. Non-standard colours could still be supplied by painting black telephones to match samples supplied by customers but the extra charge was considerably higher.

The metallic colours, Old Gold and Oxidised Silver, were popular but there was a tendency, after some use, for the paint to chip. Because of this they became non-standard colours at the end of 1934, along with Walnut for which there was little demand. Ivory, Chinese Red and Jade Green remained the standard colours for the next twenty-five years. The intervening war years and the demands of the post war period precluded much thought about a new or extended colour range.

The introduction of the 700 series modern telephone in 1959 heralded a new era of colours because the new thermo-plastic material could be readily produced in colour. In addition to black, the Post Office adopted six colours recommended by the Council of Industrial Design and, during the past 10 years, these have proved to be a positive aid to selling. The array of colours was increased last year when the new luxury Trimphone was offered in Grey/White, Two-tone Blue and Grey/Green.

During the test marketing of the Trimphone the Post Office had already decided that the time was ripe for a review of colours and that the public should be invited to co-operate. A design consultant was commissioned to recommend new colours for material testing and market research trials. Subsequently, in the summer of 1968, a small quantity of telephones in both modern and Trimphone design was manufactured in Tangerine, White, Grey (mono-tone), Red (bright), Black (proposed addition to Trimphone range), Transparent, Bright Gold (polished finish), Satin Gold (matt finish), Bright Chrome (polished finish), and Satin Chrome (matt finish).

At the end of August, 1968, the Market Research Division at Telecommunications Headquarters was asked to conduct research to identify customers preference for the colours* and, because the production of metallic colours involves an electro-plating process which increases the unit cost of instruments, to test market reaction to the metallic finished telephones at premium charges. Another object of the survey was to obtain basic information to help determine the colour ranges of future telephones. In addition to the experimental colours, modern telephones and Trimphones in the existing colour ranges were included. A complete set of modern telephones in both existing and new colours contained 16 instruments and a set of Trimphones contained 13. It was decided that the most practical method of exposing the telephones to a wide cross section of the public was to show them at Post Office exhibitions and, where necessary, to stage special displays in TMOs and HPOs. A total of 19 displays, each lasting about two weeks, was arranged in all Regions and Directorates between September, 1968 and February, 1969. To ensure simplicity of display and encourage maximum response from

*See Telecommunications Journal *Spring, 1969, pages 16–17.*

A reel containing data obtained from the survey questionnaires is put on the computer at the National Data Processing Service Centre in London.

visitors, only one type of telephone was shown at a particular location. Uniformity of display was achieved by housing the telephones in display units built to Marketing Department's requirements and the telephones were arranged so that the four metallic colours were separated from those with the normal thermo-plastic finish.

Visitors were invited to complete a questionnaire which asked them to consider the range of colours in thermo-plastic and indicate their likely first choice for a home telephone. They were then invited to choose a metallic colour and asked to give an overall choice between the two selected. Those visitors who chose a metallic colour as their overall choice were also invited to indicate their reaction to an additional single payment charge. Respondents were also asked if there was any other colour they would have liked to have seen in the display. Further questions were designed to identify the persons in terms of age group, sex and whether they lived in a telephoned household.

There was an enthusiastic response from the public—over 22,000 questionnaires being completed throughout the country. After initial editing in Market Research Division these were forwarded to Manchester Data Conversion Centre for punch card preparation. Information on the punched cards was subsequently transferred to magnetic tape at Docos House, London and processed by computer. The end product was a paper print-out containing detailed tabulations.

A pleasing feature of the results was that the existing colours scored well, suggesting that our customers are reasonably satisfied with the present choice available. Not unexpectedly, preference varied considerably according to age group. Perhaps reflecting current trends in fashion, teenagers and young people tended to favour the more vivid shades such as Tangerine, Bright Gold and Bright Chrome. Older people were inclined to be more conservative and generally voted for the neutral colours White, Ivory and Grey. But despite this trend, both Bright Gold and Satin Gold received a substantial number of votes from the over 55 years age group. Although the difference between male and female opinion was much less pronounced than that between age groups, the results suggest that, perhaps surprisingly, males are a little more flamboyant in their choice of colours.

It seems that the new White and existing Concord Blue are the most appealing for the modern telephone design and that the existing Two-tone Blue is the most popular for the Trimphone. Not unexpectedly, the results in each Region were remarkably consistent although one or two differences did arise. In South West Region, for example, people seemed to prefer Satin Gold in the Trimphone design while people elsewhere preferred Bright Gold. But all seemed agreed that Satin Chrome was the least popular.

The colour ranges included in the displays of modern telephones and Trimphones were not identical but nevertheless similar patterns of opinion emerged; for example, White, Blue and Tangerine are very popular for both telephones. This seems to suggest that the preference for a telephone colour is much less influenced by the shape of the instrument than might be thought. This fact alone should be a valuable contribution to determining the colour ranges of future types of telephones.

The new White was much preferred to Ivory and Grey/White which are the most similar colours in the current ranges. Black was the bottom of the poll, beaten even by the novel transparent telephone which did not seem to have much appeal. However, since the opinions of our business customers were not sought in this survey, the retention of Black might be considered necessary to meet the needs of some business premises.

About 60 per cent of those who made a metallic colour their first choice indicated their willingness to pay an additional charge which suggests that there could be a substantial market for telephones in this finish. But the results of material durability and electrical safety tests are just two of the many factors which will have to be considered before a decision is reached about inclusion of metallic finishes in the colour range.

Analysis of other colours suggested by the public was interesting if not particularly fruitful. Various shades of Pink and Light Blue were frequently suggested but it is difficult to name a colour which was not mentioned.

Market research is only a guide to management and many considerations, such as determining the optimum number of colours to be included in any range, will have to be taken into account before a decision is made about future marketing. It seems certain, however, that our customers and the Post Office are likely to have a colourful future.

THE AUTHOR

Mr. W. J. Paterson *is a Sales Superintendent in the Market Research Division of Marketing Department in THQ. He joined the Post Office as a Youth-in-Training in Glasgow in 1950 and in 1963 became a Sales Representative in Dundee. His present post is concerned with market research into subscribers' apparatus and services.*

A Sales Representative interviews a young visitor to a display in Sheffield.

Staff at Telecommunications Headquarters analyse the questionnaires.

Operators at Manchester Data Conversion Centre make punched cards from questionnaires.

Experts from all over the world attended the recent international conference in London on Switching Techniques for Telecommunications Networks. This article reports briefly on their discussions and takes . . . . . .

A world wide look at Switching

SOME ideas incorporated in the latest switching techniques were first thought of more than 50 years ago. This statement by Mr. Oscar Myers of IT & T, one of the world's leading experts on switching, was among the most thought-provoking made at the recent international conference in London on Switching Techniques for Telecommunications Networks.

While the old ideas, such as those included in the Lorimer system of the 1950's, had been quite brilliant, said Mr. Myers, they were in advance of their time and because of the technological limitations then existing, could not then have been adopted.

Mr. Myers advised research and development engineers to "take a look over their shoulders". A number of the old ideas, he said, had never been put into operation but they could, perhaps, with the latest techniques applied, find some application in solving some of today's major switching problems.

The conference divided itself into three main divisions:— Time division switching, using Pulse Code Modulation by which speech is chopped up into very short pulses; the controlling of switching systems by computer-like controllers and discussions on the actual systems themselves as distinct from the methods of controlling them. There were also a number of papers dealing with planning, theoretical studies into the behaviour of switching systems, maintenance and signalling.

The main lesson learned from the discussions was that there still does not seem to be any reasonable economic alternative to Space Division-type systems based mainly on sealed relays, although several companies were proposing different systems of making connections in the speech path.

Everyone was looking for a high-speed switching system of great flexibility in application. What the switching world needed to do now was to design and produce systems that could enter the existing networks, yet be adapted almost every year to meet new and changing circumstances.

The conference agreed, however, that electronic systems had produced a new kind of reliability in switching. Because of the ability of the electronic systems so quickly to check out and correct failures and automatically switch calls to an alternative path, customers now seldom experienced an unsatisfactory connection. The reliability of these systems had achieved levels previously considered impossible and they were still improving.

Several different systems were described, all producing more advanced facilities and doing their job more efficiently and rapidly.

Keen interest was shown in the possibilities opened up by Stored Programme Control—the control of a system by processing equipment which has many characteristics of the modern computer adapted to switching needs. Many delegates strongly supported both Time Division and

Engineers check a pulse distribution amplifier and monitor circuits in the pulse code modulation equipment at London's Empress Exchange.

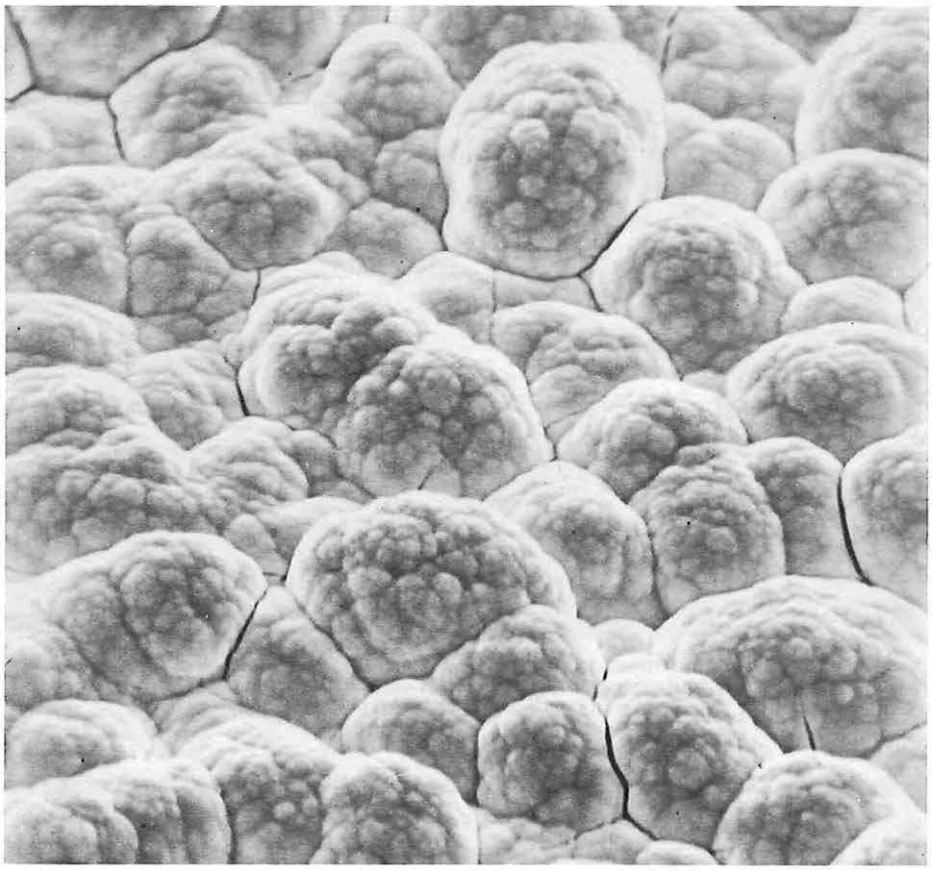
Space Division techniques but an equal number felt that while these systems had a future it had not yet been established that either could satisfy all known requirements.

The delegates also referred to the growing need for switch data transmission circuits and put forward proposals for handling this kind of traffic by both Space and Time Division techniques. The problem of expanding the Strowger type exchange with up-to-date electronic equipment was also discussed and it was generally felt that this was a very costly operation.

In his introductory address to the conference the British Postmaster General, Mr. John Stonehouse, told delegates that Britain had always played a leading role in advancing switching technology. Electronic exchange orders were now being placed with British manufacturers at a rate of some £6 million a year. The system was proving extremely reliable, with very low running costs and a good return on capital. The system provided not only all existing customer and service facilities but also opened up possibilities of a range of new services.

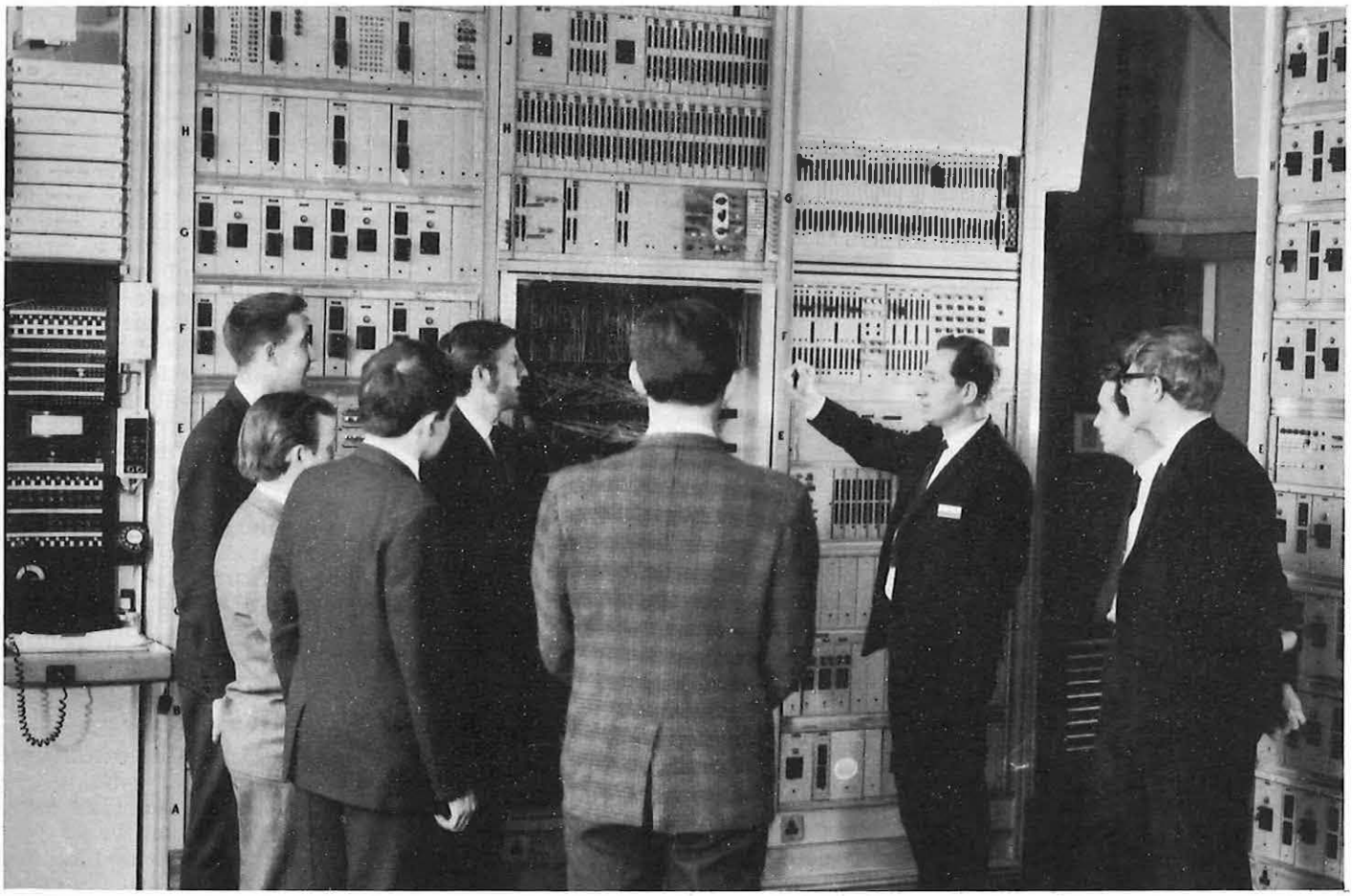
Of the 750 delegates attending the conference, 250 were from 23 overseas countries. Some 120 papers were presented in under five days.

