Post Office telecommunications journal

Spring 1972 Vol. 24 No. 1 Price 9p

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Up to 16.3% p.a. over 10 years–that's how much a UKP High Yielder investment policy can make for Post Office Corporation employees, thanks to special low premium rates. And premiums can be deducted from salary without extra charge. Send for full details today.

Please send me details of your special terms available to Post Office Corporation employees on personal application to you or the Civil Service Insurance Society. I am interested in:

☐ High Yielder 10-year investment. ☐ Blueprint: a long term investment. ☐ House purchase.

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Dept Bch_____

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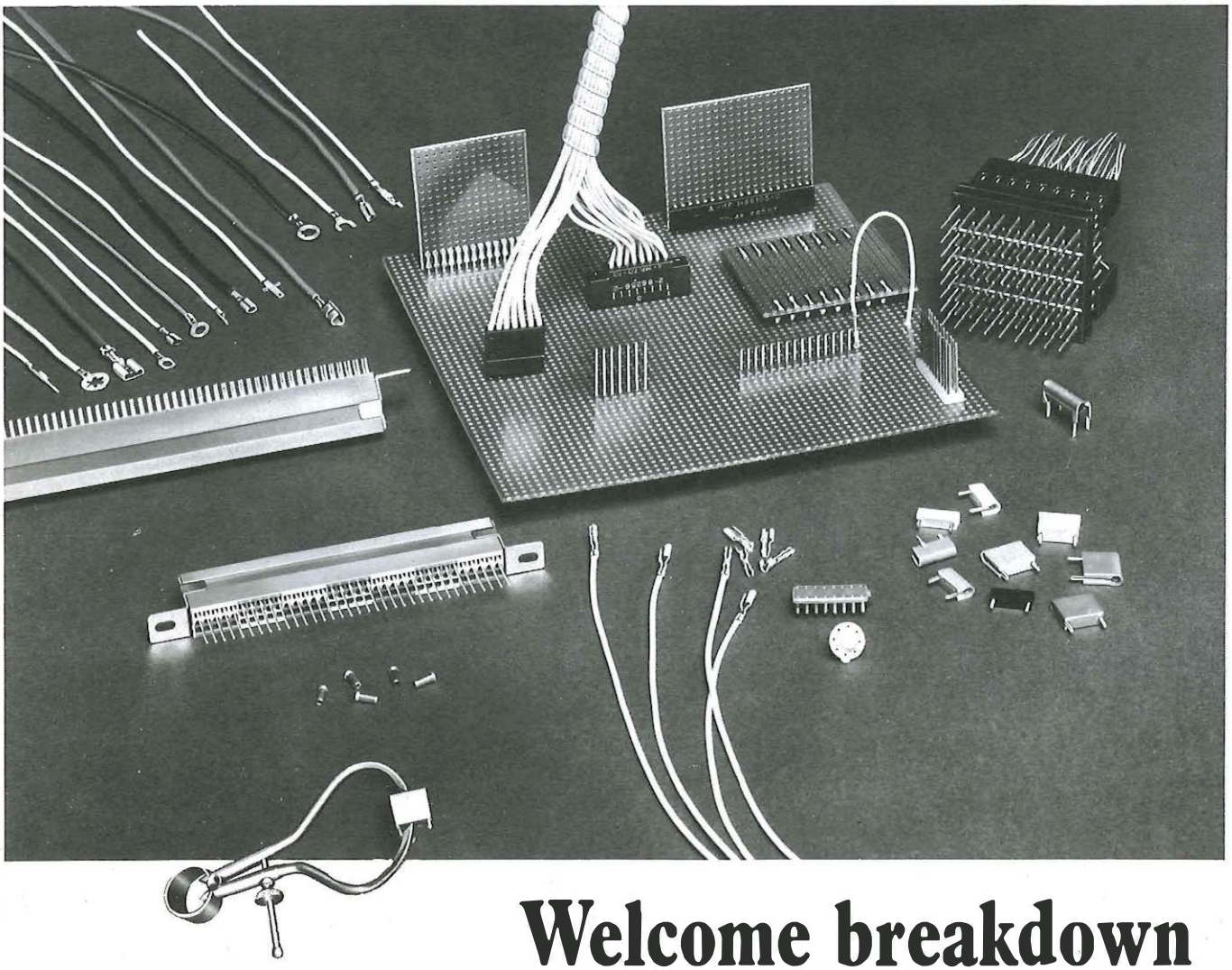
Mr. Roe



Welcome breakdown in communications.

AMPMODU and TERMI-POINT are trademarks of AMP Inc.

Consistent performance and reliability of course, but for overall capability we also offer the broadest range of products and production techniques. Together, they comprise an unrivalled breakdown of products and methods which offer the surest safeguard against other forms of breakdown. We call this AMPeconomation – the process by which AMP provides its customer with electrical connections of the highest quality at lowest applied cost.

Plug-in Coupler Connector

Post Office approved to specification D2464 designed to facilitate in-house production – in conjunction with the stripper crimper automachine. Tin-plated contacts. Plug-in coupling connector available for inter rack wiring.

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An interconnection concept based upon a family of stamped and formed receptacles and mating posts. Receptacles applied to boards by staking machine permit multiple stacking of modular cards and mating with interconnecting boards or wiring grid panels. Housings are available for receptacles, including wire-crimp types.

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A broad range of printed circuit products by AMP includes receptacles for component mounting and testing, quick connect/disconnect devices and connectors for braided shield and coaxial cable.

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The full benefits of low-cost programmed wiring without capital outlay. Complete panels produced from wiring lists using the TERMI-POINT clip technique, with positional accuracy of wiring assured and electrical checking as required.

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Ring, spade, hook terminals, pins and receptacles and special items are available from AMP in the widest range of configurations, materials and finishes. Supplied in continuous strip form, they are reel-mounted for high speed application by automachine.

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In a word AMPeconomation

AH617

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Manufacturers of FORMICA* Glass Epoxy, Paper Phenolic and Polyester Glass Laminates.
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OUR NEW BUTTON CELLS LOOK THE SAME AS OUR OLD ONES

Up to 20% extra capacity

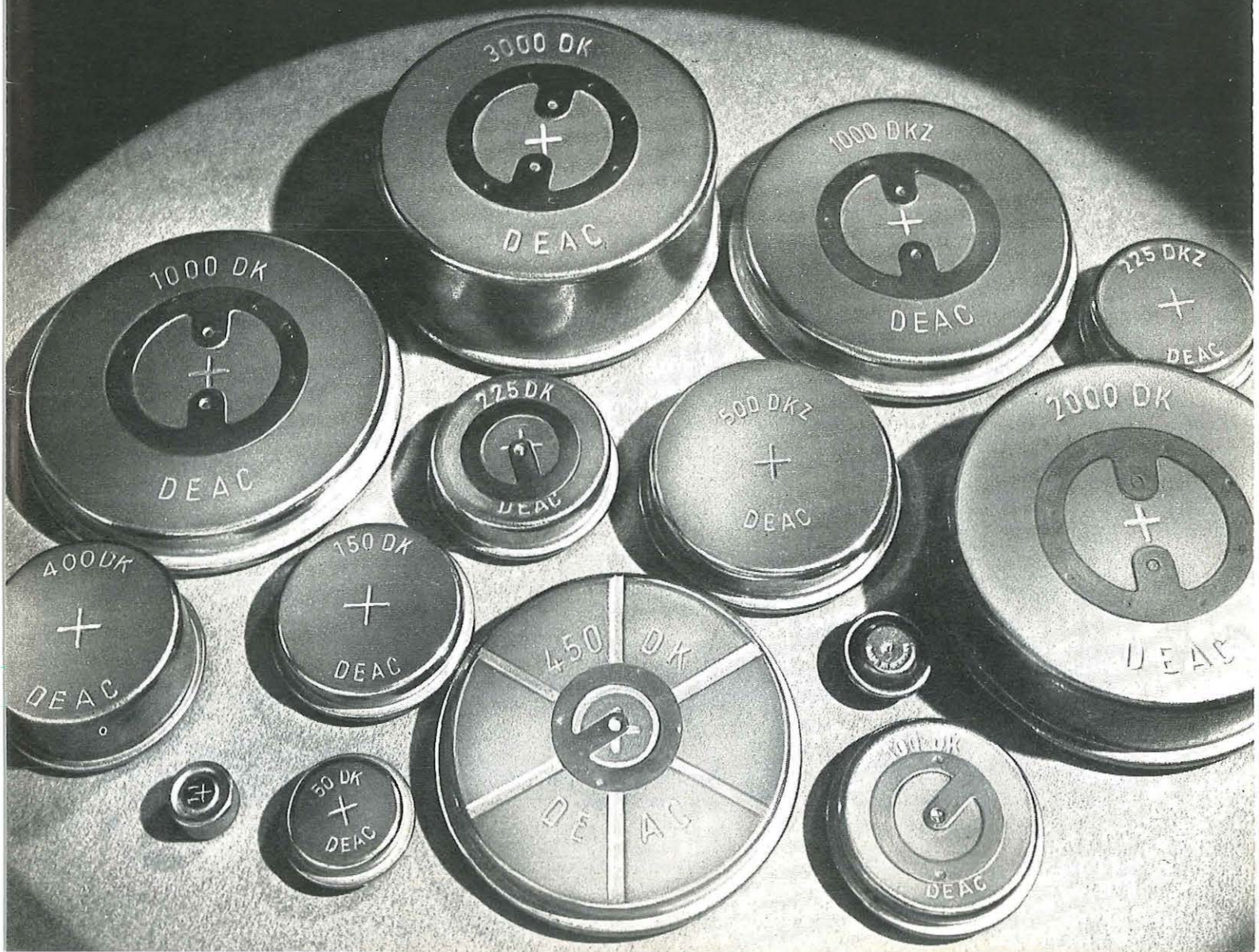
Now Deac button cells are even more powerful than ever before. Packed with extra capacity for better all round performance. And yet with no increase in size. So incorporate Deac in your designs and get the most versatile power source available. Operational in *any* position. There's a comprehensive range of over 50 types of Deac cells from 10mAh to 23Ah. All safe against overcharge, overdischarge and reversal of polarity. Compact, reliable and rugged. Fast delivery. Also a comprehensive range of chargers and power supply systems. Deac are the only British company making nothing else but hermetically sealed nickel cadmium accumulators. So it makes sense to talk to the specialists first. Send for technical literature.

TALK TO THE SPECIALISTS

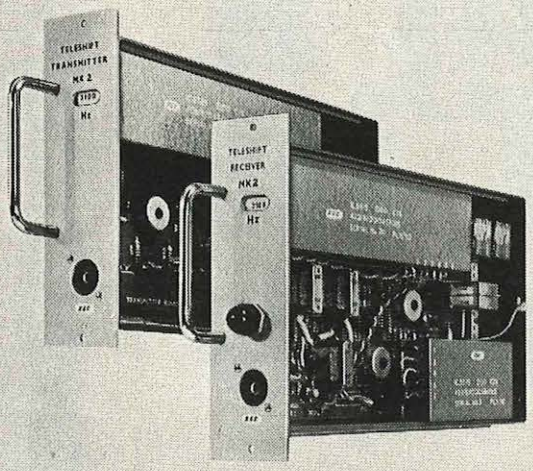
DEAC

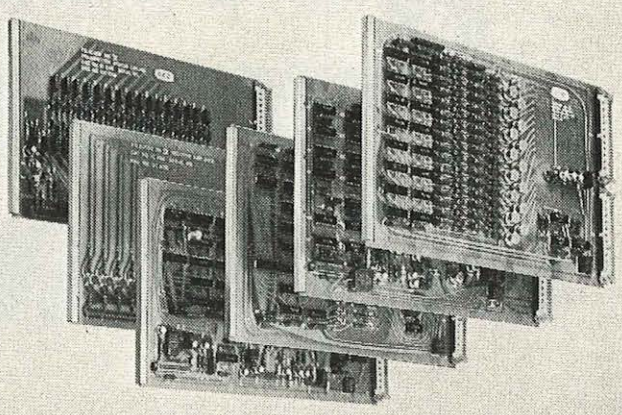
Hermetically Sealed Nickel Cadmium Accumulators

Deac (Great Britain) Limited, Hermitage Street, Crewkerne, Somerset. Tel: Crewkerne 3366. Telex 46331



Designing a telemetry link-up? Then measure with TELEDUCER scan with TELECODE and transmit with TELESHIFT





These three units add up to the finest range of modules available for use in configurations suitable for most telemetry systems. And who makes them? GEC-Elliott Process Automation Ltd., of course, the company which has been a pioneer in the design and manufacture of telemetry equipment for use in a wide cross-section of industry.

Here are some of the basic facts:–

Teleshift
- for the transmission of alarms, indications and controls over land line or radio link.
- can also be used as a modem – up to 50 or 200 baud – with other telemetry equipment.
- caters for up to 24 channels on any one line.

Teleducer
- an analogue measurement transmission system using Teleshift for transmission.
- allows for simultaneous transmission of up to 24 measurements over one line.

Telecode
- a scanning system for either "on/off" or analogue signals using Teleshift for transmission.
- scanning speeds of 15 or 100 bits per second.
- up to 120 bits per channel with a maximum of 24 channels on any one line.

The unit modular design of these components enables systems to be constructed as required without the assistance of special design engineers.

If you are presently designing a new system or merely thinking about one, get in touch with GEC-Elliott; there's a feast of information available that you will find useful.

GEC-Elliott Process Automation Ltd.,
Telemetry and Digital Systems Division,
New Parks, Leicester LE3 1UF, England.
Tel: Leicester (0533) 871331

GEC-Elliott Process Automation Ltd

a GEC-Elliott Automation company

getting a word in edgeways

. . . just a few words, in fact to remind you that ASSOCIATED AUTOMATION manufacture coin-operated telephone equipment for world-wide use.

National preferences, currencies, and operating systems present no problems. Our equipment is reliable and secure and can be left unattended.

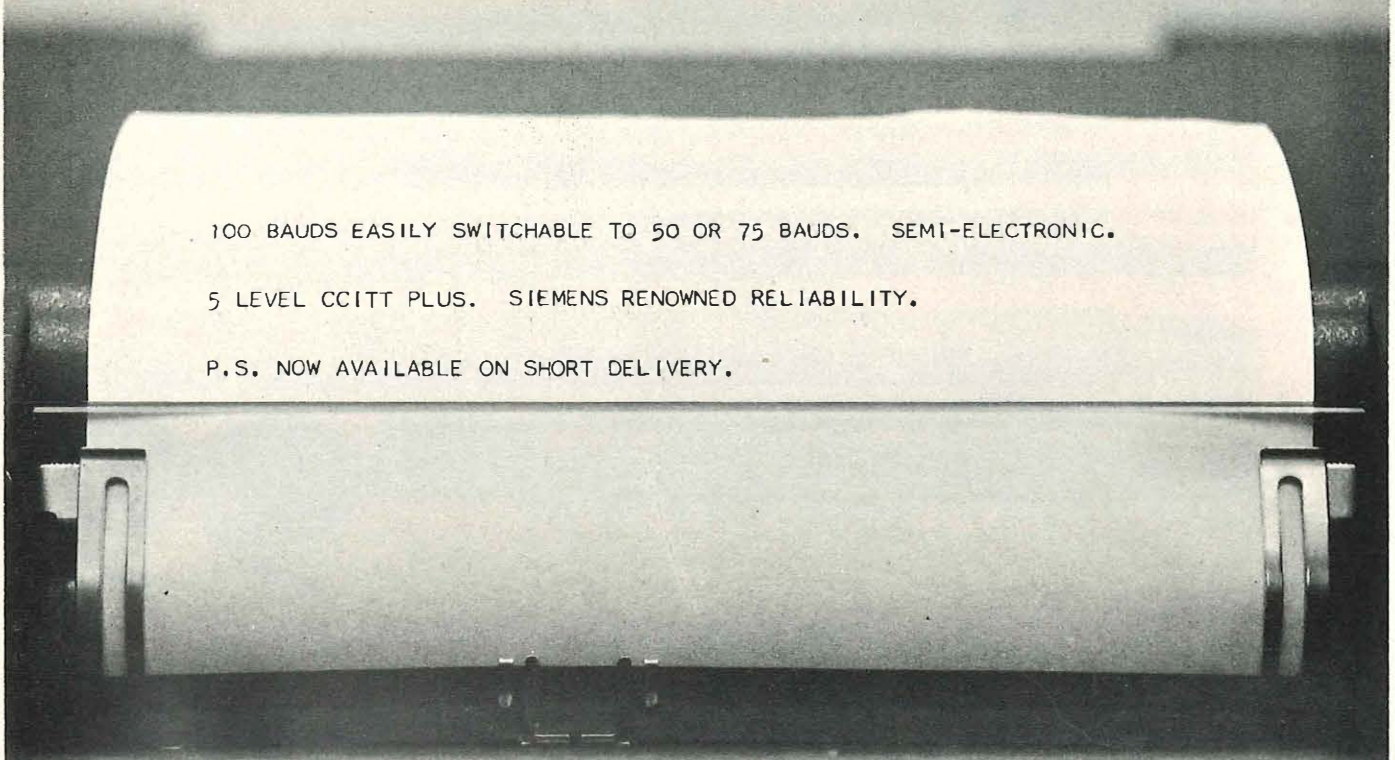
Enquire also about our coin-operated stamp vending machines for postage and savings schemes.

Associated Automation Limited

Dudden Hill Lane
London N.W.10
A member of the
GEC Group of Companies

SIEMENS

A brief message to explain



You need to know a lot more about our T150. Write, call or telex and we'll send you full technical information. If you don't need all the facilities built into the T150, ask for details on our T100.

If you need even more than the T150 offers – for example up to 22 characters per second, or a teleprinter that's also specially designed as a computer terminal – then ask about our T200.

Siemens Limited, Great West House, Great West Road, Brentford, Middlesex. Telephone: 01-568 9133. Telex: 23176.

why our T150 Teleprinter sells itself. Siemens.

SL 9-172-1

ever wanted

to cope with up to eight at a time in each direction?

with the GEC upper 6 microwave system you can!

For high density routes, the GEC 6·8GHz semiconductored microwave radio equipment can accommodate up to eight radio bearers in each direction of transmission, using a single antenna. The highly economical frequency usage provides up to 16 x 960 high-quality speech channels in the same frequency spectrum.

GEC MICROWAVE TYPE 68R9A

G.E.C.

Takes telecommunications into tomorrow

GEC-AEI TELECOMMUNICATIONS LTD, OF COVENTRY, ENGLAND.

A Management Company of The General Electric Co. Ltd. of England.

IB/50A

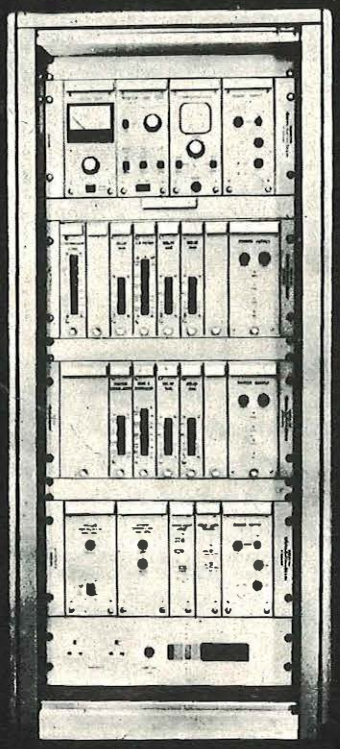
GEC Lincompex

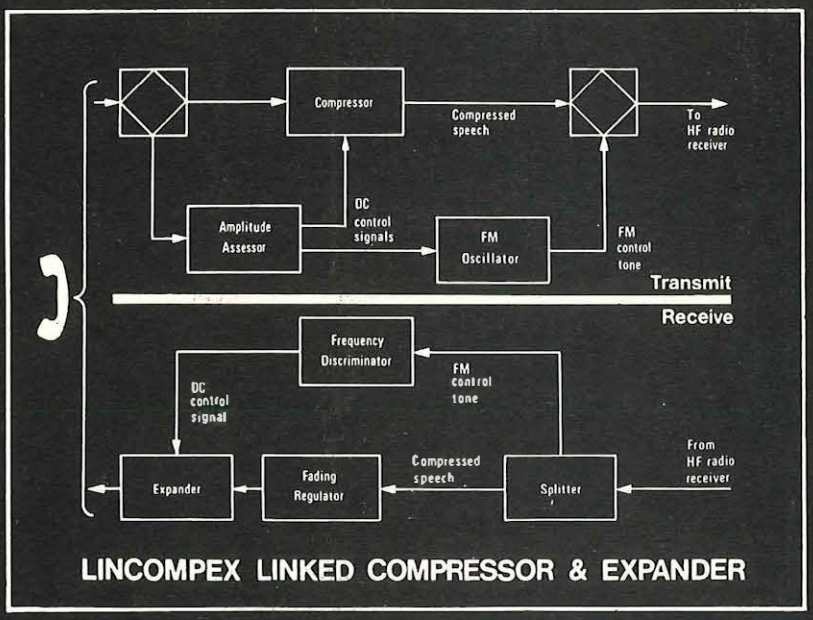
Already proved in practice in over 35 countries ...

can increase revenue from your long-distance HF radio circuits, too!

Over 35 countries already rely on GEC Lincompex to bring the quality of HF radio telephone circuits up to line transmission standards. Now, you, too, can increase your revenue from long-distance HF radio circuits with GEC Lincompex. Developed from a British Post Office design, it provides:

- ☐ Improved signal-to-noise ratio
- ☐ Substantial reduction in fading
- ☐ Constant loading of radio transmitter
- ☐ Quiet 'no-signal' periods to ease the flow of conversation
- ☐ Higher traffic handling capability
- ☐ Elimination of singing suppressor





LINCOMPEX LINKED COMPRESSOR & EXPANDER

A single-channel '1T' terminal. It comprises: monitor unit; Lincompex transmit unit; Lincompex receive unit; and ringer/signalling & echo-suppressor equipment.

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IB54

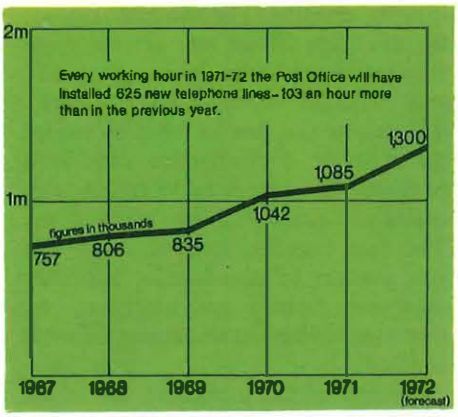
Post Office telecommunications journal

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

Spring 1972 Vol. 24 No. 1

COVER: There is nothing random about the wiring patterns in the "cyclic store" area of the TXE4 electronic exchange. When a new customer is connected to the exchange, his wire is threaded in its own unique pattern through the numbered rows of the rack. The pattern provides a code of all the information that needs to be stored – his telephone number, the location of his exchange equipment, whether it is shared service etc. See TXE4 – a big brother for TXE2 – on page 11.

ATTACKING THE WAITING LIST



IN THE PAST year the Post Office has provided 1,300,000 new exchange connections, an increase of 20 per cent over the previous year. But orders for new telephones are now at an unprecedented level, and an acute shortage of exchange equipment combined with explosive demand has led to a waiting list of 200,000.

The Post Office has launched a crash programme to contain this waiting list, and in support the Government has approved an increase of £100 million in the already massive Post Office investment plan. To implement the programme in the field the Post Office has recruited an additional 1,000 engineering staff, and a further 2,000–3,000 jobs will be created over the next two years. Telecommunications manufacturers will also be increasing their labour force, particularly in development areas.

The present exchange equipment shortage has been brought about largely through delays by contractors in manufacturing and installing Post Office orders. Although there has been some recent improvement, steps are being taken to relieve the pressure created by past delays. To do this the Post Office plans to increase its fleet of mobile telephone exchanges and to buy more portable exchange epuipment which can be brought into service faster than fixed installations.

Much of the extra equipment – including 268 "caravan-trailer" exchanges which can be moved around the country to areas of high demand – has already been ordered and will be working within 15 months. This will provide service for about 120,000 customers, and there are plans for a further supply of mobile equipment which will provide capacity for another 105,000 customers.

With all these measures the waiting list should be contained and, subject to satisfactory delivery of equipment from industry, progressively reduced.

Given this rising investment programme, totalling £3,000 million over the next five years, the Post Office believes it is essential that an adequate level of profit should be maintained and re-invested in the Telecommunications business. It was with this in view that proposals were put to the Post Office Users' National Council for an increase in telephone rentals and some installation charges. This increase, the first since July 1970, would yield an additional three per cent revenue.

It costs over £150 in plant for every new telephone added to the system, but only one new residential customer in four uses it enough to offset the low rental and produce the overall return on capital required by the Government. Since about half of the capital investment is spent on equipment for new customers, the Post Office takes the view that it is only reasonable for them to pay a more realistic charge. Otherwise an added burden would fall on existing customers.

THE COST OF GETTING ENGAGED

Telephone calls which fail to get through cost the Post Office nearly £30 million a year.