R. HANNAH



It looks for all the world like a worm's eye-view of a cauliflower. It is in fact the apparently flat (to the naked eye) surface of a reed relay. This shot, magnified 10,000 times shows that the plated surface of the relay forms into a series of cauliflower knobbles which offer many potential contact sites. The photograph is reproduced by permission of the Plessey Company Limited.

The intricacies of the latest TXE3 equipment are explained to visitors to the experimental installation at the GPO'S Armour House in London

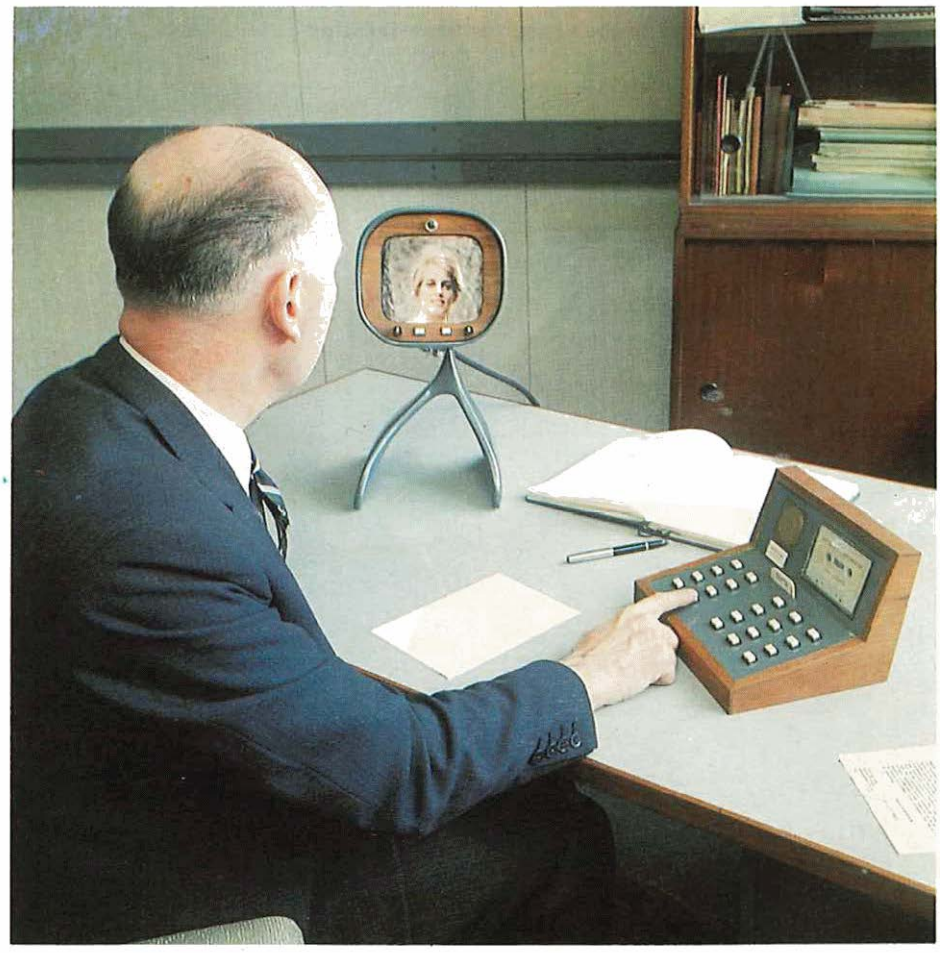


A scale model of part of the future local distribution system currently being studied. The model includes underground cable distribution and an alternative microwave radio link system with aerials positioned on the street lamps and houses.

Engineers at the Post Office Research Station at Dollis Hill have been taking a long and searching look into the future and have come up with a fascinating picture of what could happen to our telecommunications system within the next 20 years

By A. G. HARE

Telecommunications of th



With the aid of the Dollis Hill "mock-up" the author demonstrates the Viewphone facilities which could be provided in the future.

WHAT kind of telecommunications services will be available in the 1990s and what will be the environmental effects which the explosion in telecommunications will create within 20 years?

This was the theme of a symposium held recently at the Civil Defence Staff College at Sunningdale at which delegates from leading national organisations discussed with senior Post Office representatives the changes which the future is likely to bring.

The Post Office is, of course, vitally interested in the future, not least because it must study the trends in social and educational patterns and movements in industrial and economic development which will influence the nature of the demand for its services. Correct anticipation of these demands can bring many marketing advantages.

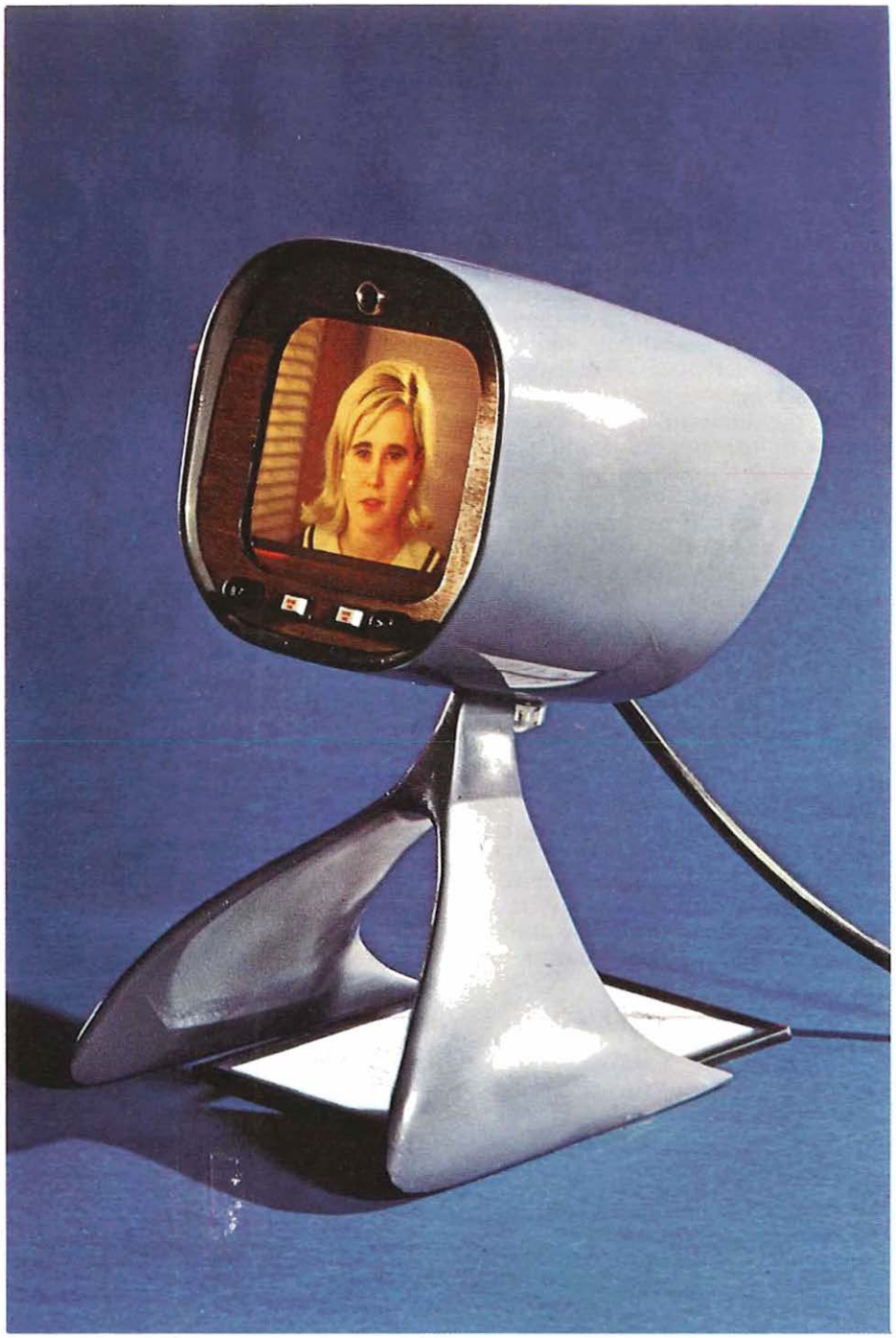
As a stimulant to constructive thought, engineers in the Local Telephony branch of the Post Office Research Department at Dollis Hill created for the occasion a realistic "mock-up" model of the type of installation which could be available to our customers within the next 20 years. It is a concept of "social engineering" which could have very wide—indeed startling—consequences on the way we live and work.

Two important assumptions were made. The first was that the services we will offer will penetrate in one form or another into virtually every

home and office or industrial unit in the country. Everyone will be linked to the local communications centre by means of wide bandwidth transmission media capable of carrying a variety of services to each user. The second assumption was that the control of all the system facilities provided by way of the local network will be vested, at the centre, in a high-speed "processor" with which the information interchange is effected by computer-like digital techniques.

The model of the terminal installation is in two units. One simulates basically a two-way *Viewphone* instrument with viewer, camera and loudspeaker system. The other, a unit which could be built into furniture, incorporates a microphone and control panel and has access to the local communication centre. The engineers predict that with the potential capability of such a centre, the operation of the keys on the customer's control panel could open the gateway to a flood of information.

ne future



A close up of the viewing unit model.

It is envisaged that everyone wishing to use the service will have a small card on which a personal code is recorded. A slot in the control panel will receive this card for interrogation and enable any desired service to be charged directly to the individual user's account at a central accounts unit no matter where the call originates. With the card in the slot, a call will be set-up by keying the required numerals, in sequence, on the touch buttons mounted on the panel (the dial, of course, having disappeared).

With the prospect of international calls requiring 15 or so digits, an *aide memoire* is a pressing need. The numbers are therefore displayed on the viewing screen for verification, allowing a quick check to be made before the "connect" button is pressed to initiate the call routing signals.

With the connection made, the call charge rate in minutes per New Penny will be displayed on the screen. Should the wanted number be engaged, a touch on the "Call Again" button will instruct the processor at the communication centre to keep trying until the line becomes free. A reminder displayed on the caller's screen would be an acceptable alternative to the frustration of the engaged tone.

When the call is established for speech, the two-way vision facility is brought in by a touch on the "Vision" button. For those conscious of their "tele-image", a "View-me" button enables them to see themselves as others see them. There is the added possibility of a switch from a close-up to a "family group" when the call becomes a communal affair.

Clearly, the *Viewphone* could have great potential application in the transmission of information in the form of documents, letters and diagrams. The "mock-up" demonstrates the use of an auxiliary lens, fitted beneath the *Viewphone*, to scan any such material placed under the instrument for display on the remote screen. Such a feature would be greatly enhanced if a black-and-white facsimile copy could be obtained by, for example, placing photosensitive paper in contact with the face of the receiving viewer. In fact, the demonstration model shows a colour picture on the screen and offers the attractive proposition of a colour print reproduction by a technique similar to that of the *Polaroid* film process.

The ability to pre-record messages would be a prerequisite of any terminal equipment in the future. For this purpose, the control panel will therefore accept a detachable magnetic tape cassette. Such messages could be "triggered" by an incoming call to provide an automatic answering option.

Information storage need not be so restricted, however. For business use, the possibilities are many and intriguing. With a transmission medium available which has a high-speed digital access to the communication

centre, the user's local store could be primed with a great variety of company data prepared "off-line" and set to run in off-peak periods at lower tariff rates. The capabilities of the system would not be constrained by the limited data interchange speeds attainable on the present telephone link. The control panel keys would provide a means of numerical data entry adequate for most users but the option of high-speed, custom-built data machinery would be available for those with specialised large-scale computer activities requiring fast interworking.

For the domestic user, a *Viewphone* link with the communication centre could mean access to a variety of educational and other community services, such as programmed learning channels and library and information retrieval facilities offered in response to access codes keyed from the control panel. The prospect of the confidential, but coldly accurate, display of one's up-to-the-minute bank statement and such possibilities as remote shopping (not forgetting the necessary accounting) could produce significant changes in the pattern of home life in the not-too-distant future.

An all-purpose link to a versatile communications centre could allow a wide variety of domestic services to be co-ordinated. Public utility meters remotely read for automatic accounting, fire and burglar alarms continuously interrogated and domestic apparatus such as central heating and cookers switched to a customer-dictated programme could lead to a revolution in the home. Such a system could mean that people would not need to leave their homes to carry out their day-to-day domestic and business activities.

Better-quality television and radio-signal reception, without unsightly aerials, would be achieved by piping these services along the common wideband link directly to the standard domestic receivers. The choice of such programmes need not be limited to the four national channels. A number could be readily allocated for special features of local or topical content.

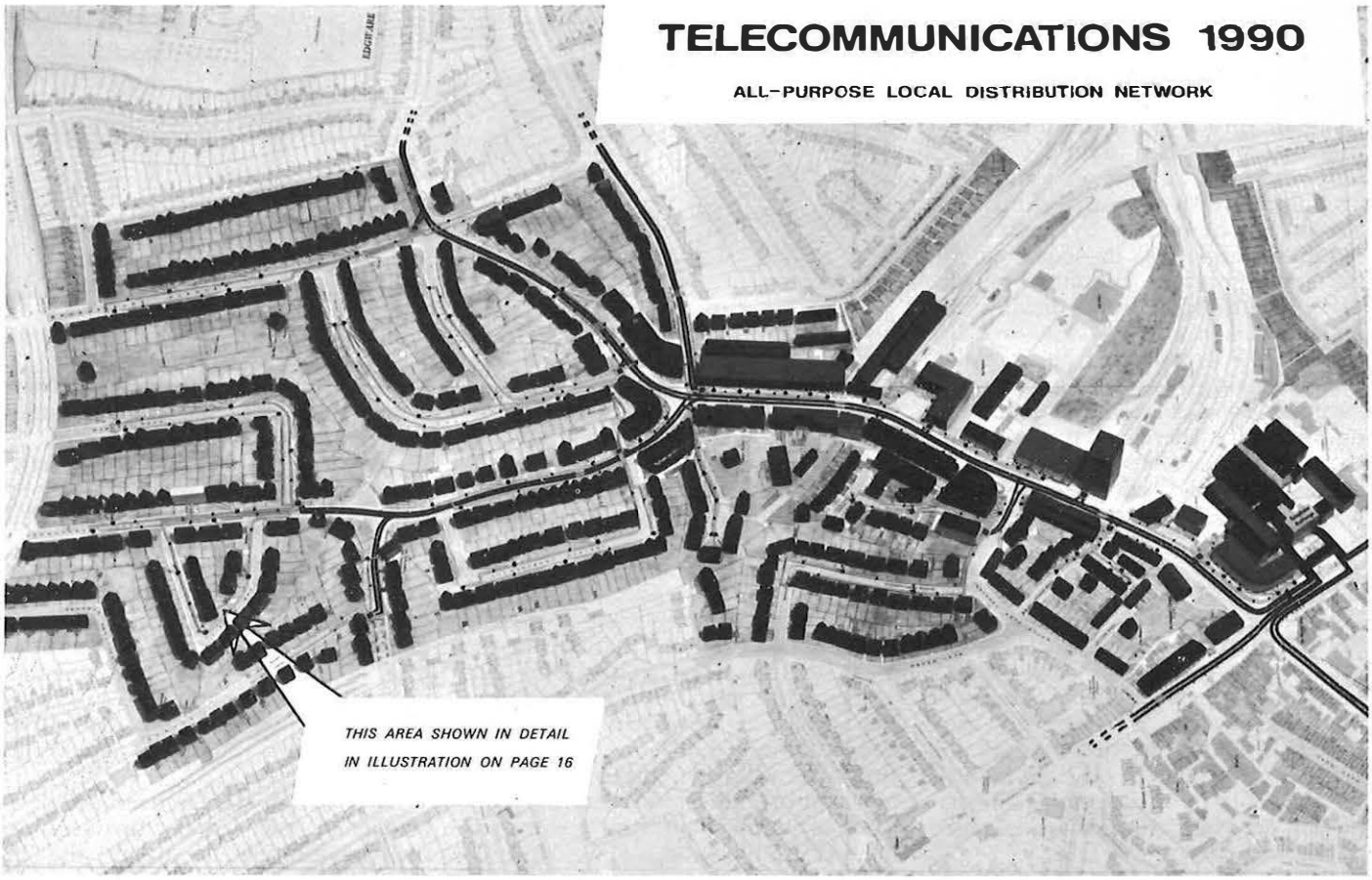
With the aid of the *Viewphone* model, a concept of the equipment necessary at the future user's installation has already been gained. We can also expect to see some pretty comprehensive data-processing electronics at the communication centre. But the vital link between the two will have to be very carefully tailored to carry the vast increase in "information transfer" implicit in these proposals.

Engineers have been thinking about this aspect, too. One scheme being studied at Dollis Hill requires some of the switching functions of the local centre to be moved out into small street cabinets which have co-axial "highways" linking them to the centre. From these cabinets, further co-axial ring highways are laid to form service loops supplying small areas of the community. Positioned around these rings would be a number of traffic concentrators, each directly serving a small number of users.

The switching of vacant paths at the concentrators and through the cabinets would be under the direct control of the centre and enable efficient utilisation to be made of the co-axial cable capacity and the plant associated with it. The only part of the network not shared between users would then be that between concentrator and user—a relatively short distance, but admittedly costly in some instances.

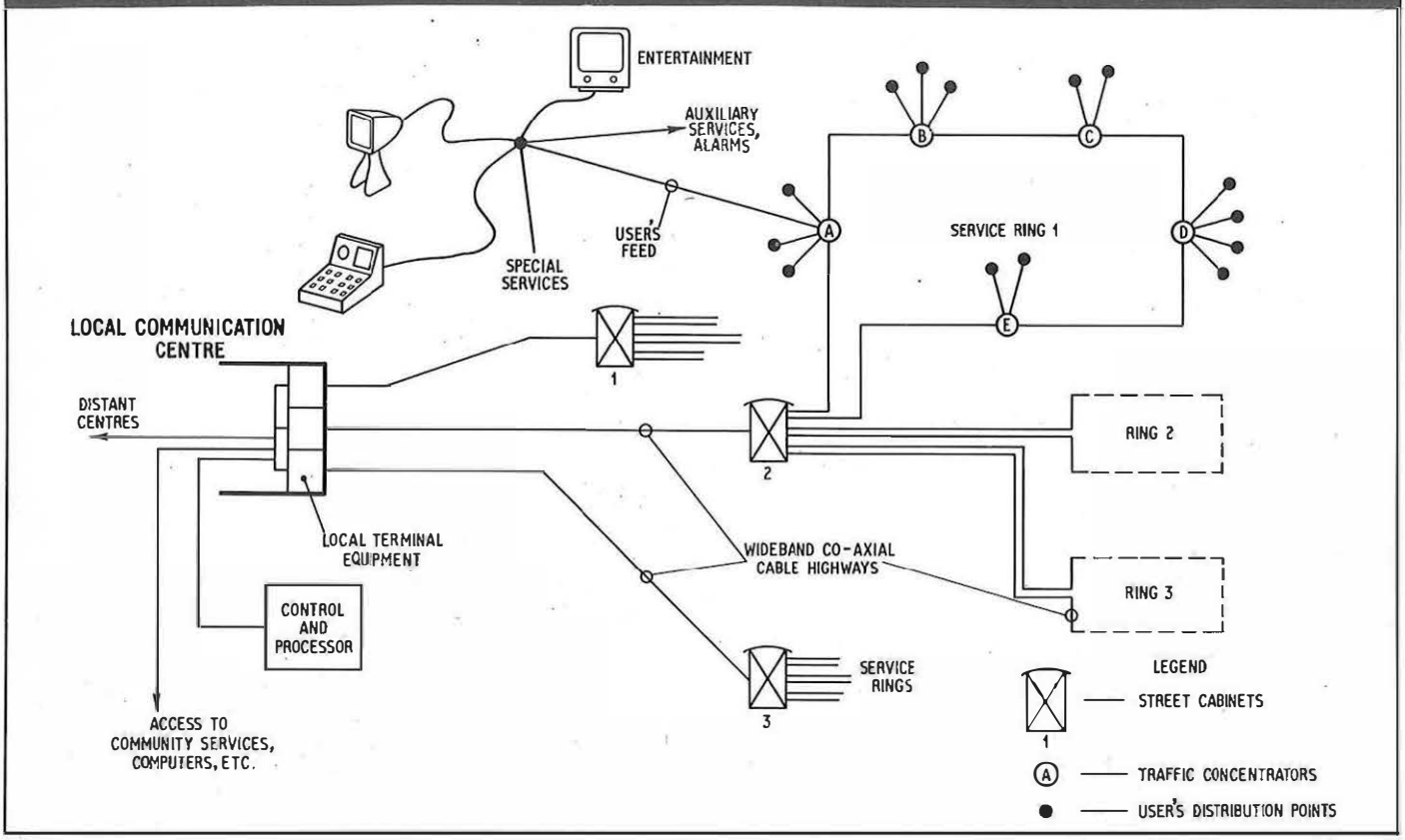
It may be possible for some of these links to be replaced by highly-directional millimetric radio links using "flea-power" transmitters, one mounted, perhaps on a street lamp adjacent to the concentrator and the other on the eaves of the user's home. This idea is now being seriously studied and models of parts of the local distribution layout have been constructed to help establish principles.

The Local Telephony group at Dollis Hill does not claim to know the answers to all the technical problems involved in producing equipment to give the facilities suggested by its models. Some services could be made available now, others involve appara-



A small scale relief plan of a typical future local distribution network. Wideband cables radiate from the communication centre to the street cabinets. From these a ring system of distribution carries a variety of services to every user.

A LOCAL NETWORK



This simplified diagram of a future local network shows service rings which collect traffic for routing on common highways to the local communications centre.

tus either presently undergoing engineering trials by Telecommunications Headquarters or at prototype stage.

In one new experiment at Washington New Town in County Durham, a Telecommunications Development Department project will, this summer, provide a "piped" radio and television service on a co-axial cable system laid with the telephone distribution network. Remote reading of service meters has already been demonstrated and an experiment with a small switched *Viewphone* network is due to begin later this year in Telecommunications Headquarters. Transmission and switching of digital information has been proved a working proposition in the 24-channel Pulse Code Modulation junction telephone links now in use and in the *Empress* tandem exchange in London which is currently switching digital telephone traffic of the type we may generate soon in the local network.

Many problems—some quite fundamental—still need to be tackled. The *Viewphone* display is a case in point. The ubiquitous cathode-ray tube is—after more than 40 years—still unchallenged as a display device. How attractive it would be to have a "solid-state" semi-conductor device on a flat screen which, when appropriately energised, would luminesce in the three primary colours and also emit ultra violet radiation for facsimile purposes!

So much research effort is being put into electroluminescence in Britain and in other countries that some answer in the form of a marketable device is bound to come soon. Already it is possible to obtain red displays.

With the whole telecommunications system in Britain needing to expand rapidly and with user requirements continuously widening, a radical change in the network cannot long be delayed. Installing more equipment to existing designs—perpetuating the present system—will not solve the problem. But the type of user terminal highlighted by the Dollis Hill model needs to be backed by fast data processing equipment at the central installation, much more versatile than existing electro-mechanical and present prototype electronic systems, and with an inherently high degree of reliability.

As a result of the latest advances in microelectronics reliable packages of the complexity required for the new equipment are becoming available at costs which are at least sensible. Incorporating these techniques in the central processor design could be a vital key to the success of the future system.

The processing centre will need safeguarding against failure, error and abuse but, provided such security can be built-in within overall economic constraints, the facilities which the 1990 user will enjoy may well be of the scope and range that the Dollis Hill models predict.

The telephone, as we now know it, could then be seen as the device of an era fading into the past and taking with it in its passing some, at least, of our present social habits.

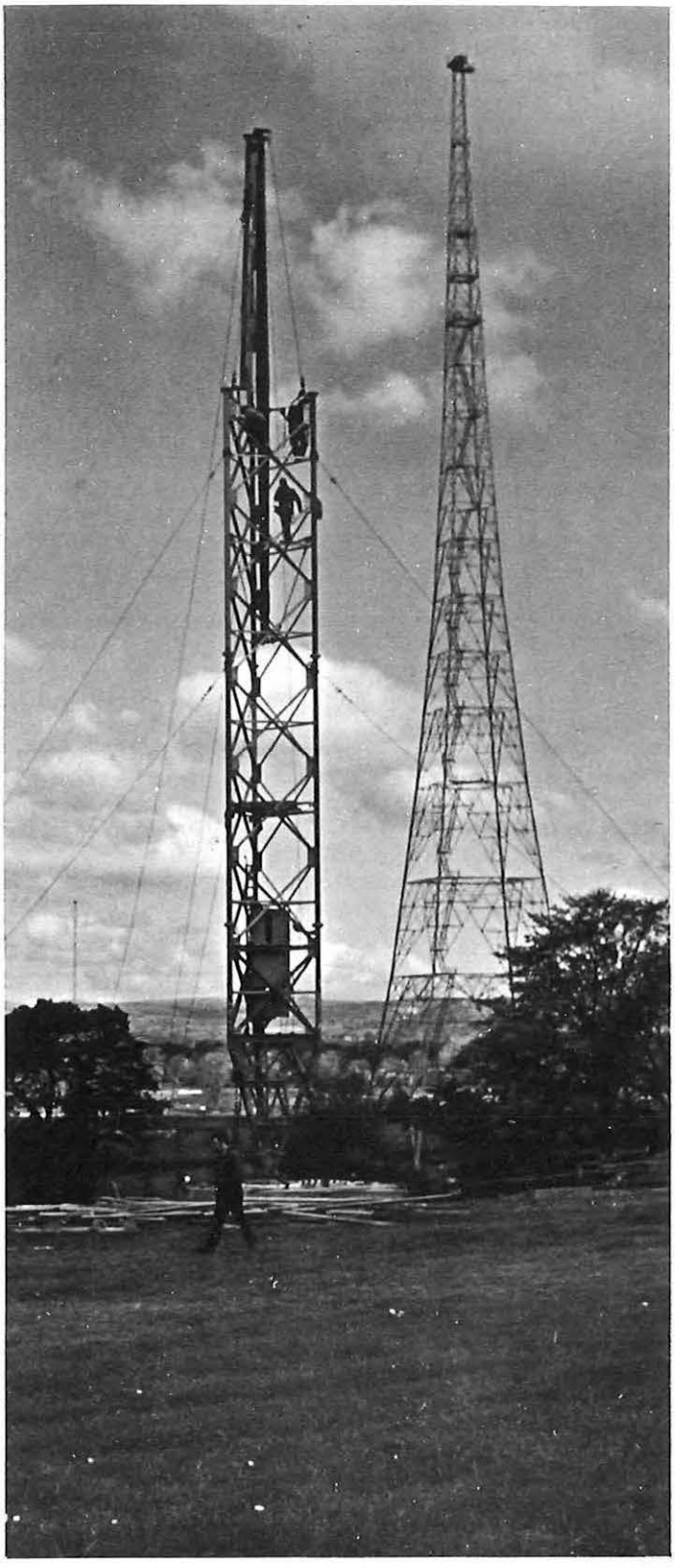
THE AUTHOR

Mr. A. G. Hare, BSc.(Eng.), C.Eng., M.I.E.E., *is an Assistant Staff Engineer in Research Department. He joined the LTR, West Area in 1938 as a Youth-in-Training and later transferred to the Engineering Department. Moving to Dollis Hill in 1950, he spent some years in RS Division developing electronic data handling equipment. In 1963 he joined the transistor production unit to organise its electrical measurement facility. Since last year he has been with the Local Telephony Branch of the Systems Division studying the future requirements of the local distribution system.*

THE NEW

Modernisation of the 26-year-old Criggion Radio Station in Wales has now been completed. This article tells of the work involved and the problems which had to be overcome

The Post Office VLF transmitting station at Criggion—call sign GBZ—was built during World War Two when tall steel structures for supporting the necessarily large and high aerial system were practically unobtainable. Fortunately, three 600-ft. self-supporting towers that had been destined for a radio station abroad, were made available to the Post Office but, by themselves, these were inadequate to support an aerial large enough to radiate sufficient power. It was therefore necessary to find a steep-sided hill about 1,000-ft. high to provide additional support points for the aerial, and it was this requirement that mainly determined the location of the station at Criggion, where Breidden Hill rises steeply to the necessary height above the broad plain of the Severn Valley. The three towers were erected on a line parallel to the hillside and an aerial of the shape and size shown opposite erected. There was no time to develop new forms of aerial and transmitter construction so the well tried designs which had been in service since 1926 at Rugby Radio Station (GBR) were adopted. The twin-triangular aerial top consisted of eight-ft. diameter multi-wire wire cages which, though light and capable of withstanding the operating voltage of about 130 kW, were known to be rather vulnerable to icing and wind. The final amplifier utilised paralleled banks of, by modern standards, low-power valves. The station was scarcely completed when fire destroyed the Rugby Station in 1943, whereupon Criggion was rushed into service and carried traffic until the Rugby transmitter was rebuilt some nine months later. Although the aerial was as large as was practicable with the limited number of support points available, it had less height and about half the capacitance of GBR. Consequently, the power radiated by Criggion was less than a quarter of that obtained from Rugby.



A new mast rises into the sky against a background of the existing towers.