FA Ryan and TC Johnson

ANY YOUNG man will tell you that getting engaged is very costly. Although he is more likely to be thinking about a wedding ring, whereas this article is concerned with telephone rings, the idea of the expense involved is equally applicable. Getting "engaged" on a telephone call or failure of the called customer to respond to the ring results in loss of revenue, and costs telephone administrations the world over a great deal of money.

It is a sobering thought that in a business that handles over ten thousand million chargeable calls every year nearly one attempt in every three fails to result in a conversation. The two main reasons for this high failure rate are customer engaged (approximately 14 per cent) and customer no reply (10 per cent). The action that can be taken to reduce the number of ineffective calls is a problem that has been worrying telecommunications staff for many years. The fact remains, however, that this vast number of unsuccessful calls uses equipment, trunks and junctions, etc, that could otherwise be earning valuable revenue.

The cost of the ineffective use of the telephone service is normally hidden by our traditional costing methods which allow for an element appropriate to the ineffective part of the service to be included in the cost of successful calls.

Since the need for telephone plant is based on the level of traffic (effective plus ineffective) in the busy hour it is the number of failed calls in this period that directly involves the Post Office in expenditure on plant for ineffective, non-revenue-earning traffic. Outside the busy hour there are usually lines and equipment spare and, except for wear and tear of equipment, and electricity consumption, the cost of handling ineffective calls at these times is relatively insignificant.

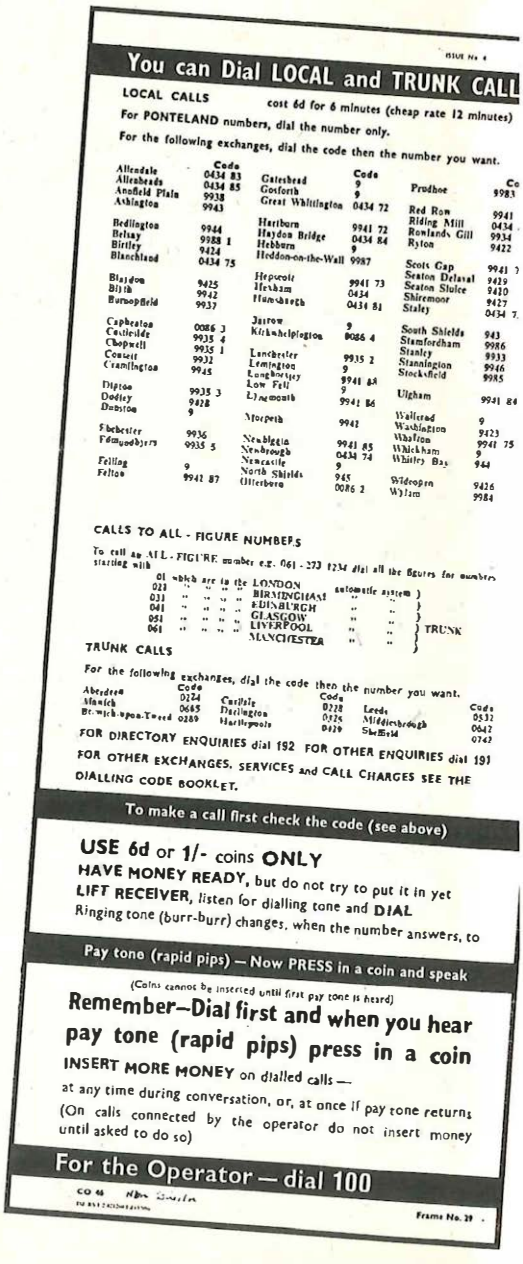
A measure of the cost of ineffective calls can be obtained by apportioning the overall costs pro-rata to the number of effective and ineffective calls that have occupied equipment during the busy hour. However, separate apportionments must be made for subscriber trunk dialled, subscriber local dialled and operator controlled calls because of their different call characteristics in terms of failure rates and average holding times. Due allowance must also be made for the varying holding times of the differing types of equipment, in particular the short holding time of equipment such as register translators.

Although service observations cover the periods 8 am–6 pm Monday to Friday, we do not normally extract and publish a separate measure of the busy hour service (this can be done selectively as and when required). However, for the purpose of this article it is not unreasonable to assume that the percentage of ineffective attempts in the busy hour, due to customer engaged and no reply, is at least equal to that outside this period. Day failure rates were therefore used in a study recently made to assess the cost to the Post Office of the ineffective use of the telephone service.

The results were startling to say the least. The estimated cost of failures due to "no reply" for example was revealed to be some £9.8 million per year and the cost of failures due to "engaged" £6.8 million annually. (The higher percentage of engaged customer calls is offset by the very short holding times – approximately one third that of no reply attempts.)

Estimates of the cost of unnecessary use of the operator services were also made. The two major components in this sphere are the use of the operator service for calls which could have been dialled direct by the customer and the use of the directory enquiry service for numbers which were already shown in the local area directory. Estimated cost of calls unnecessarily routed via operator was £2.3 million per year and of unnecessary use of directory enquiries £4.1 million.

A study of this nature would not be complete without an estimate of the cost



You can Dial LOCAL and TRUNK CALL

LOCAL CALLS cost 6d for 6 minutes (cheap rate 12 minutes)

For PONTELAND numbers, dial the number only.

For the following exchanges, dial the code then the number you want.

	Code		Code		Co
Allendale	0434 83	Gateshead	9	Prudhoe	9983
Allenheads	0434 85	Gosforth	9		
Annfield Plain	9938	Great Whittington	0434 72	Red Row	9941
Ashington	9943			Riding Mill	0434
		Hartburn	9941 72	Rowlands Gill	9934
Bedlington	9944	Haydon Bridge	0434 84	Ryton	9422
Belsay	9988 1	Hebburn	9		
Birtley	9424	Heddon-on-the-Wall	9987	Scots Gap	9941
Blanchland	0434 75	Hepscott	9941 73	Seaton Delaval	9439
Blaydon	9425	Hexham	0434	Seaton Sluice	9430
Blyth	9942	Hunwsworth	0434 81	Shiremoor	9427
Burnopfield	9937			Staley	0434 7
		Jarrow	9		
Capheaton	0086 3	Kirkwhelpington	0086 4	South Shields	943
Castleside	9935 4			Stamfordham	9986
Chopwell	9935 1	Lanchester	9935 2	Stanley	9933
Consett	9931	Lemington	9	Stannington	9946
Cramlington	9945	Longbenton	9941 88	Stocksfield	9985
		Low Fell	9		
Dipton	9935 3	Lynemouth	9941 86	Ulgham	9941 84
Dudley	9428				
Dunston	9	Morpeth	9942	Wallsend	9
				Washington	9423
Shebester	9936	Newbiggin	9941 85	Whalton	9941 75
Edmundbyers	9935 5	Newbrough	0434 74	Whickham	9
		Newcastle	9	Whitley Bay	944
Felling	9	North Shields	945		
Felton	9941 87	Otterburn	0086 2	Widdrington	9426
				Wylam	9984

CALLS TO ALL - FIGURE NUMBERS

To call an ALL - FIGURE number e.g. 061 - 273 1234 dial all the figures for numbers starting with

01	which are in the LONDON	automatic system
021	" " " " BIRMINGHAM	" "
031	" " " " EDINBURGH	" "
041	" " " " GLASGOW	" "
051	" " " " LIVERPOOL	" "
061	" " " " MANCHESTER	" "

} TRUNK

TRUNK CALLS

For the following exchanges, dial the code then the number you want.

	Code		Code		Code
Aberdeen	0224	Carlisle	0228	Leeds	0532
Alnwick	0665	Darlington	0325	Middlesbrough	0642
Berwick-upon-Tweed	0289	Hartlepools	0429	Sheffield	0742

FOR DIRECTORY ENQUIRIES dial 192 FOR OTHER ENQUIRIES dial 191

FOR OTHER EXCHANGES, SERVICES and CALL CHARGES SEE THE DIALLING CODE BOOKLET.

To make a call first check the code (see above)

USE 6d or 1/- coins ONLY

HAVE MONEY READY, but do not try to put it in yet

LIFT RECEIVER, listen for dialling tone and **DIAL**

Ringing tone (burr-burr) changes, when the number answers, to

Pay tone (rapid pips) — Now PRESS in a coin and speak

(Coins cannot be inserted until first pay tone is heard)

Remember—Dial first and when you hear pay tone (rapid pips) press in a coin

INSERT MORE MONEY on dialled calls —

at any time during conversation, or, at once if pay tone returns

(On calls connected by the operator do not insert money until asked to do so)

For the Operator — dial 100

Frame No. 39

to the business of calls failing due to plant failures and congestion. In the busy hour congestion will be at its greatest, but again day (8 am–6 pm) period failure rates have been used, being the only measure available. This puts the estimated cost of failure due to Post Office plant at £2.9 million per year.

Miscellaneous failures (customers dialling wrong numbers, abandoning calls, etc) account for a further £4 million. So the overall cost to the business of the ineffective use of the telephone service, including unnecessary use of the operator services, is a rather frightening total of £30 million a year.

With an overall cost of this size, some improvement in the level may appear relatively easy to achieve. Such is not the case however. Nor is this a problem which is peculiar to the British Post Office; it is common to all Administrations and can only partially be solved by customer education and co-operation.

There appears to be no obvious way to reduce the number of customer engaged and no reply calls to residential customers.

Customer education can and does play its part, however. On business installations the telephone switchboard is often the first contact by the potential customer. The telephone is therefore regarded as the gateway to the company and the efficiency with which telephone calls are handled is often taken as a guide to the quality of the organisation. Telecommunications staff have long been aware of this and of the need to draw the attention of business customers to imperfections in their telephone practices. Where plant has been available they have encouraged the customer to rent additional lines when necessary and stressed the need for prompt answering on all lines.

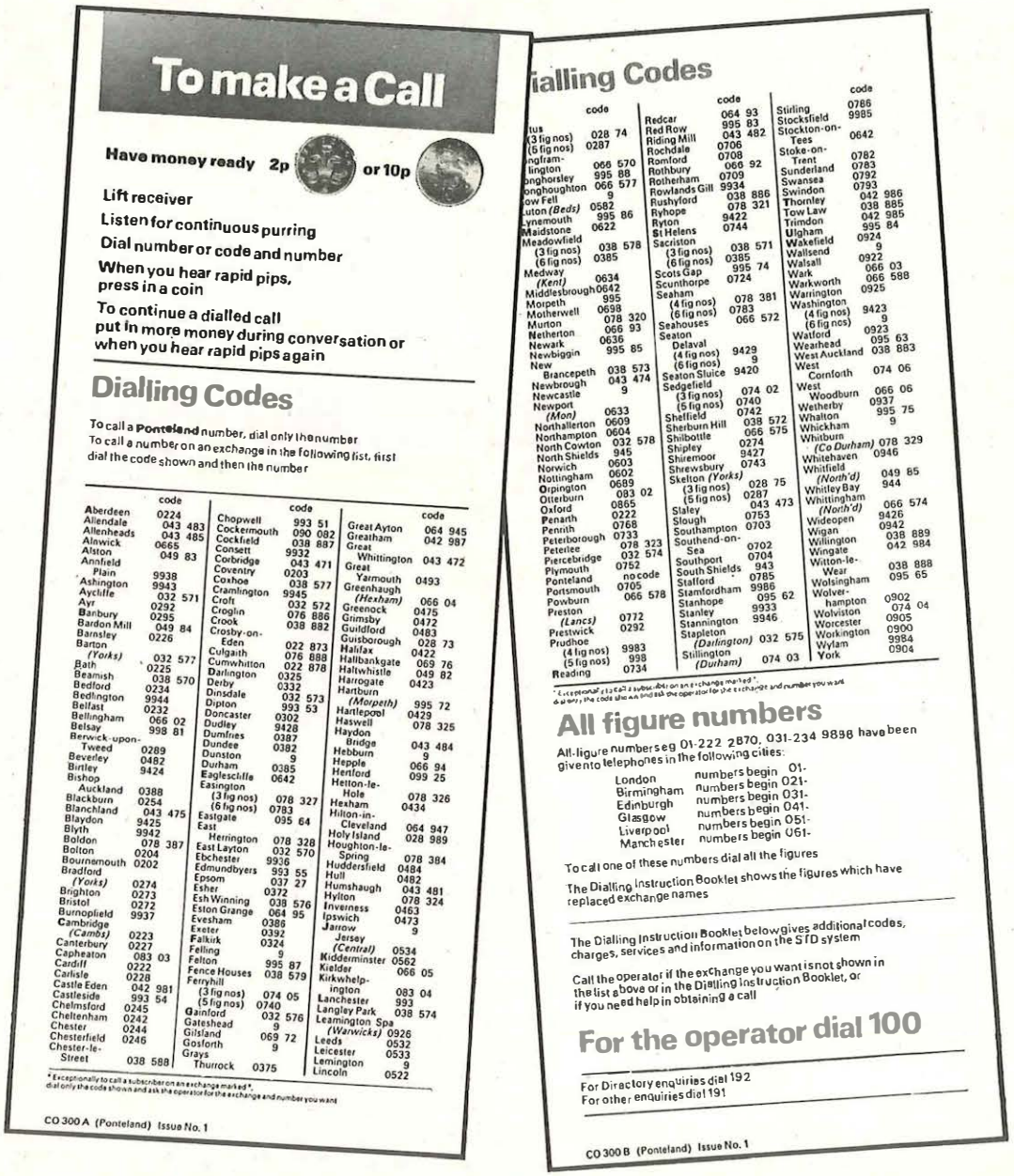
A variety of service literature, films etc is available to assist Telephone Managers when advising telephone users on such aspects as how to prepare an office directory; what to look for when selecting a PBX operator; how to be a good PBX supervisor; how to be an efficient operator or extension user, etc. All of these are designed to improve the efficiency with which our customers use the telephone service.