CRIGGION

By L. L. HALL

IT was in 1967 that the decision was made to bring the performance of Criggion more into line with that of Rugby, itself considerably improved in 1966. Accordingly, the VLF plant at Criggion has been enlarged and rebuilt using modern forms of construction. The specification aimed at quadrupling the radiated power, making provision for higher keying speeds to handle modern machine printing telegraph systems and providing for frequency shift (F1) as well as CW (A1) modulation.

As most of the cost of a high-power VLF station is expended in the provision of the external plant, the prime consideration was how best to enlarge the aerial. To simplify construction and improve reliability it was decided to employ steel-cored aluminium conductors such as are used for high-voltage power lines. These cables are relatively invulnerable to damage by icing, wind or by such manoeuvring of the aerial as may be necessary for maintenance purposes. They are also large enough in diameter to obviate corona discharge with most practical layouts of conductors.

The problem was to design a layout of cables for the aerial top which would:

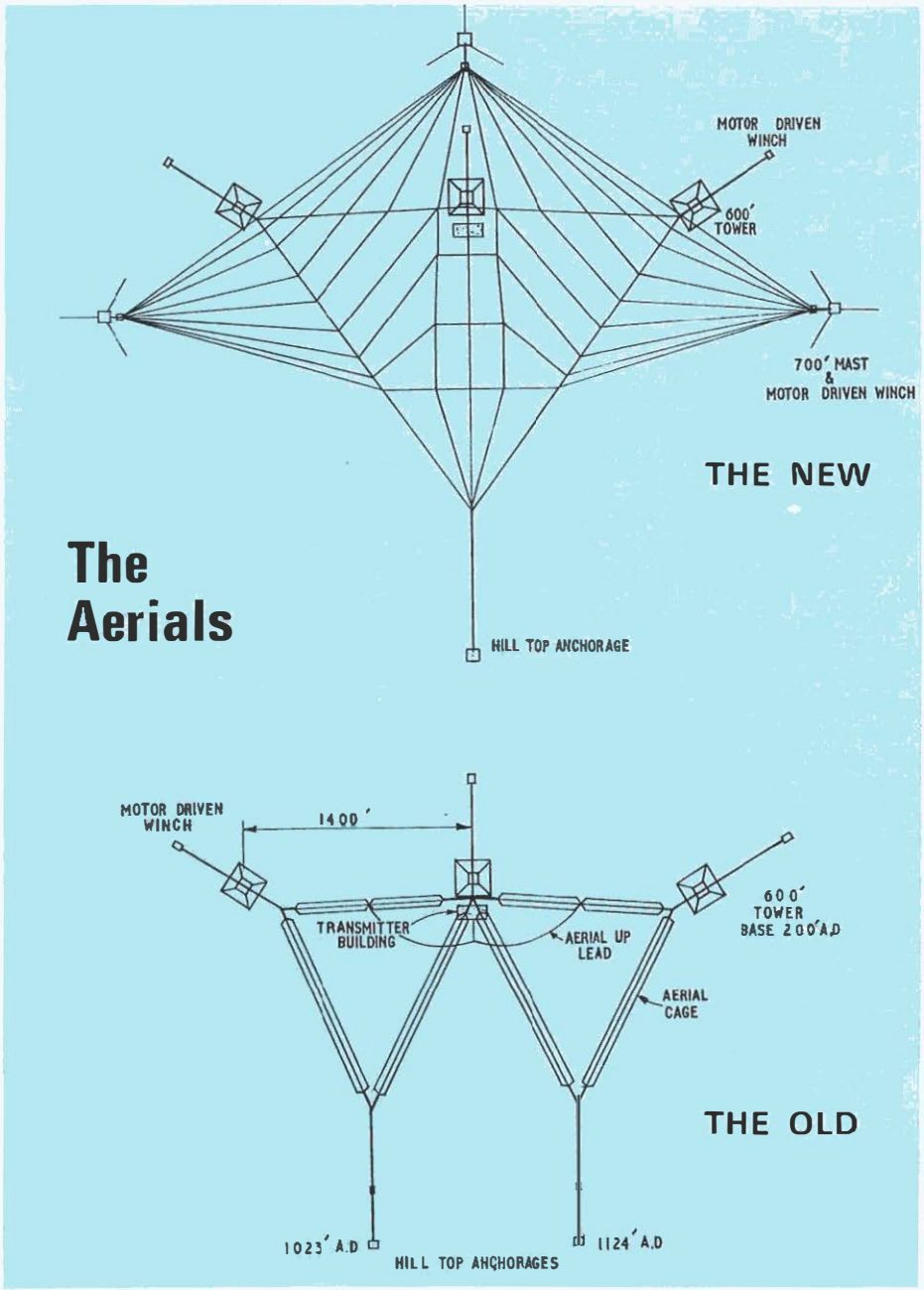
(a) provide adequate height and capacitance to enable the required power to be radiated without entailing excessive voltage on the aerial;

(b) be of such shape that, while the existing towers—which had been designed to withstand very high winds but modest top loads—would contribute to the support of the new aerial, as far as their design would permit, most of the weight would be supported by the most economical arrangement of new structures; and

(c) enable the new structures to be so located that the minimum of extra land would be required.

Several layouts of cables were considered, the capacitance of each layout being checked by electrical measurements on a model, from which it was concluded that the new form shown would produce the desired results with reasonable certainty and be the most practicable and economical.

The mechanical loads in the conductors and the resultant pulls at the mast heads were evaluated by computer analysis of the aerial design. It was found that, to achieve the best practicable mean height for the aerial top, three new masts 700-ft in height would be necessary to support the outer corners of the roughly triangular aerial, which has a side length of about $\frac{2}{3}$ mile and comprises 14 miles of conductor weighing 40 tons, and that the mast head pulls would have maximum values under icing or wind conditions of 40 to 50 tons with a corresponding pull at the single hilltop anchorage of 76 tons.



The new masts are of constant section, having 5½-inch diameter solid steel legs at the corners of a 7-ft. 6-ins. equilateral triangle, and are stayed at four levels by spiral-strand steel ropes of up to 2¾-inch diameter. The overall weight of each mast with its stays is 146 tons but under peak loading conditions the downward thrust on the mast foundation could rise to 430 tons and the top backstay pull to 110 tons.

These foundation loads presented a particular problem at Criggion, where the subsoil consists of soft glacial clay which is incapable of sustaining pressures of more than a fraction of those normally adopted for firm earth, without danger of incurring considerable settlement. Consequently foundations of abnormal size were necessary.

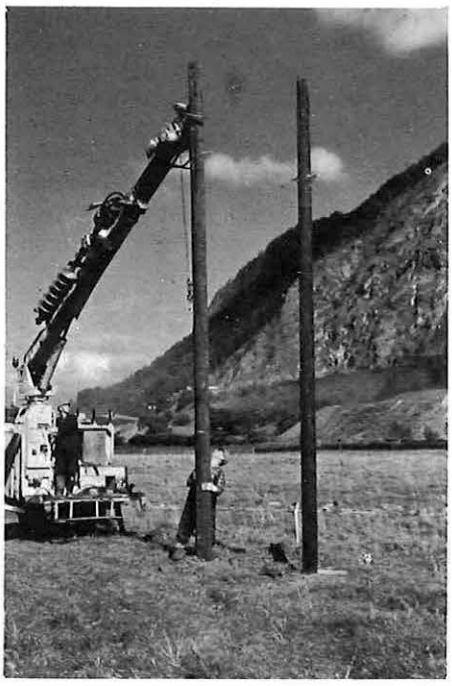
Reinforced concrete rafts some 45-ft. square were provided for the mast bases, and the stayblocks—which are of ample weight to counteract the vertical components of the staypull—were 21-ft. wide by up to 38-ft. long. The latter were T-shaped in section, the top slabs being necessary to restrict vertical pressure on the soil prior to erection of the stays and the vertical stems for resisting the horizontal components of the staypulls.

To raise and manoeuvre the aerial a powerful electrically-driven halyard

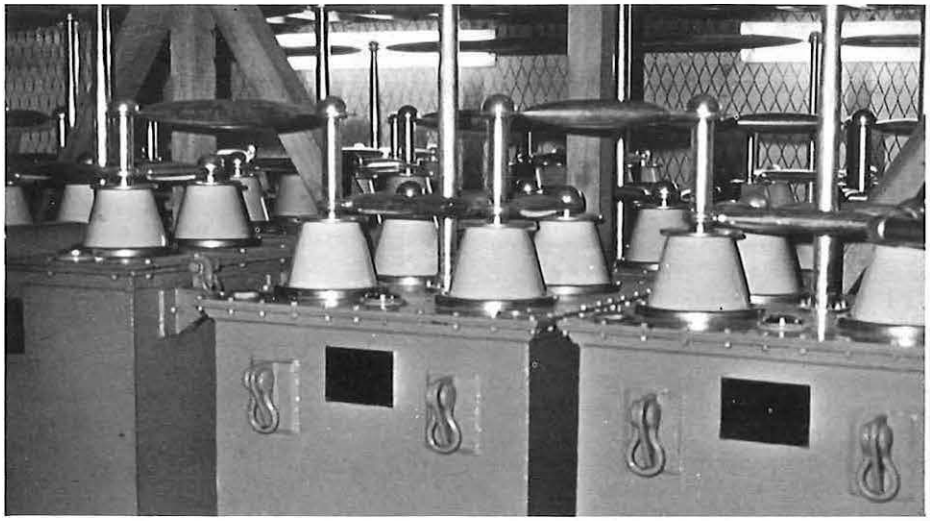
winch has been provided at each mast and tower and at the hilltop. Each winch may be operated either locally, or remotely from a central control position (CCP) in the transmitter building, the halyard tension being displayed at both points. Should severe weather conditions be experienced while the aerial is in its normal operating position, the CCP operator could, by remote control of the winches, reduce the halyard tension at any mast or tower to any desired value. And should the aerial need to be partially lowered for maintenance purposes, close supervision of the necessary manoeuvre by an engineer in the field is facilitated by VHF communication between him and the CCP operator.

The actual construction work was initially bedevilled by foot and mouth disease restrictions and by abnormally wet weather which considerably increased the difficulties of general access and foundation construction. Despite these hazards the construction work was completed within 18 months.

The old VLF amplifier has also been replaced concurrently with the provision of the new aerial. The new amplifier and its associated valve anode cooling system is, to all intents and purposes, a copy of a similar equipment designed and built by the Post Office at the Rugby Radio Station and brought into use in late 1966. It consists of three similar unit amplifiers each delivering up to 150 kW at 19.6 kHz and 100 kW at 16 kHz into a common anode and aerial tuning circuit. Any amplifier may be disconnected from the load, leaving the other amplifiers to maintain service on reduced power.



Setting circumferential poles using a Post Office "polecat" mechanical aid.



The main tuning capacitors in the Coil Room.

Right: **It's all hands busy as engineers secure the first mast section on the base.**

Below: **The interior of the new coil room showing the main aerial tuning inductor.**

The 14 kV supply required by the final valves is derived from a solid-state rectifier unit for each amplifier. A mimic diagram at the end of the transmitter shows the operational condition at any time and, from a sub-joined panel below, full manual "remote" control of the amplifiers and other equipment can be exercised. The aerial remote control equipment mentioned previously is adjacent. Apart from the basic manual controls, automatic tuning of the aerial circuit is provided to compensate for aerial changes due to weather conditions and to ensure that the aerial current is maintained at its full value.

The original emergency power supply has also been replaced by three 350 kVA diesel-generator sets to serve the three amplifiers and all their common equipment. A fourth, similar generator is provided for emergency use in supplying the mast halyard winches, the aircraft warning lights on the masts and the miscellaneous station load.

The combination of the new aerial and amplifier has raised the radiated power from approximately 7.5 kW to 30 kW at 19.6 kHz, compared with the 60 kW radiated from the Rugby transmitter at 16 kHz.

THE AUTHOR

Mr. L. L. Hall *who retired at the end of March this year was an Assistant Staff Engineer attached to the Radio Planning and Provision Branch of the Network Planning Department. He was involved with the mechanical design of aerial structures.*

The Queueing System for the new Cordless Switchboard

Great advances have been made in developing cordless switchboards. This article deals with the engineering aspects of the latest development in this field—the Cordless Switchboard System No. 1

By D. L. HEPTINSTALL and E. H. KEITCH

THE Cordless Switchboard System No. 1 which will shortly be brought into use at Croydon, has been adopted by the Post Office for automanual centres and orders have been placed for more than 1,100 other positions. It supersedes the sleeve-control system which has been in use for many years.

Under the new CSS1 system, calls enter the automanual centres by way of various types of incoming relay set according to the type of traffic (the 100 Operator-Assistance service, Directory Inquiry and so on); the source (subscriber or operator) and the line signalling (local or long distance).

Each incoming relay set is connected to its individual distributor-hunter—a 50-outlet uniselector. When a call arrives the distributor-hunter searches for a free distributor —a 200-outlet motor uniselector.

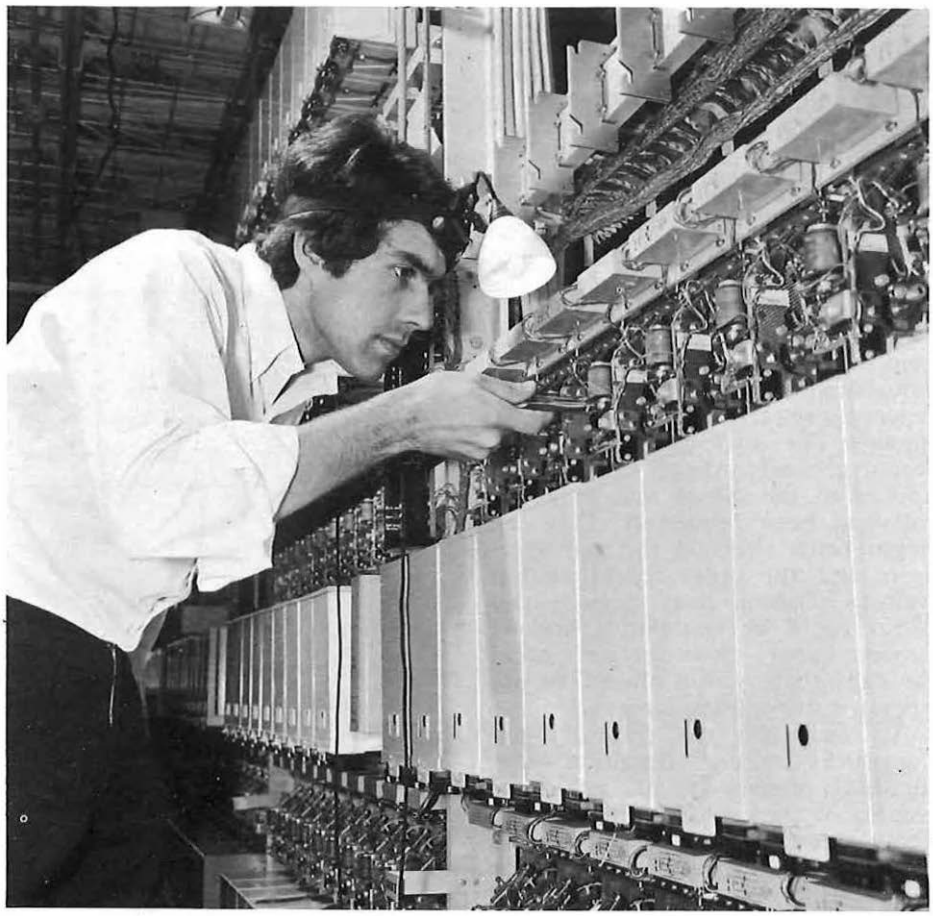
Distributors are arranged in groups, each group served by one of the main queues. For security reasons, any exchange unit has a minimum of two main queues which serve units of up to 35 positions. Three main queues are needed for units of from 36 to 60 positions and for units of 61 to 96 positions four main queues are required. Ninety-six positions is the maximum size of a unit. The number of distributors in each group depends on the traffic flow.