Mr F. A. Ryan is a Chief Telecommunications Superintendent in the Management Services Department of Telecommunications Headquarters. He is leader of the Statistical Organisation and Methods team which carried out the comprehensive study of the cost to the Post Office of ineffective telephone calls.

Mr T. C. Johnson is a Senior Telecommunications Superintendent working in the same team with particular responsibility for the examination of statistical procedures, production of management studies and special statistical studies.

See: Coping with congestion – page 18.

Replacing call-office notices like the one on the left with the new and clearer type on the right has resulted in a marked improvement in the public's use of telephones in kiosks – and a huge financial saving. The two-frame type makes striking use of colour and is more precisely worded. It is easier to read and includes 300 local and trunk exchange codes compared with about 100 on the old notices. The Post Office estimates the new notices have resulted in the elimination of 9½ million unnecessary calls a year for operator assistance, producing an annual saving of about £500,000. They are being progressively introduced throughout the country, but already plans have been made for a third frame to be added which will take the number of codes displayed to about 600. In areas favoured by foreign tourists the extra frame may be used to provide foreign-language instructions. Dialling Instruction Booklets may also be redesigned.



To make a Call

Have money ready 2p or 10p

Lift receiver

Listen for continuous purring

Dial number or code and number

When you hear rapid pips, press in a coin

To continue a dialled call put in more money during conversation or when you hear rapid pips again

Dialling Codes

To call a **Ponteland** number, dial only the number
To call a number on an exchange in the following list, first dial the code shown and then the number

	code		code		code
Aberdeen	0224	Chopwell	993 51	Great Ayton	064 945
Allendale	043 483	Cockermouth	090 082	Greatham	042 987
Allenheads	043 485	Cockfield	038 887	Great Whittington	043 472
Alnwick	0665	Consett	9932	Great Yarmouth	0493
Alston	049 83	Corbridge	043 471	Greenhaugh (Hexham)	066 04
Annfield Plain	9938	Coventry	0203	Greenock	0475
Ashington	9943	Coxhoe	038 577	Grimsby	0472
Aycliffe	032 571	Cramlington	9945	Guildford	0483
Ayr	0292	Croft	032 572	Guisborough	028 73
Banbury	0295	Croglin	076 886	Halifax	0422
Bardon Mill	049 84	Crook	038 882	Hallbankgate	069 76
Barnsley	0226	Crosby-on-Eden	022 873	Hallwhistle	049 82
Barton (Yorks)	032 577	Culgaith	076 888	Harrogate	0423
Bath	0225	Cumwhitton	022 878	Hartburn (Morpeth)	995 72
Beamish	038 570	Darlington	0325	Hartlepool	0429
Bedford	0234	Derby	0332	Haswell	078 325
Bedlington	9944	Dinsdale	032 573	Haydon Bridge	043 484
Belfast	0232	Dipton	993 53	Hebburn	9
Bellingham	066 02	Doncaster	0302	Hepple	066 94
Belsay	998 81	Dudley	9428	Hertford	099 25
Berwick-upon-Tweed	0289	Dumfries	0387	Hetton-le-Hole	078 326
Beverley	0482	Dundee	0382	Hexham	0434
Birtley	9424	Dunston	9	Hilton-in-Cleveland	064 947
Bishop Auckland	0388	Durham	0385	Holy Island	028 989
Blackburn	0254	Eaglescliffe	0642	Houghton-le-Spring	078 384
Blanchland	043 475	Easington (3 fig nos)	078 327	Huddersfield	0484
Blaydon	9425	(6 fig nos)	0783	Hull	0482
Blyth	9942	Eastgate	095 64	Humshaugh	043 481
Boldon	078 387	East Herrington	078 328	Hylton	078 324
Bolton	0204	East Layton	032 570	Inverness	0463
Bournemouth	0202	Ebchester	9936	Ipswich	0473
Bradford (Yorks)	0274	Edmundbyers	993 55	Jarrow	9
Brighton	0273	Epsom	037 27	Jersey (Central)	0534
Bristol	0272	Esher	0372	Kidderminster	0562
Burnopfield	9937	Esh Winning	038 576	Kielder	066 05
Cambridge (Cambs)	0223	Eston Grange	064 95	Kirkwhelpington	083 04
Canterbury	0227	Evesham	0386	Lanchester	993
Capheaton	083 03	Exeter	0392	Langley Park	038 574
Cardiff	0222	Falkirk	0324	Leamington Spa (Warwicks)	0926
Carlisle	0228	Felling	9	Leeds	0532
Castle Eden	042 981	Felton	995 87	Leicester	0533
Castleside	993 54	Fence Houses	038 579	Lemington	9
Chelmsford	0245	Ferryhill (3 fig nos)	074 05	Lincoln	0522
Cheltenham	0242	(5 fig nos)	0740		
Chester	0244	Gainford	032 576		
Chesterfield	0246	Gateshead	9		
Chester-le-Street	038 588	Gilsland	069 72		
		Gosforth	9		
		Grays Thurrock	0375		

* Exceptionally to call a subscriber on an exchange marked *, dial only the code shown and ask the operator for the exchange and number you want

CO 300 A (Ponteland) Issue No. 1

Dialling Codes

	code		code		code
tus		Redcar	064 93	Stirling	0786
(3 fig nos)	028 74	Red Row	995 83	Stocksfield	9985
(5 fig nos)	0287	Riding Mill	043 482	Stockton-on-Tees	0642
ngfram-tington	066 570	Rochdale	0706	Stoke-on-Trent	0782
onghorsley	995 88	Romford	0708	Sunderland	0783
onghoughton	066 577	Rothbury	066 92	Swansea	0792
ow Fell	9	Rotherham	0709	Swindon	0793
uton (Beds)	0582	Rowlands Gill	9934	Thornley	042 986
ynemouth	995 86	Rushyford	038 886	Tow Law	038 885
Maidstone	0622	Ryhope	078 321	Trimdon	042 985
Meadowfield (3 fig nos)	038 578	Ryton	9422	Ulgham	995 84
(6 fig nos)	0385	St Helens	0744	Wakefield	0924
Medway (Kent)	0634	Sacriston (3 fig nos)	038 571	Wallsend	9
Middlesbrough	0642	(6 fig nos)	0385	Walsall	0922
Morpeth	995	Scots Gap	995 74	Wark	066 03
Motherwell	0698	Scunthorpe	0724	Warkworth	066 588
Murton	078 320	Seaham (4 fig nos)	078 381	Warrington	0925
Netherton	066 93	(6 fig nos)	0783	Washington (4 fig nos)	9423
Newark	0636	Seahouses	066 572	(6 fig nos)	9
Newbiggin	995 85	Seaton Delaval (4 fig nos)	9429	Watford	0923
New Brancepeth	038 573	(6 fig nos)	9	Wearhead	095 63
Newbrough	043 474	Seaton Sluice	9420	West Auckland	038 883
Newcastle	9	Sedgefield (3 fig nos)	074 02	West Cornforth	074 06
Newport (Mon)	0633	(5 fig nos)	0740	West Woodburn	066 06
Northallerton	0609	Shelfield	0742	Wetherby	0937
Northampton	0604	Sherburn Hill	038 572	Whalton	995 75
North Cowton	032 578	Shilbottle	066 575	Whickham	9
North Shields	945	Shipley	0274	Whitburn (Co Durham)	078 329
Norwich	0603	Shiremoor	9427	Whitehaven	0946
Nottingham	0602	Shrewsbury	0743	Whitfield (North'd)	049 85
Orpington	0689	Skelton (Yorks) (3 fig nos)	028 75	Whitley Bay	944
Otterburn	083 02	(5 fig nos)	0287	Whittingham (North'd)	043 473
Oxford	0865	Slaley	043 473	Wideopen	066 574
Penarth	0222	Slough	0753	Wigan	9426
Penrith	0768	Southampton	0703	Willington	0942
Peterborough	0733	Southend-on-Sea	0702	Wingate	038 889
Peterlee	078 323	Southport	0704	Witton-le-Wear	042 984
Piercebridge	032 574	South Shields	943	Wolsingham	038 888
Plymouth	0752	Stafford	0785	Wolverhampton	095 65
Ponteland	no code	Stamfordham	9986	Wolviston	0902
Portsmouth	0705	Stanhope	095 62	Worcester	074 04
Powburn	066 578	Stanley	9933	Workington	0905
Preston (Lancs)	0772	Stannington	9946	Wylam	0900
Prestwick	0292	Stapleton (Darlington)	032 575	York	9984
Prudhoe (4 fig nos)	9983	Stillington (Durham)	074 03		0904
(5 fig nos)	998				
Reading	0734				

* Exceptionally to call a subscriber on an exchange marked *, dial only the code shown and ask the operator for the exchange and number you want

All figure numbers

All-figure numbers eg 01-222 2870, 031-234 9898 have been given to telephones in the following cities:

London	numbers begin 01-
Birmingham	numbers begin 021-
Edinburgh	numbers begin 031-
Glasgow	numbers begin 041-
Liverpool	numbers begin 051-
Manchester	numbers begin 061-

To call one of these numbers dial all the figures

The Dialling Instruction Booklet shows the figures which have replaced exchange names

The Dialling Instruction Booklet below gives additional codes, charges, services and information on the STD system

Call the operator if the exchange you want is not shown in the list above or in the Dialling Instruction Booklet, or if you need help in obtaining a call

For the operator dial 100

For Directory enquiries dial 192
For other enquiries dial 191

CO 300 B (Ponteland) Issue No. 1

A VOICE-AND-VISION telephone service which will enable two people not only to speak with one another but to see each other at the same time is one of the innovations which telecommunications administrations around the world are now studying.

If a viewphone service is to be offered to the public in this country, a huge amount of money will have to be invested in equipment. Yet a service of this kind is still so much an unknown quantity in every telecommunications respect that many of the unknowns must be eliminated before such an investment is made.

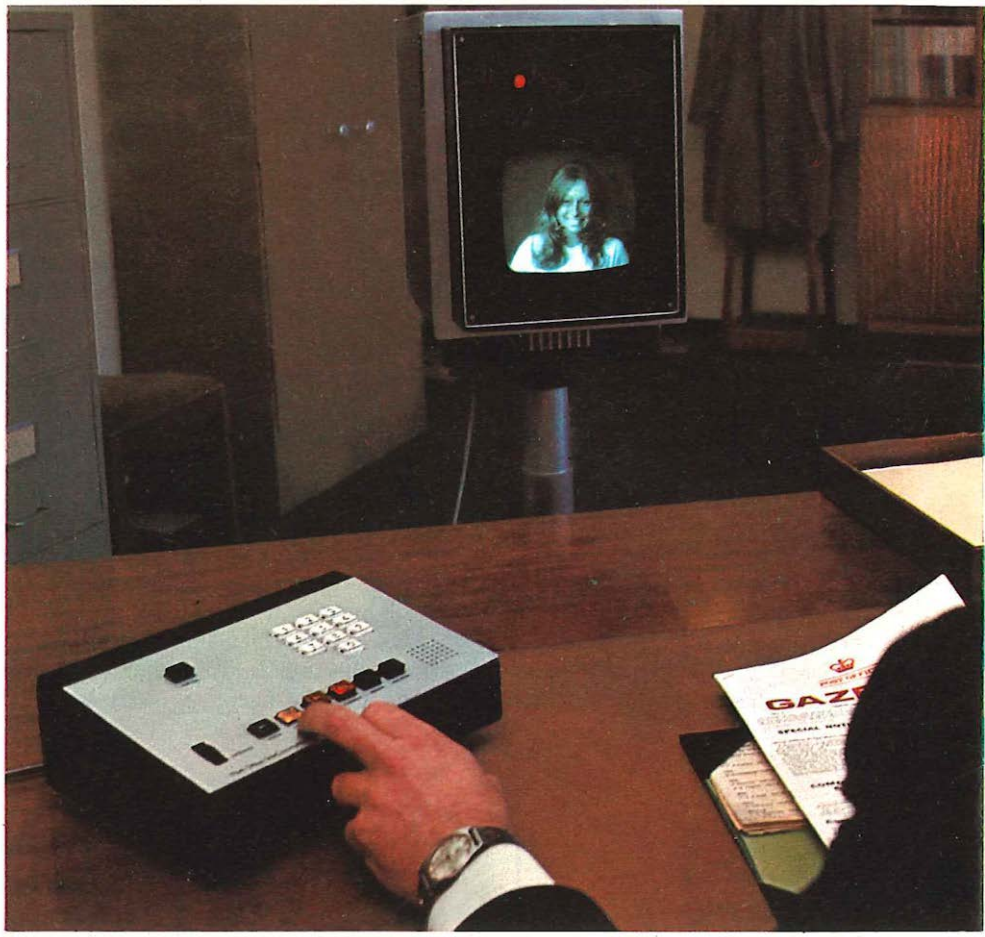
It is in an attempt to do just this that the Post Office is now conducting an in-house trial of viewphone – a public field trial would be premature at this stage – over a private network linking Post Office staff in a number of offices in London headquarters buildings and the Research Station at Dollis Hill.

The trial should bring into focus some of the large number of subjective aspects regarding the performance of a viewphone service which have to be resolved. Will the customer, for example, accept a picture with less information content than public television, for although viewing standards in the trial will give the impression of being similar to those of BBC and ITV, the viewphone picture will be very much smaller than is provided by the household television set. Other questions that need answers concern the depth of field, viewing distance, lighting conditions and control arrangements.

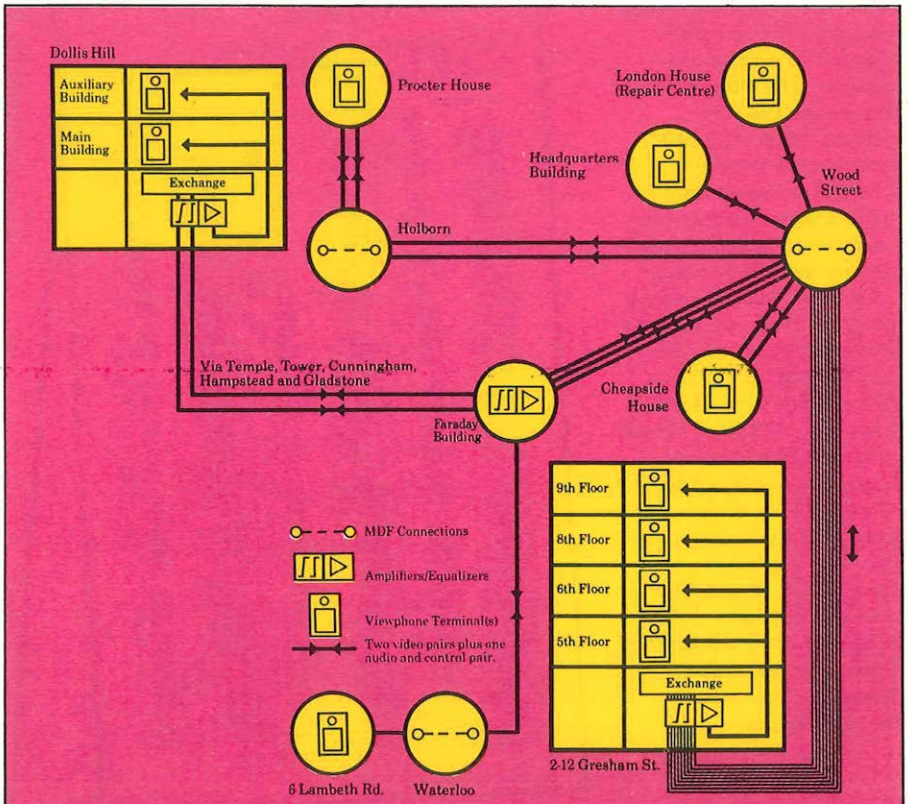
There are many technical and operational features which must also be resolved. These include the performance adequacy of the transmission and switching equipment and the viewphone terminal, and, of course, the servicing arrangements for all this equipment.

For the trial sufficient equipment has been provided to permit a maximum of 18 people at any one time to be connected to the viewphone network which has been set up. A number of offices within the various buildings involved have been wired for service. This will allow the participants to be changed so that different communities of viewphone interest will be created and more data provided. Those who will take part have been selected from the management and directorate, particularly in the Development, Research and Marketing areas, who will be directly involved in taking major decisions about viewphone.

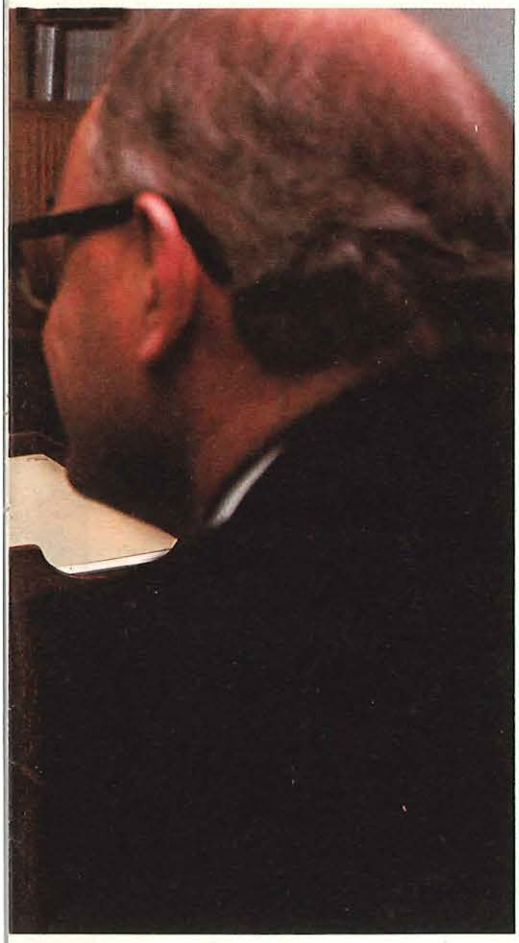
The two viewphone exchanges which have been established, one at Telecommunications Headquarters in Gresham Street and the other at Dollis Hill, are linked through tie lines to form a private network which is completely separate



The face to face



THE EXPERIMENTAL VIEWPHONE NETWORK



Left: The author of this article, Mr C. F. J. Hillen, receives a call from Miss Jo Giordano who is secretary to the Project Director of the viewphone trial, Mr C. A. May.

telephone

CFJ Hillen

Keying

Ringing

Busy

Number unobtainable

Engineering test

The normal dialling and ringing tones are heard when a viewphone call is being set up, but to give the caller confidence that the vision system is also working these symbols appear on the screen to correspond with the tones.

from the public telephone network. A fault-reporting service has also been established and the complete network in many respects has to mirror the servicing responsibilities of the telephone network, but with the added complication of the vision features.

All this has required the provisioning of an entire range of equipment not yet available on the commercial market and has involved Research Department in the investigation and selection of practical picture standards, the subsequent development of viewphone terminal equipment containing camera and vision monitor, the production of subsidiary equipment for controlling the transmitted and received picture and associated speech, and production of wideband exchange switching equipment.

The primary objective for the viewphone instruments used in the trial was to obtain equipment capable of providing a good quality monochrome head-and-shoulders picture of the participants. The picture parameters chosen follow closely those currently being considered at international telecommunications committee level where efforts are being made to determine a world-wide standard. Particular parameters used on the field trial equipment include a 319-line structure associated with a line-time base of 8 kHz. With a picture height of some five to seven inches viewed at a distance of about four feet these parameters will yield a picture whose subjective quality is comparable with 625-line broadcast television. The differing picture structure will permit a transmission bandwidth of 1 MHz to be used instead of the more usual 5 MHz of television.

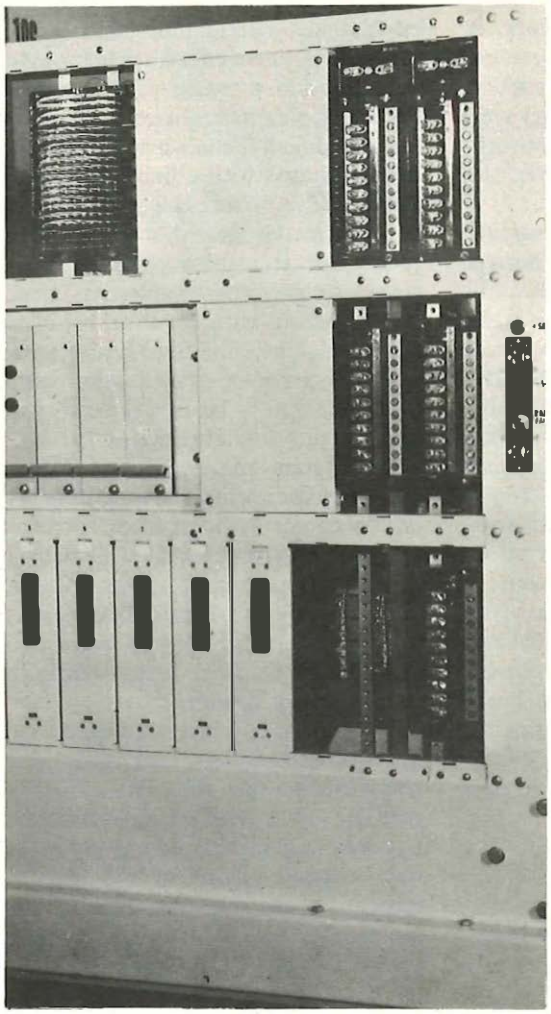
The camera employed has adequate sensitivity for normal room lighting, but has an automatic adjustment so that it will be able to cater for the wide range of light levels expected under differing office conditions. A brightness control has also been provided to correct for variations in incident light striking the visual monitor display.

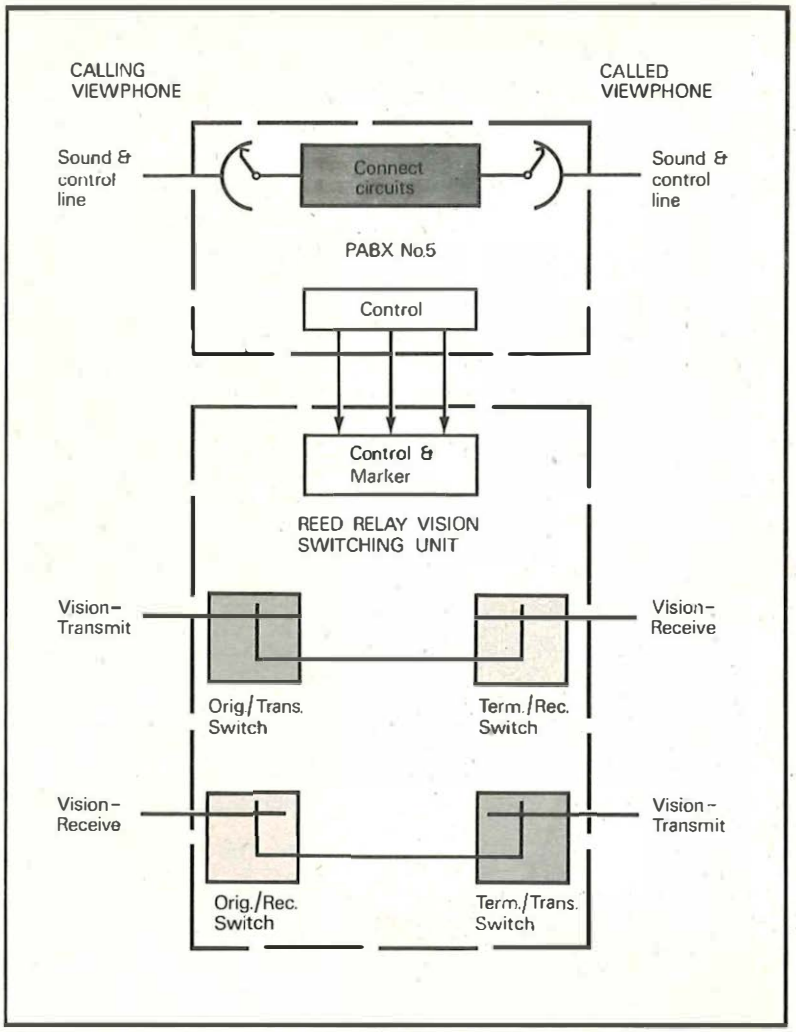
The monitor uses conventional cathode ray tube techniques. Two versions are being used on the trial – one with a picture size of 147 mm (5.8 inches) wide by 135 mm (5.3 inches) high and another with a larger picture of 193 mm (7.6 inches) by 175 mm (6.9 inches). User preferences for the smaller or larger picture will be determined.