On seizure, the distributor searches for a free queue place. Twenty outlets in the early part of the distributor arc are multiplied to a common queue circuit. Ringing tone is returned to the caller from the distributor.

The queue is, in effect, a device for "parking" distributors until operators are ready for the calls they are carrying. Parked calls are released to operators when requested. There are, in fact, two separate functions in the queue circuit. The first arranges for only one queue place at a time to be marked free on the distributor arcs and for the marked outlet to be busied as soon as a distributor switches to it, the next then being marked free. When the queue is empty, the single marked outlet may be any one of the 20. When outlet 20 is taken up, outlet 1 becomes the marked outlet, except when outlet 20 is the last vacant place. The queue's second function is to release distributors parked on the queue outlets when operators ask for the calls and to release them in the order in which they arrived. For example, if the queue is empty and a call arrives, the distributor carrying that call searches for and switches to the single marked outlet which may be outlet 5. This outlet is now busied and outlet 6 becomes marked free. If three other calls now arrive one after the other they will take up in turn outlets 6, 7 and 8 and outlet 9 will be marked for the next call. Should an operator now request a call from the queue the distributor released will be that parked on outlet 5 which is the longest waiting call. The next distributor released on request by an operator would be that parked on outlet 6 and so on. Meantime, of course, further calls may arrive, taking up in turn outlets 9, 10, 11 and so on.

Operators request calls from a queue by operating a speak key on the position and depressing the connect answer bar. This results in a pulse being sent over a common lead to the queue circuit and the connecting circuit being marked free on the distributor multiple. Outlets to connecting circuits (168 maximum for a 96 position unit) are arranged in the remainder of the distributor arc the grading being arranged so that traffic is dispersed as evenly as possible over the positions.

The pulse condition releases the distributor carrying the "head of queue" call. In addition to the "pulse" common wire for releasing calls from a queue there is also a separate common wire on which a steady-state condition persists from the time the connect answer bar is depressed to the actual arrival of a call at the connecting circuit. This second common wire will be referred



An engineer adjusts a motor uniselector on a main queue distributor rack.

The operational aspects of the system were explained in the article "The New Cordless Switchboard" by F. E. Wyeth and C. G. Dickinson in the Spring, 1969, issue.

to as the "operators waiting" common and its use is described later.

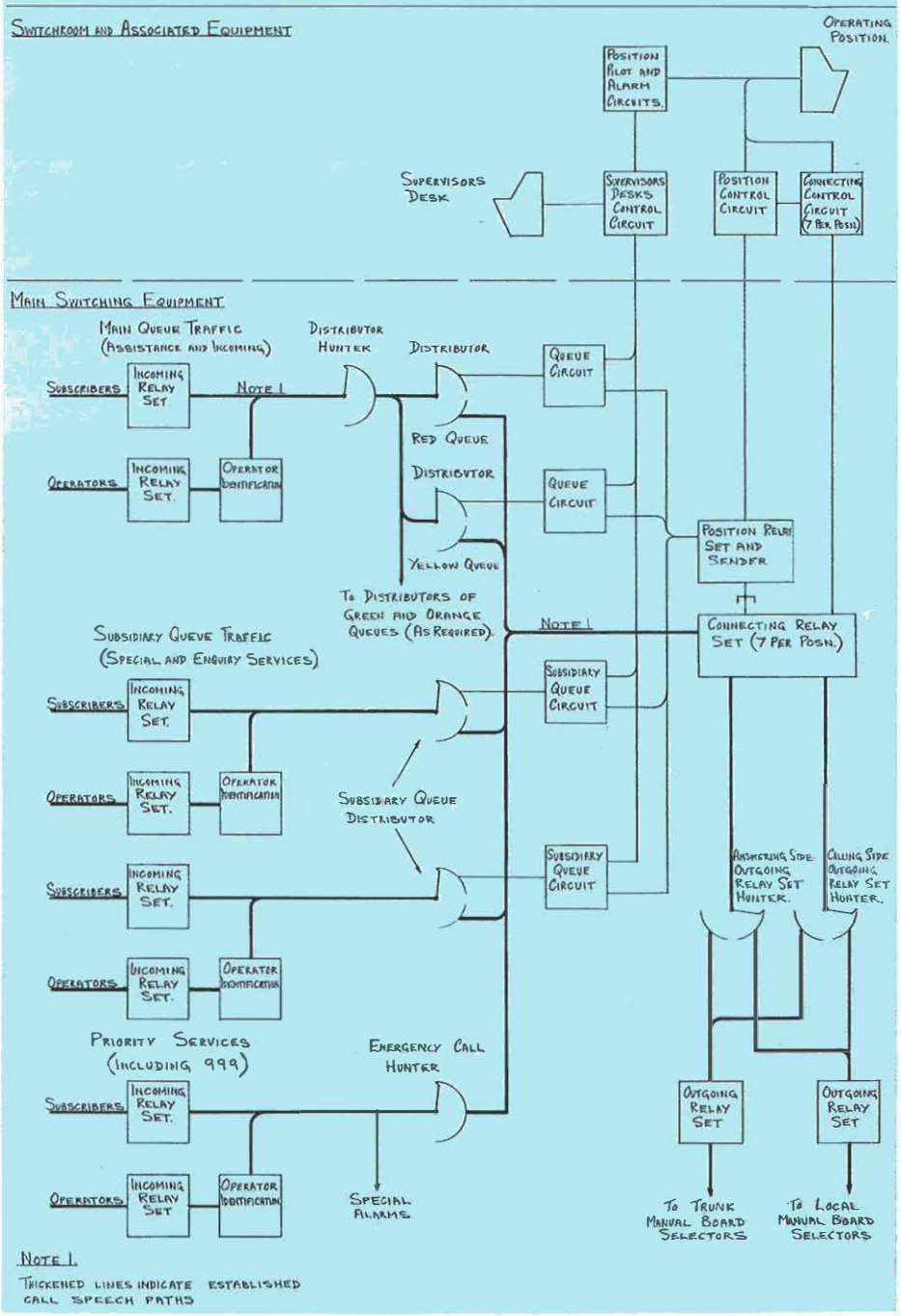
The distributor arc outlets are split into two groups a maximum of 20 for queue places and of 168 for connection to positions. The circuitry is arranged so that until a call has entered and been released from the queue the distributor cannot cut into connecting circuit outlets and, having been released from the queue, cannot again cut into a queue outlet. The purpose of this arrangement is shown by the following example. Assume that a call enters the distributor when queue place 20 is marked free but that before the distributor reaches that outlet another distributor which started earlier cuts into and busies it, causing outlet No. 1 to be marked free. If the distributor has passed outlet No. 1 it must pass all the 168 connecting circuit outlets before it again reaches queue outlet No. 1. Hence the need to avoid cutting into connecting circuits at this stage. Again, when a call is released from, say, queue outlet No. 3 when queue outlet, say, No. 12 is marked free, it is necessary to prevent the distributor cutting into that marked outlet otherwise the call re-enters the queue.

The use of the "operators waiting" common wire is best illustrated by assuming that two operators simultaneously request calls from the same queue. The two pulse conditions would normally overlap and it would appear to the queue that only one call had been requested. This call might reach either of the two operators and the other would be left waiting. During busy periods this effect could be cumulative because however many more operators asked for calls there would always be one operator still waiting for a call.

To overcome the difficulty the "operators waiting" condition automatically releases another call if the condition persists for more than about one-and-a-half seconds when there are one or more calls in the queue. The one-and-a-half second period is sufficient to cover a distributors maximum search time for a connecting circuit on release from the queue. When all waiting operators have received calls the "operators waiting" condition is removed and no more calls are automatically released from the queue.

When every queue place is taken ("full queue" condition) every distributor served by that queue is busied in the distributor hunter multiple and calls now entering can find only distributors served by other main queues. The distributors are unbusied again only when one or more queue places become free in the queue to which they are multipled. If all main queues are full the distributor hunter rotates to the end of its arc where busy tone is returned to the caller.

SIMPLIFIED BLOCK SCHEMATIC C.S.S. No. 1



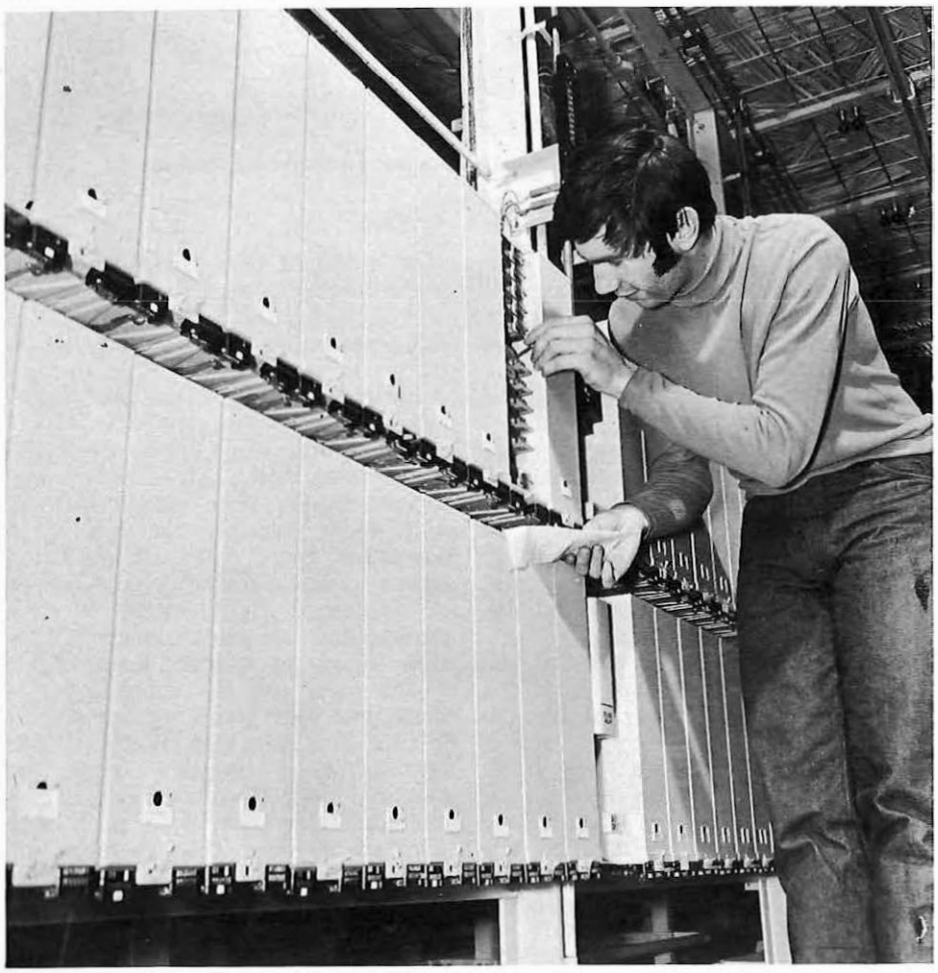
Incoming relay sets carrying subsidiary queue traffic are not connected to distributor hunters. Instead they are linked directly to smaller distributors—actually 50-outlet uniselectors. The first five outlets of the smaller distributor are multipled to a queue circuit and the rest of the arc has access to a maximum of 42 connecting circuits, that is, six positions. In contrast to the main queues where alternate speak keys are used to take traffic from one of two main queues, any connecting circuit on a position allocated to deal with a particular subsidiary queue may be used to take traffic from it.

The queue circuit contains devices to detect calls which either fail to enter a queue or are not released when operators request them. When either of these faults is detected the distributors served by the queue are busied as if the queue were full. A flashing alarm lamp signal is given on the supervisor's control console. All calls waiting in the queue are released and, together with any which have not yet entered the queue, search for connecting circuits at random.

To avoid undue mechanical wear and tear, use is again made of the "operators waiting" common wire. The distributors carrying calls released under fault condition search only when one or more operators are waiting and otherwise "park" themselves on a special outlet. This is known as the "no queueing" condition.

A check is made on a position sender during installation of the Croydon Cordless Switchboard.

An engineer tests a queue relay set.



The chief supervisor confirms the queue closure by operating a key. The queue can be reopened only by the supervisor after she is satisfied that the fault condition has been cleared. Closure of subsidiary queues is not possible since only one queue is provided for each type of subsidiary queue traffic. Fault conditions will apply only a "no queueing" condition.

As soon as a distributor switches into a connecting circuit after release from the queue the circuit is busied against all other distributors and the operator is able to speak to the caller.

When the caller's requirements are known the operator can send the call over any one of the four outgoing routes provided from the switchboard simply by depressing the non-locking key associated with the required route. This sends coded signals to the position relay set, which results in the seizure of the position sender and an outgoing relay set in the appropriate trunk or local grading. Depression of "director" or "register" keys also sends signals to the position sender indicating the value of a "prefix" digit to be inserted before those keyed into the sender by the operator.

By this means four discreet groups of outgoing trunks are made possible while retaining a basic two-position outgoing hunter. In addition connections may be made in the position relay set to allow the two derived routes to be provided on either the trunk or local selector gradings, thus giving maximum flexibility in the exchange trunking design.

To complete a call, the operator keys into the sender the required digits and depresses the send-finish key. This information is stored in the sender until an outgoing relay set has been seized. Then the information, preceded where necessary by a prefix digit, is retransmitted to set up the call.

When the calling and called parties are connected, the transmission path between the incoming and outgoing relay sets is by way of the connecting relay set. It does not pass through the operator switchroom equipment and for this reason the switchboard can be detached from the main switching equipment without incurring additional transmission loss. When the operator is speaking or monitoring on the connection she is in effect "tapped on" to the main transmission path.

THE AUTHORS

Mr. D. L. Heptinstall *is a Senior Executive Engineer engaged on development in the Exchange Switching Division of THQ and is in charge of equipment design for automanual and automatic exchanges.*

Mr. E. H. Keitch *is an Executive Engineer in the same development group and has been engaged for a number of years on switchboard development.*

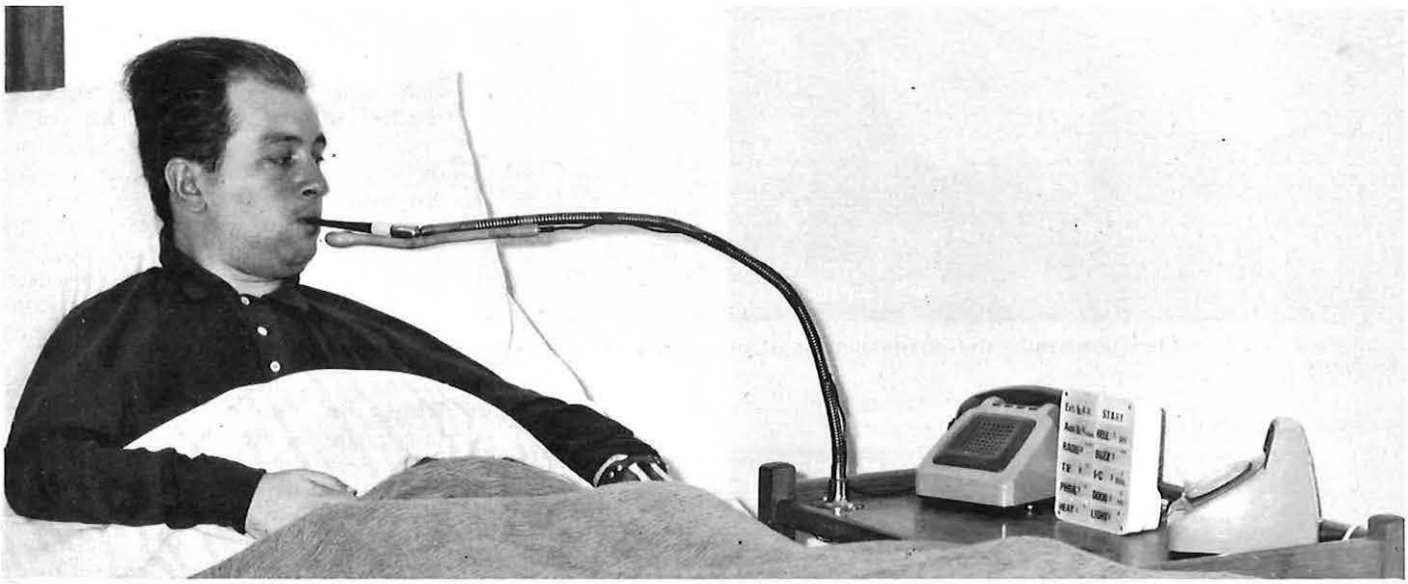
For many people throughout the country the telephone is often their only link with the outside world. For these men and women, crippled or bedridden, the Post Office's Loudspeaking Telephone 5B has been a boon. Now further developments of this instrument enable them to dial anywhere in the country and even to the Continent. To those people for whom the telephone has brought the world to their bedside it is affectionately known as the . . .

PUFF SUCK TELEPHONE

Our Cover Picture

A patient at Stoke Mandeville Hospital operating the puff suck telephone.

by J. d'A COLLINGS and L. E. SAUNDERS



A bedridden patient puffs and sucks at the tube attachment to obtain the telephone number he requires.

THERE are a number of people who, as a result of spinal cord injuries or the after effects of polio, have little or no controllable movement in their bodies below the neck. The value of the telephone service to such people is particularly great and a new Post Office development—the Loudspeaking Telephone 5B—will enable them to dial their own calls on the STD network to anywhere in the country and by ISD to the Continent by puffing and sucking at a tube.

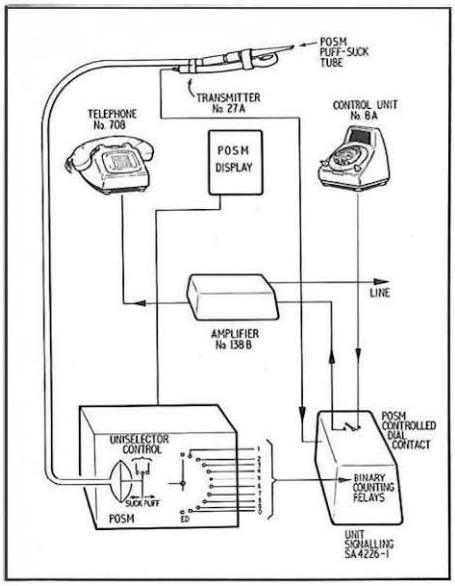
Recent years have seen the development of Patient Operated Selector Mechanisms (POSM) which enable electrical equipment of various types affecting the patient's environment to be controlled by mouth. The mouth has been found to work well as a simple pneumatic control giving pressure/suction signals to a suitable mouthpiece. The POSM converts the pneumatic signals from the mouth into electrical outputs by diaphragm-operated micro-switches controlling uniselectors. Up to 12 switching choices a second have been achieved in practice—an important feature when considering such applications as typewriting. It is purchased by the patient or can be supplied under the National Health Service.

The electrical outputs are used to control a range of domestic equipment such as bell, light, heat, radio, television, bed tilt, page turner and so on and additional equipment is available which enables an electric typewriter, tape recorder or calculating machine to be operated.

Where control of the telephone was required early installations consisted of a Sender No. 1—a mechanical device for dialling 0 or 100—and a modified Loudspeaking Telephone No. 1 with an extension microphone attached to the flexible mouthpiece tube of the POSM. It enabled incoming calls to be answered but calls could only be originated with the help of the exchange operator.

The new LST 5B consists as before of a modified LST 1 with extension microphone but with a relay signalling unit replacing the Sender No. 1. The relay units are now being manufactured at the Post Office Factory at Enfield, and trials in patients' homes will begin later this year.

Visual indication of the operation of the POSM unit is given by a translucent display with panels marked with each available function. Each panel has three coloured indicating lamps—white, red and green—behind it. Sustained light suction at the mouthpiece causes a uniselector to step round, at a speed comfortable to the user, and the white lights to illuminate each panel on the display in turn in a clockwise direction. The uniselector is stopped when the required selection is reached by changing the suck to a puff. The selected device is thus switched on, the red indicator light comes on behind that panel to indicate that the device is in use and the uniselector and white light reverts to the Start



A block diagram of the LST 5B.

position ready for the next selection.

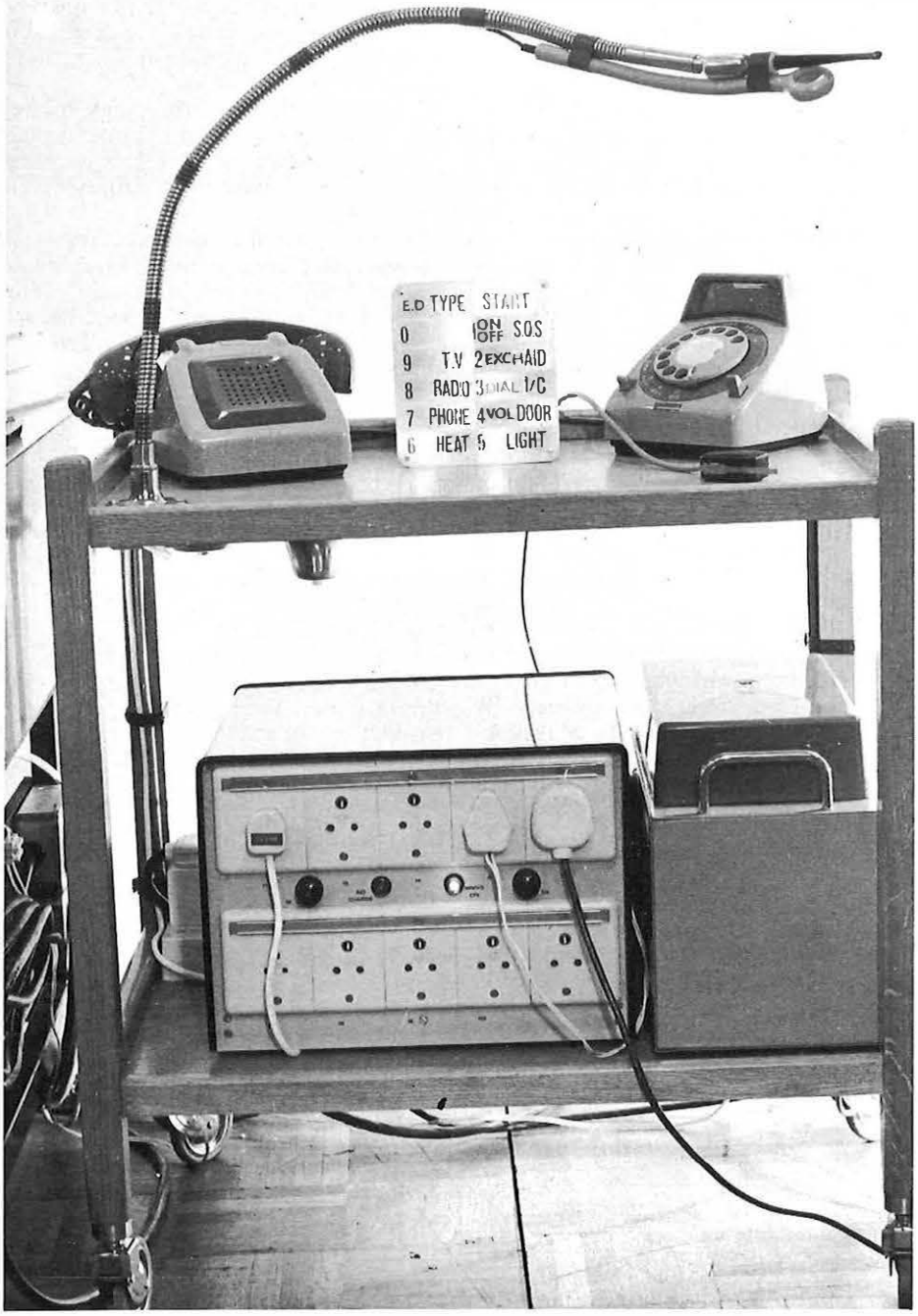
To answer an incoming telephone call it is necessary only to select PHONE. The POSM unit supplies power to the relay signalling unit in the LST 5B and this in turn seizes the telephone line, trips the ring and switches on the loudspeaking telephone.

When an outgoing call is to be made the user selects PHONE, then DIAL (preceded by EXCH if it is necessary to mark Shared Service) and then uses the POSM unit to mark the required dialling digits, one at a time on ten marking wires. A binary counter counts out the number of pulses corresponding to the digit marked.

The white lamps alone indicate the digits selected during dialling on the display panel, the large figures on the left hand side being used for this purpose. The white light is extinguished and returns to START again after each digit has been marked. After dialling ED (End Dialling) is selected. When the call is established and the called subscriber has answered, VOL can be selected and the required volume marked on three volume wires in one out of eight possible combinations giving a control in eight steps of 2.5 db each. The green lamps illuminate the small figures in the bottom centre of each panel to indicate the volume settings.

If during a call one of the other environmental functions is required the panel with the digit 0 can be selected to transfer control back to the POSM unit. The selection of other functions allow these devices to be switched at will without affecting the progress of the telephone conversation. At the end of a call it is necessary to ring off by selecting OFF to release the line.

Use of the telephone by the severely handicapped provides them with much-needed social contacts and in some cases the ability to carry on their livelihood. By enabling them to dial their own calls without the aid of the exchange operator the LST 5B gives them a real sense of achievement and they benefit from the lower charges for directly dialled calls.



The equipment required for the LST 5B. In the centre on the top of the trolley is the visual display unit which shows the user the various stages of the operation.

THE AUTHORS

Mr. J. d'A Collings *is a senior sales superintendent in Marketing Department at THQ. He joined the Post Office as a technician at Criggion Radio Station in 1948 and was a sales representative in Bedford area 1950–58 before moving to headquarters as an assistant sales investigation officer in ITD/SSB.*

Mr. L. E. Saunders, *an executive engineer in the Electro-mechanical and Telephone Apparatus Department of TDD joined the Post Office in 1943 in London. He was appointed assistant engineer in 1955 and in 1966 took up his present duties as executive engineer on loudspeaking telephone design.*

. . . and an aid for the deaf

A device which enables deaf people to use the telephone has been developed in the United States by a deaf Stanford University physicist. It consists of a box coupling a teletype and a telephone line.

A deaf person places his receiver in the coupler box and dials the number of another deaf person. The ensuing conversation consists of messages typed by the two people. A quick-flashing light on the box indicates when the line is busy and a continuous slow flashing indicates that no-one is answering. Another flashing light warns the person being called that his telephone is ringing.

The device can be used at present only on a limited scale because of the high cost of teletype machines, but the American Telephone and Telegraph Company and Western Union Telegraph Company have reconditioned 200 old models for a series of trials.

NEW PENCILS FOR TELEPHONISTS

The simple pencil used by telephonists has provided its own problems in the country's switch-rooms down through the years. A new pencil has now been introduced. This article tells the interesting story of its development

THE pencil a telephonist uses and her chair at the switchboard may seem unimportant compared with the major changes going on around us in an electronic age. Yet both have influence on job satisfaction which is out of all proportion to their cost. Surprisingly, perhaps, each has given rise to more Joint Production and Awards Committee suggestions by operating staff than any other single item.

The past 20 years has seen many experiments with both pencils and chairs. The latter problem remains to be solved but there is an interesting story behind the new telephonists' pencil now being distributed.

It all started at Leeds in 1921 when the first dialling pencil, known as "dialling butt for (wood) Westminster Pencil", was introduced. Ever since then pencils have produced problems. To overcome the sharpening problem a slide action mechanical pencil using a thick lead was introduced in the late 1930's. This was continued in use until 1954 when, because of a large increase in costs, it was superseded by a clutch type of gravity feed pencil. These, however, were unsatisfactory. The lead often disappeared because pressure on the pencil during dialling overcame the force of the clutch spring; it was unbalanced and, with the introduction of mechanical ticket accounting, the lead gave too thick a mark whilst thinner leads were broken by the mechanism.

In 1962 ball point pens with a dialling top were introduced. These used a chemical based ink with a comparatively short storage life. The ink often leaked causing damage to handbags or the pens refused to write long before the ink was used up with the result that the average user rate became 14 pens per telephonist per annum.

During the past two years Purchasing and Supplies and Service departments of THQ have been developing a new pencil. The objectives were to produce one with a thin (1.1 mm) lead that would not smudge or break easily but would successfully mark tickets for mechanical processing. The lead had to be about four inches long to avoid the need for too frequent replacement, the pencil case well balanced, easy to pick up and easy to turn in the hand from the writing to the dialling position.

After many trials and experiments, in which telephonists readily co-operated, the new pencil has emerged. A satisfactory lead was produced to a Supplies Department specification by a specialist manufacturer. Manufacturers of propelling pencil mechanisms adapted them so that they took four inch leads for trial purposes. The trials showed that the mechanism had to withstand attempts to overwind, must finally eject the last piece of lead in the lead carrier and that the lead must move at least twice as far per revolution as a normal pencil if a four inch lead was to be "wound in" in a short time.

The final shape of the case evolved during trials, but the decision to make it from nylon was reached after experiments with a number of materials.