A novel feature built into the instrument is a warning indicator visible when the subject moves "out of camera" – this works on the gunsight principle and a red light appears on the face of the instrument when the subject is not in line with the camera.

For the trial a floor-standing pedestal-mounted instrument has been chosen. This assisted the production of the first experimental equipment as it avoided to some extent the volume restrictions which would have been imposed by the smaller confines of a desk-mounted item and allowed the use of proprietary camera and monitor equipment, suitably modified. It has also permitted a greater degree of freedom in placing the instrument in offices during the trial without rearranging of desks with respect to lights and windows, and enables the picture to be viewed at a more favourable distance. However, the pedestal arrangement does not readily permit the association of visual aids such as special lens/mirror attachments for document transmission. Future developments will undoubtedly involve desk-mounted versions.

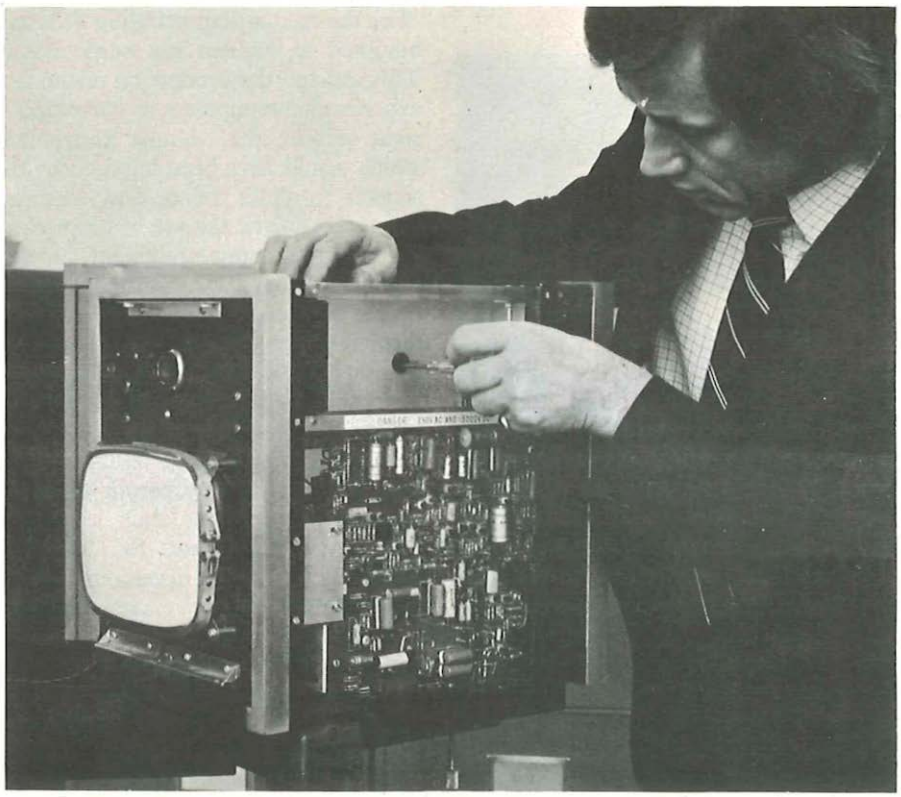
Desk-mounted control units produced in Telecommunications Headquarters Circuit Laboratory are used to set up a viewphone call. The unit includes a seize button which when depressed





Viewphone exchange trunking is shown in the diagram and the vision switching unit is pictured on the left.

Below: The viewphone instrument is made up of proprietary equipment which has been modified for the trial. The overall assembly of the instrument is by Prowest Electronics, using their television monitor. The camera is supplied by Link Electronics.



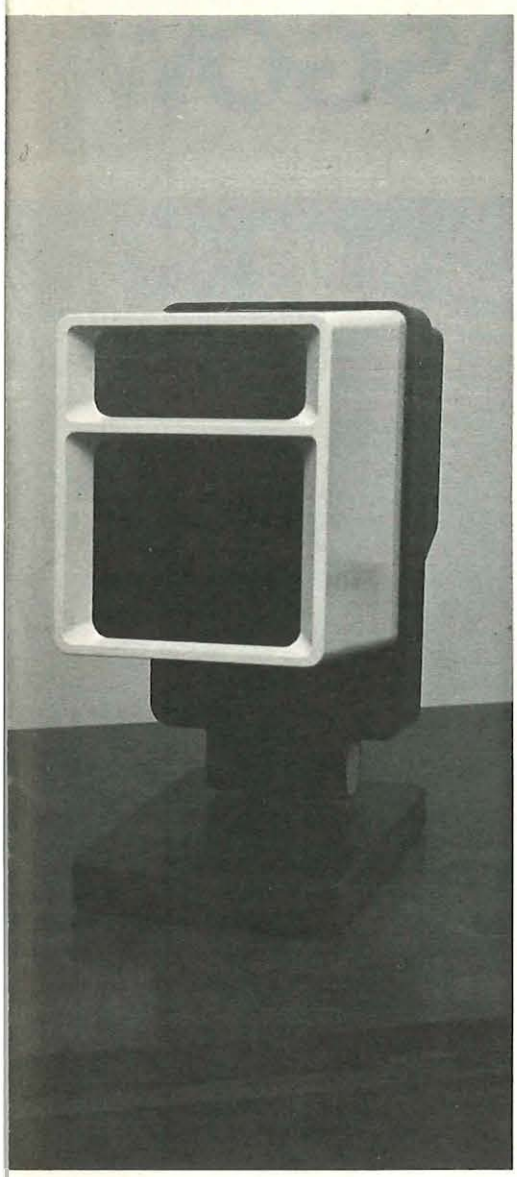
Right: The instruments in the present trial are all mounted on a pedestal. This model shows how a desk-mounted viewphone might look.

will be equivalent to lifting a telephone handset off the switchhook. A push-button key assembly is used for dialling and other controls are for picture brightness, a self-view button to check local lighting conditions, a picture transmit button to give the user the option of being seen or otherwise and volume and microphone mute buttons.

The microphone mounted in the control unit and a loudspeaker on the viewphone instrument itself forms the Loudspeaking Telephone which has been preferred to the standard handset because it will allow "face-free" and "hands-free" conversation. The unit also houses a tone caller for receipt of the incoming ringing signal.

The viewphone exchange is required to switch the speech and the 1 MHz send and receive visual signals. On the trial this is achieved by employing a standard PABX No. 5 for the speech path which also controls an associated vision switch unit formed by reed relay switches – the standard TXE2 "B" switch is used.

During the setting up of a call the ap-



THE NEXT 30 YEARS

Professor Colin Buchanan, Professor of Transport at Imperial College, has begun a study for the Post Office on how people will live and get about in towns in the 1980s and 1990s.

It is one of a series of social studies being carried out for the Post Office to find out the changes that are likely to occur in the British way of life over the next 30 years. The results will help to point the way in which new and existing telecommunications services could play a fuller part in the life of the nation.

The first study was carried out by a team led by Mr Colin Leicester of Cambridge University Department of Applied Economics. They made a forward analysis of Britain's economic development up to the turn of the century – covering consumer expenditure, public-sector spending, investment, foreign trade, industrial output and other key variables – with economic forecasts for the years, 1981, 1991, and 2001.

The study was completed last year, and has provided a framework for the other studies in the present series. With leisure time gradually increasing, it underlined the increasing importance of the way in which the people of Britain spend it and the second study now being carried out by Mr Roger Mitton, an Institute of Community Studies research worker, is basically an examination of leisure. It will look at such questions as – how much spare time people can expect during the rest of this century and how they will use it? Will people retire earlier, take longer or more frequent holidays, work a shorter week, do more shift work? From these and other factors the Post Office will expect to identify what influence leisure time may have upon telecommunication systems planning.

Professor Buchanan's study will take a special look at likely changes in the environment and in transport patterns which are of vital importance to the Post Office. The study will forecast likely developments in this area up to the end of the century.

Estimate will also be made of the future size, arrangement, density and other features of residential, commercial and industrial areas, and likely traffic flows between these areas and the possible effect on the environment. The study will point to areas where, for example, future Post Office telecommunication services could provide a substitute for physical movement. Transport between cities and its effect on town traffic, freight developments, changes in international travel patterns and possible effects of a Channel Tunnel, will also be taken into account. In addition to looking at urban areas generally, the study will examine a selected region in greater depth.

The Post Office has further studies in view, including a study into ways in which it can help educationists of the future. The series has been arranged by the Long Range Studies Division of Telecommunications Headquarters.

propriate dial, ringing, busy, number-unobtainable tones are heard by the caller, but in addition equivalent vision signals appear on his monitor screen. These have been found useful to provide confidence that the vision system is working.

Another feature of the exchange is that a level has been allocated to provide access to a caption-display camera. This display will be used for a number of purposes during the trial. For example, it permits demonstration of the system by one participant without his having to call another perhaps at an inopportune moment; it can be used as a common reference point for line-up purposes and as a "notice board".

An analogue form of transmission has been chosen for the 1 MHz vision signals. Conventional pair-type cable of the local distribution network has been used together with shaped-gain correcting amplifiers which compensate for the insertion loss and waveform distortion of the cable pairs over the 1 MHz band. The amplifiers are introduced at up to 4 km spacing depending on cable conductor gauge. The longest links of the trial, between Dollis Hill and Gresham Street in the City, have a route length of 18 km requiring seven amplifiers in each direction of transmission. The local ends within buildings are provided on screened multipair cables which have also been amplified and corrected.

At this relatively early stage of the trial it is premature to assess the benefits or otherwise arising from the transmission of a "head and shoulders" picture. Because of the increased complexity and information content, a viewphone service is always likely to be considerably more expensive than the telephony counterpart, and some additional features such as conference, facsimile copying and microfile access may well be required at least by certain customers to make the cost benefits more attractive.

The future status of viewphone compared to the telephone is difficult to predict. Its impact will depend on the cost of the competing alternatives – will point-to-point physical travel become easier or more difficult in the future? Will travel costs increase comparatively? Will facsimile services compete with or complement viewphone? What universality of penetration can viewphone be expected to achieve? Will it be restricted to certain classes of customer such as the banks, the police, the hospitals and medical profession or will it achieve a more general use with perhaps even vision street call offices?

One thing is certain, viewphone will be wanted by some customers and the Post Office will be required to decide how best the customers' needs can be met. The current headquarters trial is the first of what may prove to be a long series of steps to assist such decisions.

Mr C. F. J. Hillen, an Assistant Staff Engineer in Telecommunications Development Department, has been concerned throughout his career with development aspects in the telephone switching field. His current responsibilities include private branch exchanges and he is the Project Manager of the viewphone trial.

DIAL HOUSE, GLASGOW

Dial House dominates this section of the huge Anderston redevelopment area. The new building is linked by a three-storey wing to the old Telephone House on the extreme right of the picture. The road immediately to the left of Telephone House is Bishop Street over which Dial House forms a bridge. The section of the new building sitting on concrete "stilts" will accommodate a pedestrian deck and shopping precinct. The redevelopment area and tunnel building are shown in the diagram on the right.

growing with a new city centre

R N Palmer

GLASGOW's Dial House has provided Scotland with one of the largest telecommunications centres in the United Kingdom. Erected at a cost of about £2½ million the centre came into partial use in the summer of last year. When fully operational it will mark the completion of a very significant step in the trunk mechanisation programme for Glasgow and the West and North of Scotland.

Dial House will accommodate separate incoming and originating trunk telephone switching units, a suite of 96 cordless assistance switchboards and a major installation of transmission equipment. In addition it will house the Glasgow main switching centre in the transit network, which the Post Office is now developing to bring STD to every telephone subscriber in the United Kingdom. And in 1973 Dial House will be one of the first International Control Centres outside London when it takes over control of international trunk traffic originated in Scotland and the North of England.

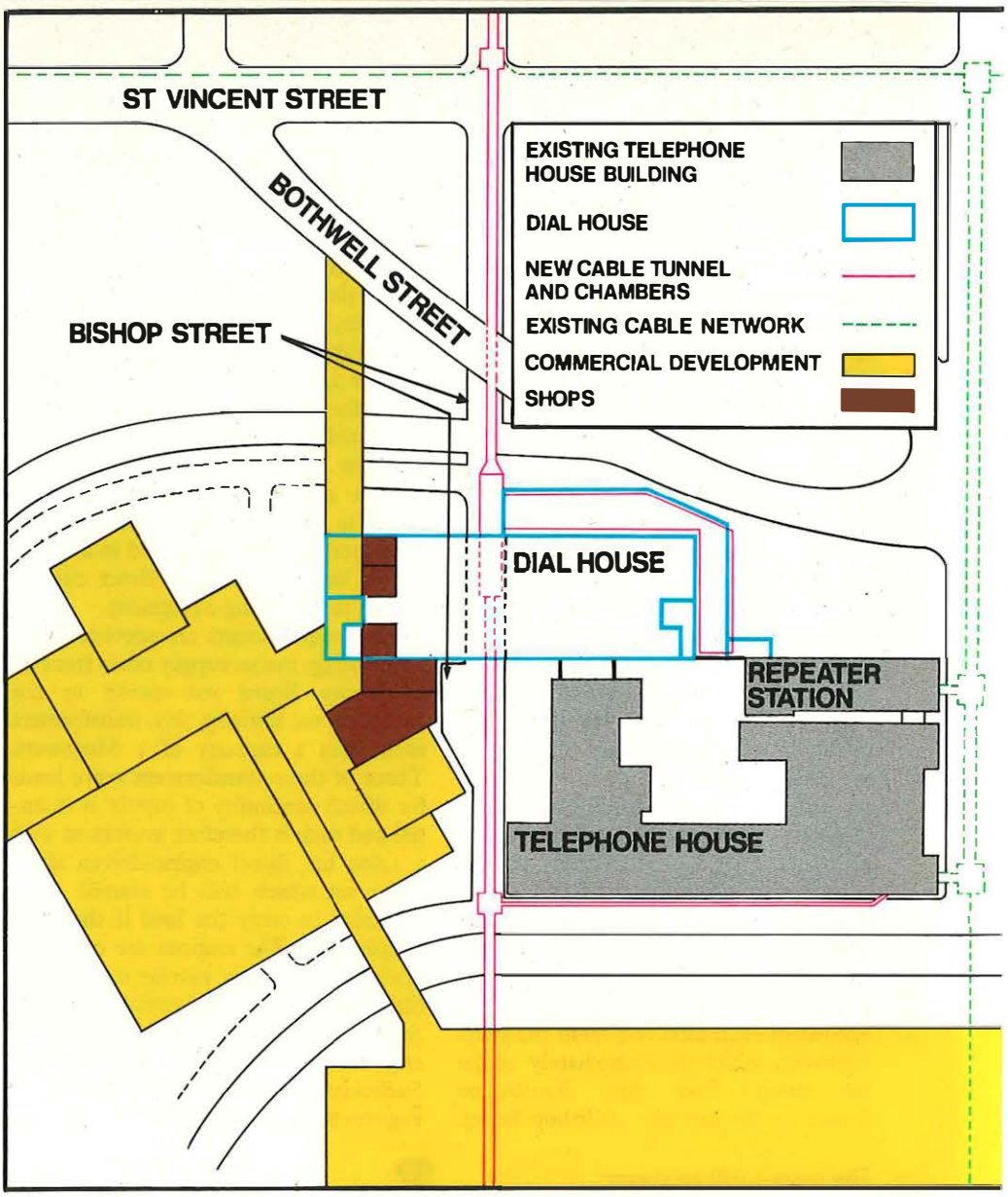
The originating trunk unit, known as "Claymore" and brought into service in

Some of the 96 cordless switchboards which will form the "Fraser" unit for operator-assisted trunk calls.

June last year, has about 2,500 trunk outlets and initially will handle nearly 36,000 trunk calls from Glasgow subscribers each hour during the busy part of the day. The incoming unit, "Baird", partly in service by the end of last year, will handle traffic mainly from distant trunk centres through some 2,100 circuits which will amount to some 29,000 calls each busy hour.

Because of delay in the building programme, construction work and much of the equipment installations had to be carried out concurrently so that very real problems in keeping equipment free from dirt and dust had to be solved. And even now extensions to the Baird and Claymore trunk units, at a cost of about £1¾ million, are commencing almost before the initial installations are completed and will require to be in service next year. These will increase the Claymore trunk outlets to 5,300 and the number of calls handled to 75,000 each hour during the busy part of the day and the Baird unit to 4,300 local junction circuits handling some 59,000 calls each busy hour. According to present forecasts, still further extensions will need to be in service in 1976 and 1979 to meet increasing demand.

Extraordinary problems were encountered in planning the building, leading in cable and in providing power. The planning problems arose because the site for the new building, which is close to the existing trunk switching units at



The busbars in the power plant which supplies the "Baird" incoming trunk switching unit. The −50v bars are covered with a blue plastic insulation material.

Part of the refrigeration machine plant which supplies cold water to the air-conditioning system. It cools the air in all apparatus space and switchrooms.

Telephone House, is within Glasgow's huge Anderston redevelopment area. About 40 acres around Telephone House are being redeveloped as a commercial centre with shops, a market, bus station and residential blocks. A feature is a pedestrian "deck" with car parking and service delivery facilities below. A large telecommunications building did not fit easily into this concept.

Even with the maximum 12 floors permitted by the planning authority, the remaining available ground near Telephone House was not sufficient to give the floor space required. The solution has been to allow the new building to bridge the street on the west side of Telephone House and where the enlarged building encroaches on the future pedestrian deck, shops have been incorporated. These are to be made available to the property developers involved in the Anderston scheme.

A tunnel under the same public road (Bishop Street), one of the longest ever constructed for the Post Office, was the only practicable method of connecting the new building with the existing underground cable network. To provide for adequate flexibility for so large a building, capacity for 200 cables was needed in each direction from the cable chamber, which is immediately under the ground floor main distribution frames on the east side of Bishop Street. The tunnel has been taken southwards for about 400 yards and northwards for 120 yards to a point where it terminates in a 60 foot-deep vertical shaft up which cables will need to be brought to link with existing duct lines. This section, however, is now being extended further northwards and then eastwards for another 2,400 yards to provide for future needs for trunk cable outlets under the congested streets in the centre of Glasgow.

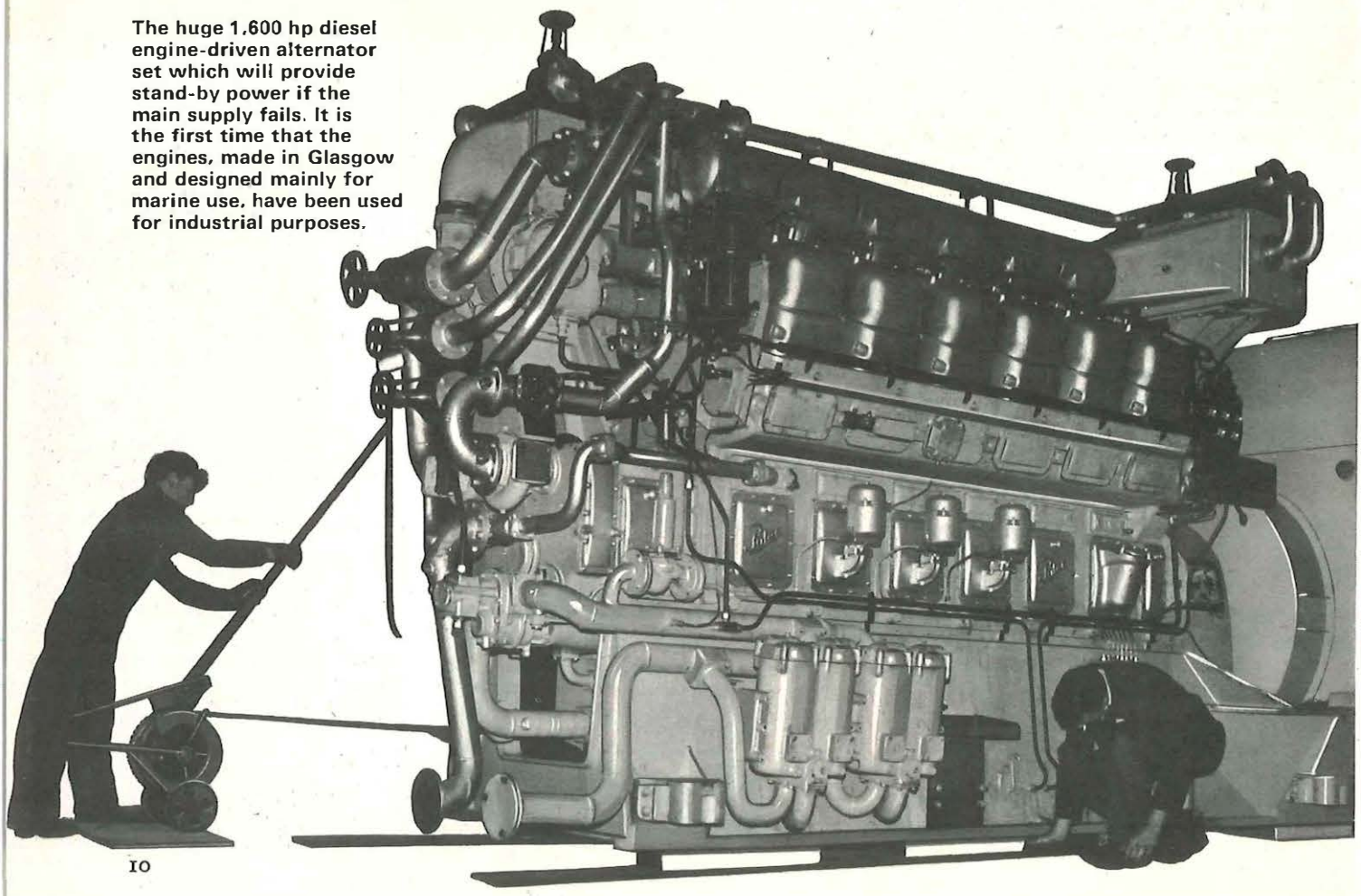
Power needs too were very large in order to meet requirements both for machinery normally required in a building of this size and for direct current supply to switching equipment.

These requirements are provided by a high voltage mains supply taken from an Electricity Board sub-station in the basement to, initially, five transformers each with a capacity of 1 Megawatt. Three of these transformers serve loads for which continuity of supply is essential and each is therefore associated with a 1,600 hp diesel engine-driven alternator set which will be started automatically to carry the load if the main supply fails. The engines are of a type designed mainly for marine use and not hitherto used for industrial purposes. Space has been planned for two further engines, alternators and transformers. Sufficient fuel is stored to enable the engines to run continuously for 14 days. The engine exhaust pipes, each almost 2 feet in diameter, are taken 165 feet to the roof in a structural duct in the centre of the building.

To supply direct current power to the switching equipment there are two 50-volt installations of batteries and rectifiers of ultimate capacity respectively of 20,000 and 16,000 amperes peak load. The building is designed to house at least one maximum-sized battery on each floor, the batteries to be vertically above one another. The two main rectifier power plants will be on the third and sixth floors respectively, each being associated with batteries on the same floor, the floor below and the floor above. In this way an attempt has been made to minimise the cost of extra strengthening of the building and the cost of power distribution.

Perhaps all the problems which have occurred during the project were inevitable when one considers all the numerous factors that are involved in an operation of this size. Dial House, however, is now on its way to being something of a monumental achievement in telecommunications in Scotland.

Mr R. N. Palmer, Regional Engineer at Telecommunications Headquarters in Scotland from 1961, was Project Manager for Dial House until his retirement at the end of December last year.



The huge 1,600 hp diesel engine-driven alternator set which will provide stand-by power if the main supply fails. It is the first time that the engines, made in Glasgow and designed mainly for marine use, have been used for industrial purposes.