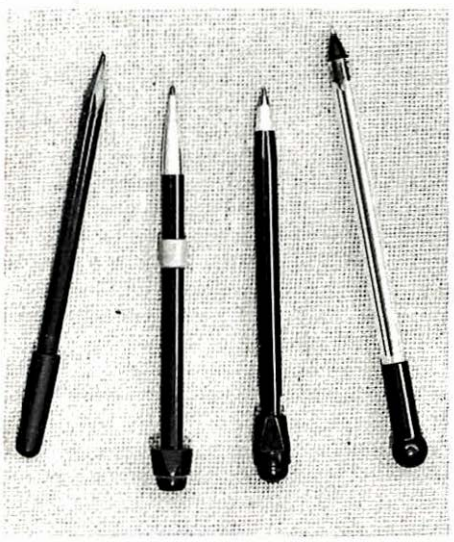
For the pencil to prove economical the annual cost of pencil + leads must be less than the cost of 14 ball point pens. This meant that the pencil must have an average life of 1,500,000 dialling operations.

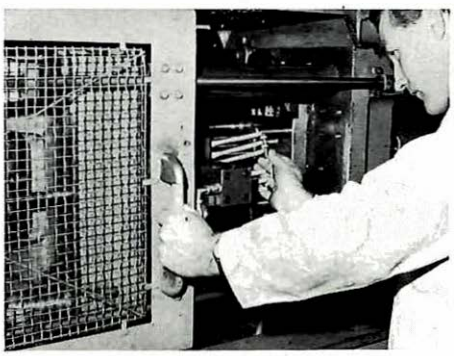
But this presented another problem. Soon after the dialling tops for ball point pens had been introduced the material for dial finger plates was changed from stainless steel to diakon. The buterate acetate dialling tops now wore quickly, but were cheap and expendable. This meant that a different material was required which would not so easily wear in use and which would also not appreciably enlarge the size of the hole in the dial finger plate. After prolonged tests by inspections branch and by the Plastics Development Division of ICI a hard grade of nylon was chosen.

At each stage of the development the possibility of employing alternative cheaper materials or manufacturing processes was considered and this has resulted in separate contracts being placed with specialist manufacturers for supply of the mechanism, the pencil case and for assembly. As a result the final cost of the new pencils will be more than 50 per cent under an earlier quotation for the same quantity of complete pencils. The large quantities required also enabled the case to be made in different colours without additional cost and 140,000 have now been produced in black, red, yellow and blue.

The final result should give lower overall costs per annum coupled with expected improvements in efficiency and increased job satisfaction for our telephonists.

F. A. WYETH





The nylon pencil cases being taken from a moulding machine.

Left: The pencils previously used. Left to right: the Leeds dialling butt, the original slide action pencil; the dutch type pencil and the biro with dialling top.

EXPANSION IN THE NORTH

Telecommunications links in Scotland, northern England and Northern Ireland are being rapidly expanded and improved by the introduction of more microwave radio systems

MORE than £1½ million will be spent in the near future on improving and expanding telecommunications in northern England, Northern Ireland and Scotland.

Three new high-capacity microwave systems linking Carlisle with Manchester and Belfast and Leeds with Newcastle-upon-Tyne are planned to come into service during 1970.

These new links will provide seven broadband radio channels (five working and two standby) between Carlisle and Belfast; five (three plus two) between Carlisle and Manchester; and four (two plus two) between Leeds and Newcastle.

Each radio channel on the Carlisle routes will be able to carry 960 telephone circuits or their equivalent data or a television transmission. The Leeds to Newcastle system will carry 1,800 telephone circuits, data or a television transmission on each radio channel.

In the event of a channel failure, automatic switching facilities will be brought into use at the terminal stations and for the over-water path between the repeater station near Stranraer (Scotland) and Belfast, high-diversity operation will be used to counteract the effect of fading due to specular or multipath reflections.

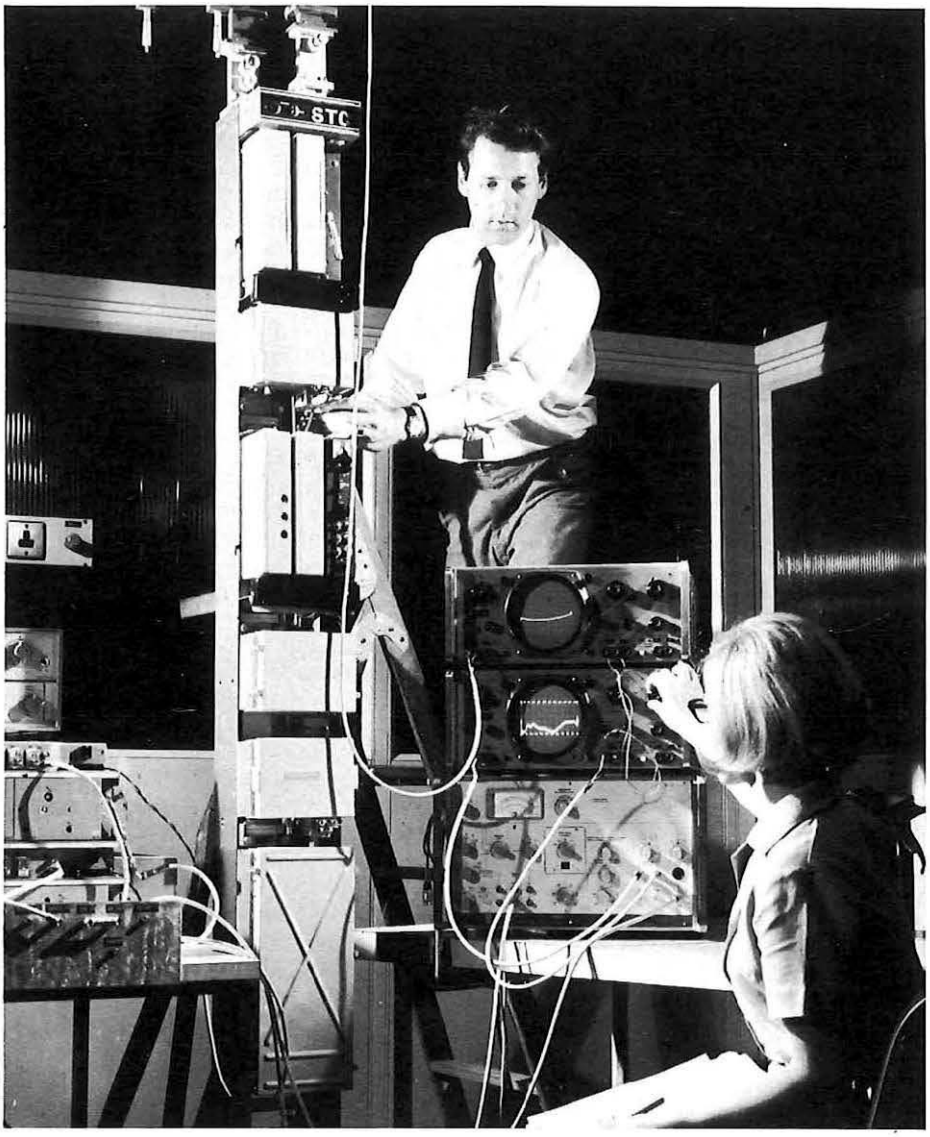
The radio unit will use a ten watt periodic, permanent magnet focussing travelling waveguide amplifier and varactor multiplier chains and all other circuits will be solid-state. Aerials will be of the Cassegrain type for single or bi-polar operation. These give a better performance than other types of aerial, particularly in matching back-to-front ratio and mechanical layout.

Operational frequencies on the Carlisle routes, which will use RL6D equipment, will be 6.425 to 7.110 GHz, and on the Leeds to Newcastle route (using RL6B equipment) 5.925 to 6.425 GHz.

The £500,000 order for the design, manufacture, installation and commissioning of these new links was recently placed by the Post Office with Standard Telephones and Cables.

In Scotland, no fewer than 36 separate microwave hops are to be provided to link the Western Islands, the Orkneys and Shetlands and other remote parts with the mainland.

These new links, totalling more than 600 miles and costing more than £1 million, will vary in length from between five and 33 miles. Each will be able to carry 300 two-way telephone conversation—although many will carry only 24—and use specially-developed high-capacity and highly-reliable equipment which, because of the remote nature of many of the terminal and repeater sites, needs to be serviced only once a year. The equipment will be solid state throughout.



STC staff carry out systems tests to the high-capacity microwave equipment which is to be used in the new links in Scotland.

On over-water paths and in other places where specular or multipath reflections cause fading, a space diversity system will be provided. Using space diversity techniques, the signals from two receiving antenae are combined at SHF and automatic control circuits operating from a rotary phase shifter ensure that the signals combine in phase.

The first links to come into service will be from Dunoon to Rothesay and Greenock and the entire scheme will be completed by the summer of 1971.

STC will also manufacture, install and commission the radio and multiplexing equipment, microwave dishes and feeders and erect the steel towers which will be needed at a number of sites.

**Post Office contracts worth some £347,000 have also been placed for major extensions to be carried out to three telephone exchanges in South-west England.*

The work, which will be carried out by the Plessey Company, will provide several hundred additional lines at the Bedminster exchange; further trunk switching equipment for handling long-distance calls at the St. Austell exchange; and an important extension for the Bristol Central exchange.

Miscellany

I.P.O.E.E. ESSAY WINNERS

THE top award of six guineas and an Institution Certificate in the 1968–69 Essay Competition of The Institution of Post Office Electrical Engineers goes to Mr. D. E. G. Coles, a Birmingham technical officer.

Awards of three guineas each and Institution Certificates were won by Technical Officers Mr. J. Methven, Salford, Mr. F. Eastham and Mr. J. F. Crake, both of Blackburn, and Instructor, Mr. G. S. Booth, of Stone.

Institution Certificates of Merit have been awarded to Technical Officers Mr. D. Watkins, Middlesbrough, Mr. D. C. Ferguson, Oldmeldrum, Mr. J. Morrison, Dundee, to Instructor Mr. J. A. Reeves, Stone and Trainee Technician Mr. J. K. Knight, Mount Pleasant.

BOUQUET FOR THE JOURNAL

Sir,

I worked for the Post Office as a designer of its Greetings telegrams advertisements before the last war and you have been good enough to send me the *Telecommunications Journal* ever since.

Now I must congratulate you on the new form of the *Journal*—editorial and typographical. Both represent a reasonable and consistent development of its services to its readers. For its past, its present and its future issues I offer my admiring thanks.—Sir Francis Meynell, The Grey House, Barn Street, Lavenham, Suffolk.

*Sir Francis, now 78, was one of Britain's leading typographical advisers. He was typographic adviser to Her Majesty's Stationery Office between 1945-66, a member of the Royal Mint Advisory Committee in 1954, President of the Society of Typographical Designers from 1958 to 1962, and a member of the Council of the Royal College of Art 1959-61. He designed most of the books produced by the Nonesuch Press of which he is a director.

Contracts

THE Post Office has placed contracts worth over £300,000 for six new TXE2 electronic telephone exchanges. Three of the new exchanges are in the Midlands—at New Ollerton, Boughton, in Nottinghamshire; Duffield, in Derbyshire; and Audley, near Stoke on Trent. The others will be installed at Grindleford, near Sheffield; Tarvin, in Cheshire; and Meadowfield, in County Durham.

NEW COUNCIL SUCCEEDS COMMONWEALTH BOARD

THE last formal meeting of the Commonwealth Telecommunications Board took place in London in March. Its role as the forum for Commonwealth co-operation in telecommunications is being taken over by the Commonwealth Telecommunications Council assisted by the Commonwealth Telecommunications Bureau, its permanent organ. The Council will be concerned with co-ordinating the international telecommunications facilities serving the needs of 655 million people in 23 countries.

The Board was established in 1949 and Britain has been its permanent home. Its main concern has been with the implementation of the agreements reached in 1948 between the majority of Commonwealth Governments for the mutual exploitation on a common user basis of the network of telegraph cables and radio facilities which link these countries together and to non-Commonwealth countries. Its work has ensured the most efficient use of the network and continuing benefits to users through charges for services substantially lower than those paid in non-member countries.

The Post Office has always been the largest user of the system and has paid a share of the total costs proportionate to its use.

The advent of more modern telecommunication facilities, such as intercontinental submarine telephone cables and satellites, has necessitated the re-organisation of arrangements for Commonwealth co-operation to cover the whole field of telecommunications. In 1966 a Commonwealth Telecommunications Council was formed and comprises senior officials of the External Telecommunications Administrations of the partner Governments; it meets at least once a year in different Commonwealth countries.

While the Council will take over from the Board in administering the 1948 agreements, its prime objective is to devise and recommend to Governments a unified system of accounting which would embrace all services carried by all media used in Commonwealth telecommunications.

Chairman of the Council is Mr. C. J. Gill, Director of External Telecommunications in the Post Office.

Speaking at a dinner in London to mark the closing of the Board, Postmaster General, Mr. John Stonehouse said that the increasing size and complexity of modern telecommunication systems and the rate of growth of new services had forced everybody to face the need for new consultative and joint financial arrangements.

Britain, he said, had played a major role in the use and development of the Commonwealth system.

The British Post Office earth station at Goonhilly was a pioneering effort which had effectively set the standard for earth stations now in use or shortly to come into use in many parts of the world.

The pioneer work of the British Post Office on the first transatlantic telephone cable system had led rapidly to the development of the jointly-owned Commonwealth submarine cable system now stretching from Britain via Canada to New Zealand and Australia and on via Hong Kong to Singapore and Malaysia.

This cable system, largely manufactured in Britain, had revolutionised Commonwealth telecommunications, brought benefits to many parts of the Commonwealth and led to very substantial increases in use and in rates of growth.

Mr. Harold Leigh

THE External Telecommunications Executive has lost its oldest inhabitant.

He is Mr. Harold Leigh, Deputy Director (Telephones), who was appointed Assistant Staff Engineer (Planning) in ETE on 1 October, 1952—five days before ETE was officially set up.

Mr. Harold Leigh

Mr. Leigh retired at the end of March after 42 years service in the Post Office. He joined in 1927 as an Assistant Traffic Superintendent and in 1929 became an Assistant Staff Engineer, serving for the next 17 years in the old Engineering Department. In World War Two Mr. Leigh was Secretary of the Inter-Services Precedence Panel for line telecommunications equipment. Between 1947 and 1952 he was Regional Engineer in the former Home Counties Region. He was promoted to Staff Engineer in ETE in 1958, and became Deputy Director (Operations) in 1963 and Deputy Director (Telephones) in 1966.

New Factory for Liverpool

A NEW manufacturing centre for the production of telephones is being established near Liverpool by Plessey Telecommunications Group. It will produce a significant proportion of all telephones currently being installed in Britain and contribute to the increasing flow of communications equipment exported to many parts of the world.

New production lines are being laid down and more than 7,000 telephones a week are expected to come off the assembly lines when the plant gets into top gear.

The new manufacturing unit is being set up to group together the telephone production currently being carried out in various parts of the country. Ultimately, the plant will have the capacity to produce a million telephones a year.

Plessey has received orders for over £1,700,000 worth of telephone instruments from the GPO alone. In addition, the Group is increasing production of main exchange switching equipment to nearly three times what it was five or six years ago.

GPO telephones leaving the production line fully assembled and tested are wrapped in protective polythene film before being finally packaged and despatched.

Post Office to train overseas technicians

THE British Post Office, among the world's leaders in satellite communications, is to give the benefit of its experience in this field to other administrations by helping to train their technicians.

Eight-week courses—there will be five a year—have been organised by the External Telecommunications Executive.

Nigeria has been one of the first overseas countries to take advantage of the courses. Already four Nigerian technicians have completed their courses which are held at the ETE Training School at Leafield, near Oxford.

Brazil also plans to take advantage of the scheme by sending two engineers and two technicians in the Autumn.

In addition to their spell at Leafield the Brazilians will spend between six months and a year studying at other Post Office training establishments.

When they return home the Nigerian and Brazilian students will train staff in their own countries—both of which intend to set up earth stations.

BIGGEST TELEGRAPH SWITCHING CENTRE IN BRITAIN

ONE of Britain's biggest companies, Imperial Chemical Industries, has brought into operation what is thought to be the largest private telegraph switching centre in Britain.

Installed by Plessey at I.C.I's Manchester administrative offices, it is connected through the company's major centres at London, Slough, Bristol, Cardiff, Birmingham, Glasgow, Wilton and Belfast servicing 117 terminals at a total of 94 establishments throughout Britain. The system is already processing 5,000 messages a day.

Basically, the complex comprises two computers linked to two high-capacity magnetic drums and two magnetic tape files. Messages which can be coded to indicate top, normal or overnight priority, are fed into the system by six data channellers which are linked to Post Office telephone lines.

There is also a special facility which ensures that when a message coded "flash priority" is fed into the system, any other less urgent message being sent at that particular time is terminated, thus enabling the "flash" message to be despatched immediately. The interrupted message is then sent in full.

Messages to be transmitted are stored on the two magnetic drums and sent according to their priority. When a message has been transmitted it is written on magnetic tape as a permanent record. If a terminal requests a repeat at any time, the message can be retrieved from the tape store and retransmitted.

Facilities are also provided to enable a supervisor to keep a check on the state of message traffic. Logging and accounting are carried out automatically and every month figures are produced showing the amount of traffic per location, its priority and cost.

The hardware interconnection gives maximum security to system traffic in the event of a hardware failure and allows reliability predictions to be made.

Information Services

IN the Winter, 1968, issue of the *Journal* (pp. 32–35) was an article about the new telephone information services in which it was said that during a market research members of the public were asked to suggest new services.

Several suggestions were made but there was no mention of a 24-hour national and international news service, including news flashes on subjects such as disasters, budgets and crises. I believe this would be a good subject for a telephone information service and would be glad of your comments.—**Wm. I. Appiah, LTR, North Area Sales Division.**

**A news service has been considered from time to time. However, the pre-requisite of any potential information service must be that it is likely to be profitable and so far it has not been possible to establish that a news service would be a viable proposition in view of the competition from the Press and broadcasting authorities. There would also be difficulty in finding a suitable source of information, with the likelihood of opposition from newspapers and broadcasting concerns. In view of these considerations it has not been found possible to go ahead with a news service of the kind suggested by Mr. Appiah, but the possibility is being kept under review.*

AROUND THE WORLD

EUROPE–JAPAN

The first telephone cable directly connecting Europe and Japan by way of Russia will be put into service soon. It will include a submarine section called the JASC cable (Japan Sea Cable) which will be brought into operation next May. In addition the INTELSAT Indian Ocean satellite will provide direct connection between European and Japanese earth stations. For security of traffic handling European administrations will use both the JASC cable and the satellite, but as Europe–Japan telephone traffic is still fairly small several members of CEPT (European Conference of Postal and Telecommunications Administrations) have decided to route their traffic over a pooled group of telephone circuits as is already done between Europe and America. Switzerland has been asked to supply the transit equipments which are to be installed in the intercontinental centre at Berne and will provide automatic access to these pooled circuits. The first direct, high quality circuit telephone connection between Europe and Japan was due to be made at the end of May.

AMERICA

The US Federal Communications Commission has given approval for the American Telephone and Telegraph Company to make a field trial and later construct a 4.6 million dollars system utilizing a new type of microwave transmission equipment. The TH-3 system makes use of solid state electronic components instead of vacuum tubes used in the TH-1. Both systems have a capacity of 1,800 communications circuits per channel but the new one is expected to have the advantage of lower maintenance costs. Construction of the new system is scheduled for 1970.

* * *

Transistors are now being made by the Westinghouse Corporation on a wide variety of flexible bases, such as mylar tape, cellulose acetate film, anodized metal foil and even rough-textured paper. These thin-film flexible transistors have worked with good stability at frequencies up to 60 MHz. By using inexpensive bases, the cost of transistors may be even further reduced. Another advantage of using a flexible substrate is that the thin-film transistors may be mass-produced in continuous rolls or strips. In addition, thin-film passive components, such as capacitors, resistors and inter-connections may be deposited at the same time.

DENMARK

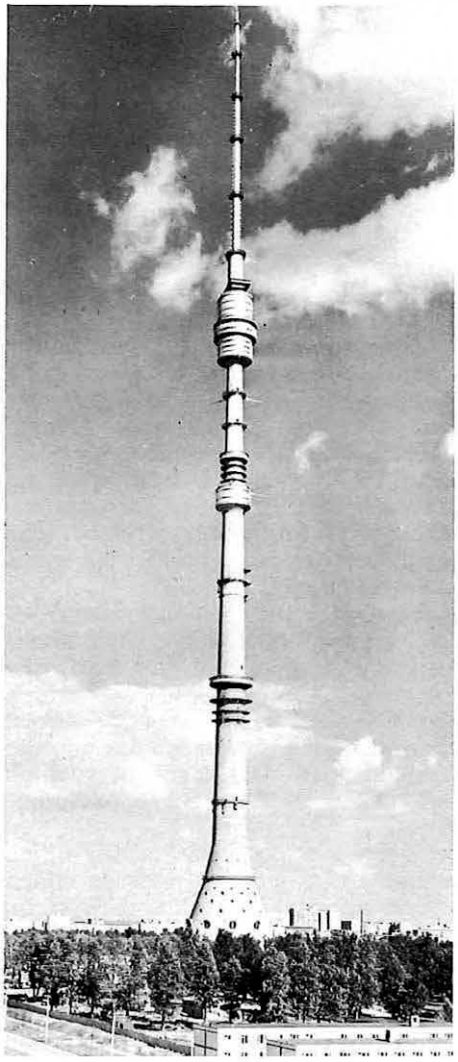
Work has begun on a network of underground and underwater cables planned to supplement the existing radio-relay network in Denmark. An underwater cable is now being laid between the islands of Fyn and Sjaelland, on which Copenhagen is situated, to replace the existing cable. After that Copenhagen will be linked to the City of Aarhus on the Peninsula of Jylland. The submarine cables on this link are expected to be ready early in 1970.

RUSSIA

Moscow now has the tallest tower in Europe. Officially named "Seventh Heaven" it is 1,600 feet high. The London GPO Tower is 620 feet and the Eiffel Tower in Paris 1,056 feet.

The Moscow tower will ultimately be rigged with a full capacity of six television channels and six short-wave radio stations. Like the GPO Tower it has a revolving restaurant at the top.

The tower rests on 10 clawlike pinions embedded in the ground to a depth of 16 feet, surprisingly shallow for the weight of the superstructure.



Moscow's "Seventh Heaven" tower.

The designer is Nikolai Nikitin whose work is so daring that many of his projects have never progressed beyond the drawing board. His design initially won a Government competition in the mid-fifties, but was subsequently rejected. It was approved a second time and vetoed once more. Final acceptance came in 1963 and construction started a year late. Work was due to be completed in 1967 but was held up by delay in delivery of components.

SICILY–LIBYA

A new £1½ million submarine telephone cable between Tripoli and Sicily is now in operation. The new cable, capable of carrying 120 telephone conversations and manufactured and laid by Standard Telephones and Cables Limited of London, was completed 59 days ahead of schedule. It provides Libya with high quality telephone access to the modern, expanding Italian communications network and thence to Europe and many other parts of the world. The route length of the cable is 300 miles, of which about one third—laid in shallow water—is armoured. The remainder is one inch lightweight deep-sea cable. A total of 24 submerged repeaters have been laid.

Other submarine cables out of Italy are planned. One of these, carrying 480 conversations, will be laid between Pisa and Barcelona. The other, to be known as MAT 1 will be able to carry 640 conversations and will connect Rome with Estepona in Spain. This cable is of great significance because it will connect via microwave links not only with the South Atlantic cable (to Cape Town) at Lisbon, but also with the new Lisbon–UK cable. Most important of all, it will similarly connect with the fifth transatlantic cable (TAT 5), to be laid between Cadiz and New York.

By 1970, Libya, Italy, Spain, Portugal, South Africa, the United States and the UK will all be directly interconnected by submarine cable.

A £3 million undersea telephone and telegraph cable across the Gulf of Sirte will also link Tripoli and Benghazi. This system will be capable of carrying 480 high quality (4KHz) telephone conversations and will be ready for service in the late summer of next year. It is 417 nautical miles long and incorporates 57 submerged repeaters. It will be free from en-route maintenance and will provide high quality, reliable communication between the two important Libyan centres. Beida, the seat of government, is only 100 miles from Benghazi.

CANADA

A new type of underground telephone cable developed at Bell Telephone Laboratories is made impervious to water by encasing the conducting wires in a mixture of petroleum jelly and plastic. The core of the new cable consists of an inner bundle of wires, insulated with polypropylene plastic, colour-coded and twisted. The twisted wires are encapsulated in the plastic-jelly mixture—a filling compound consisting of 15 per cent plastic and 85 per cent petroleum jelly. The core is then wrapped in plastic tape, held down by plastic ribbons wound about in a helix. Another coating of the jelly-plastic mixture is then applied and a layer of aluminium is wound over it. A final coating of the mixture is applied over the aluminium and a black polyethylene plastic jacket is put on to produce the finished cable.

Telecommunications Statistics

(Figures rounded to nearest thousand)

	Quarter ended Dec., 1968	Quarter ended Sept., 1968	Quarter ended Dec., 1967
TELEGRAPH SERVICE			
Inland telegrams (including Press, Service, Rail Pass and Irish Republic)...	2,144,000	2,482,000	2,345,000
Greetings telegrams	566,000	683,000	550,000
Overseas telegrams:			
Originating U.K. messages	1,824,723	1,934,093	1,841,754
Terminating U.K. messages	1,792,871	1,903,038	1,837,010
Transit messages	1,550,973	1,589,236	1,675,517
TELEPHONE SERVICE			
Inland			
Net demand	201,000	188,000	206,000
Connexions supplied...	220,000	180,000	207,000
Outstanding applications	223,000	242,000	219,000
Total working connexions	7,713,000	7,579,000	7,248,000
Shared service connexions (Bus. and Res.)	1,422,000	1,409,000	1,376,000
Total effective inland trunk calls	302,633,000	299,836,000	269,988,000
Cheap rate trunk calls	68,621,000	71,137,000	59,152,000
Overseas			
European: Outward	2,989,000	2,935,000	2,514,000
European: Transit	7,000	7,000	10,000
Extra-European: Outward	305,000†	271,000†	251,000
TELEX SERVICE			
Inland			
Total working lines	25,000	23,000	21,000
Metered units (incl. Service)	50,775,000	59,259,000*	61,220,000
Manual calls from automatic exchanges (incl. Service and Irish Republic)	33,000	28,000	30,000
Overseas			
Originating (U.K. and Irish Republic)	4,364,000	4,103,000	3,800,000

*amended figure †part estimated

Publication and Price. The *Journal* is published in March, June, September and December, price 1/6. The annual postal subscription rate is 6/6 to any address at home or overseas.

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 would be 750, 1,500 or 2,000 words. The views of contributors are not necessarily those of the Board or of the Post Office.

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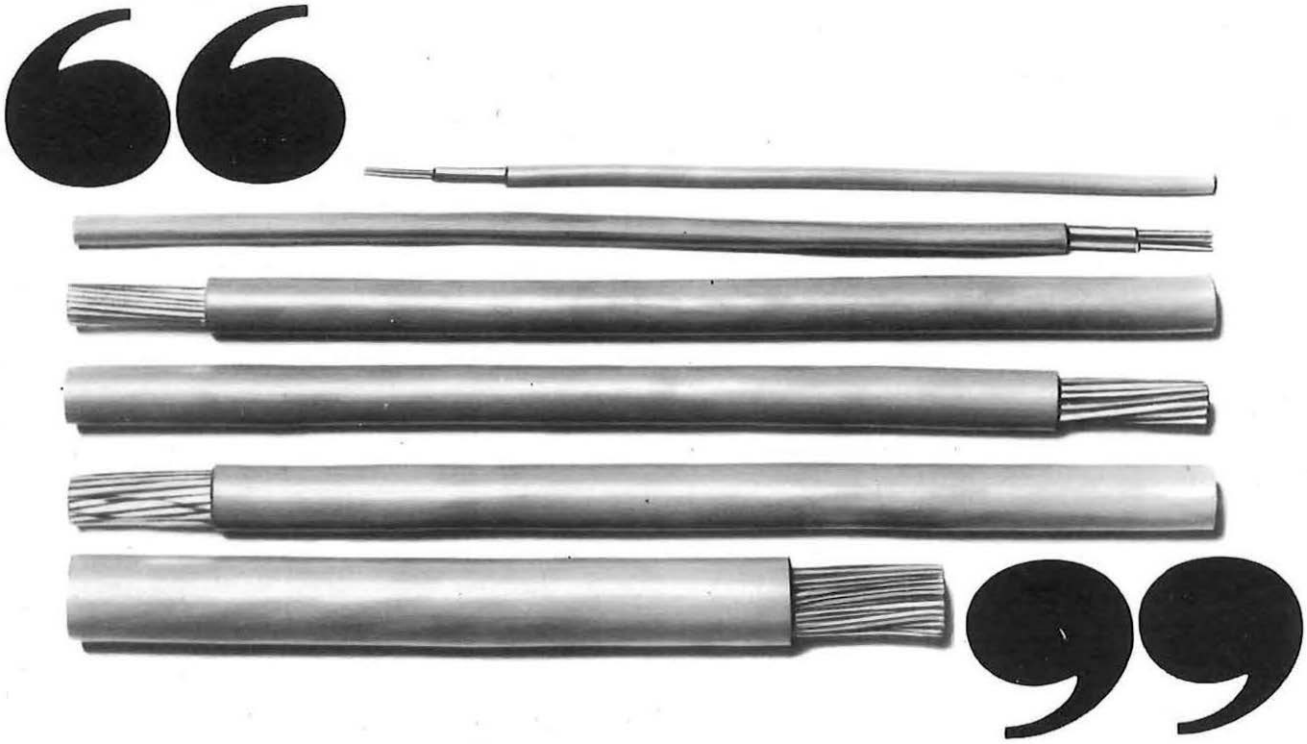

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The Post Office Telecommunications Journal is printed by BKT Printers Ltd., London and Tonbridge, and is published quarterly in December, March, June and September by H.M. Postmaster General.

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