TXE4 A BIG BROTHER FOR TXE2

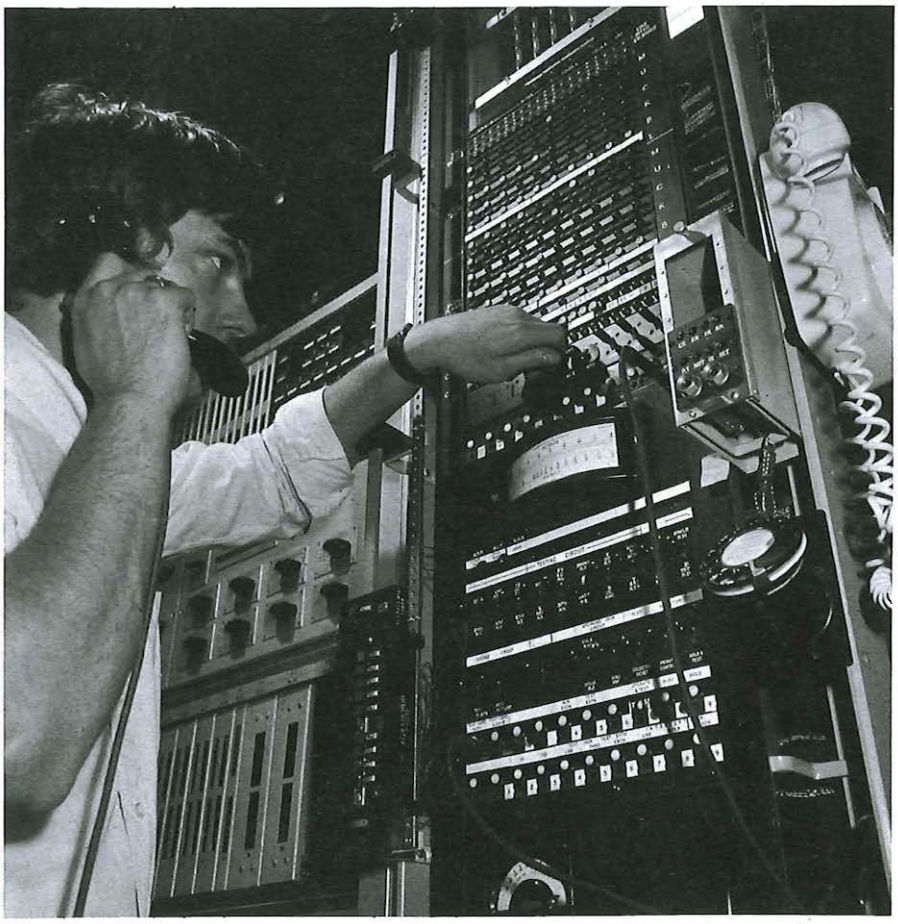
J Tippler

The control area of the TXE4 which was on field trial at Tudor Exchange, London. In the foreground a test is carried out on a plug-in program unit.

THE POST OFFICE has signed a £12½ million contract with Standard Telephones & Cables Ltd. for the supply of electronic telephone exchange equipment known as type TXE4. The contract covers the provision of about 20 large local exchanges in cities and large towns. The first exchange is planned to open in Birmingham in 1975, and others will quickly follow. TXE4 has been designed to bring the benefits of electronic standards of performance and an increased facility potential to busy exchanges in city and urban areas. It did not appear overnight.

After a period of intensive research and development work carried out jointly by the Post Office and its exchange equipment suppliers under the Joint Electronic Research Agreement during the nineteen fifties and early sixties, a decision was made to concentrate electronic-exchange work on systems which made use of reed relays to switch the speech connections. This type of relay is fast-operating – lending itself to electronic control – and its use avoids the need for the special conversion equipment between the customer's line and the exchange which might be necessary if other types of electronic component were used for the same purpose.

A further decision was that it would be necessary, for various technical and economic reasons, to design small exchanges and large exchanges differently. Work on the small reed-electronic exchange design progressed rapidly, and in 1966 the first production exchange was opened at Ambergate in Derbyshire. This type is known as TXE2, and by the end of 1972 there will be about 300 of them in service, with an installation programme extending into the future. Meanwhile, in parallel with the work on the small exchange, development of a system for large exchanges was begun. It is this which has culminated in the TXE4

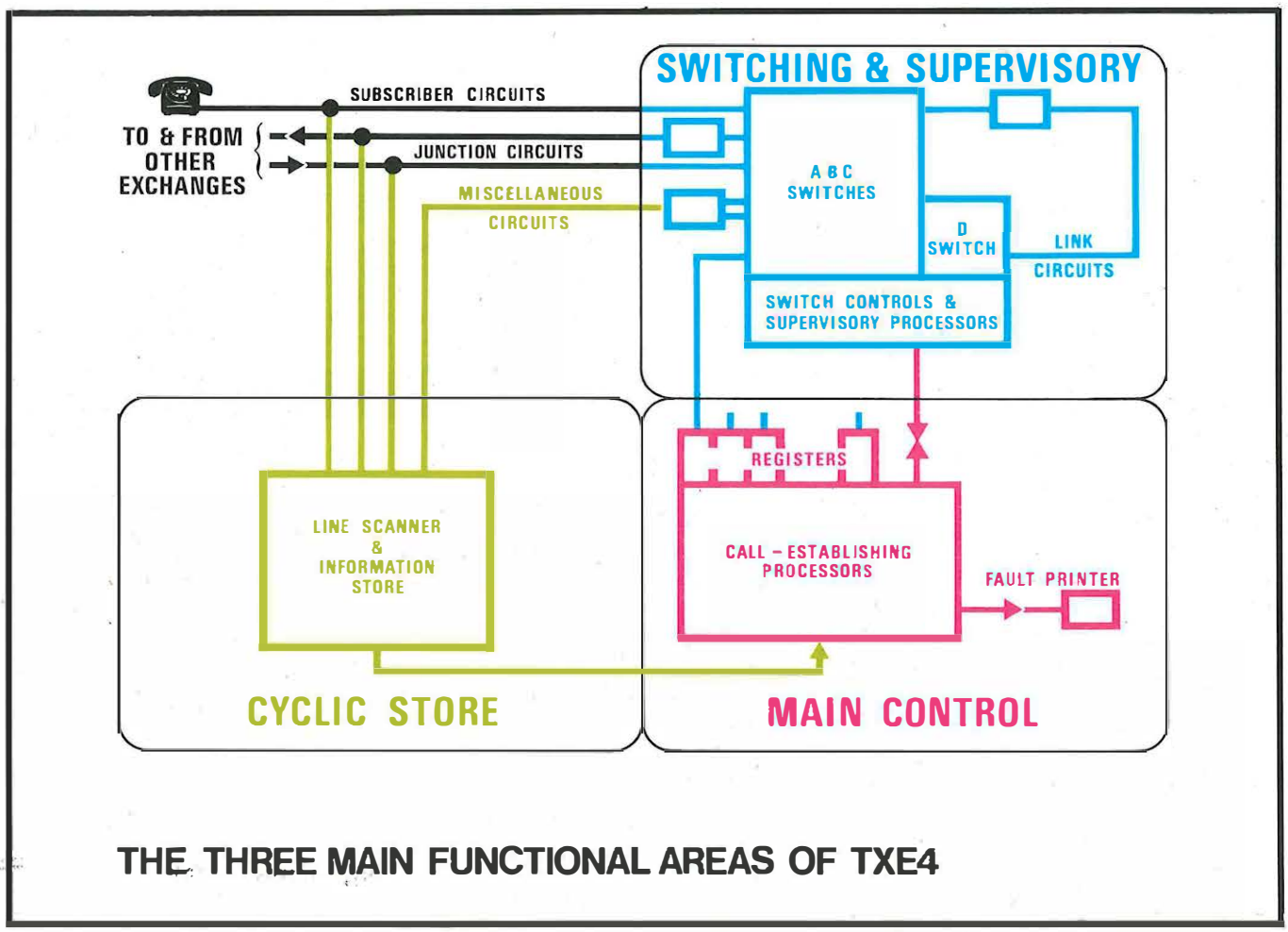


Call trace equipment is operated at the test desk.

system and the greater length of time required for the development reflects the problems which are encountered in designing economic systems for the large-exchange application.

The first version of the large reed-electronic exchange was TXE1, of which a 3,000-line example has been giving satisfactory service at Leighton Buzzard since 1968. TXE1 already contained some of the principles still found in TXE4, but was not judged right for regular production. The next stage was TXE3, when the results of an increasing accumulation of experience were fed by the Post Office and manufacturers into an intensive joint study and definition of the desirable features of a large-exchange system. A 200-line model of TXE3 was made and gave excellent public service in central London from 1968 to 1970. TXE3 was considered to be basically right, and it is from further refinement and cost-reduction of this system that TXE4 has been developed. During the final phase of development, the work has been supplemented in the Post Office by comprehensive economic studies and by a massive computer-based study of the traffic-handling characteristics of the system.

All the development work up to the initial system-definition stage of TXE4,



THE THREE MAIN FUNCTIONAL AREAS OF TXE4

was carried out co-operatively by parties to the Joint Electronic Research Agreement. The final system-refinement and detailed engineering of TXE4 is being carried out by STC in close consultation with the Post Office.

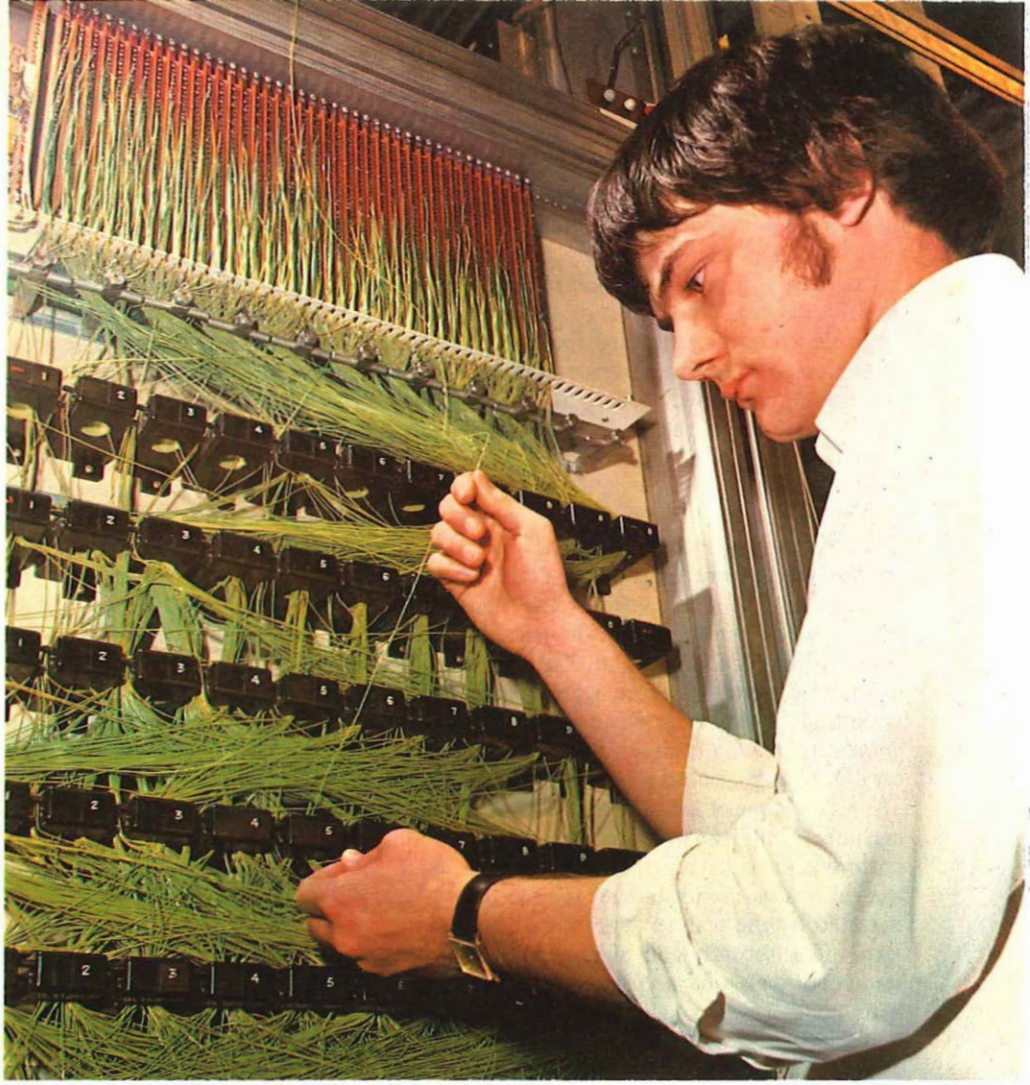
What then is TXE4?

It is a system designed to complement TXE2 in particular, but also the crossbar systems, in meeting the increasing needs for modernization and growth of the Post Office telephone exchange network. It is designed to provide local exchanges in the range from about 3,000 lines to an upper limit of about 40,000 lines. It has a high degree of electronic common control, which incorporates stored-program techniques to provide extra potential for the introduction of new facilities. Automatic fault-avoidance and fault-indicating features will give an improved standard of service and facilitate maintenance.

Physically, the TXE4 equipment is based on an equipment practice similar to that used for TXE2, though details are different. Almost everything is mounted on small plug-in units as an aid to installation and maintenance, and much of the inter-rack cabling is expected to be plug-and-socket connected. The TXE4 equipment itself will generally require less space than corresponding conventional Strowger-type equipment.

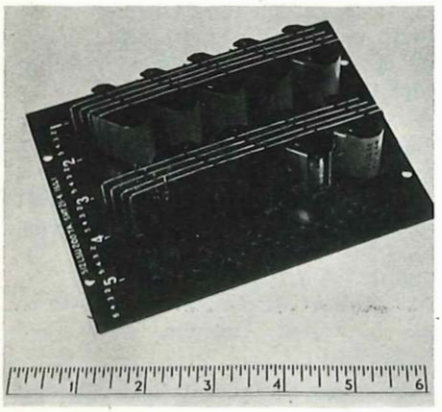
TXE4 provides a full range of current Post Office facilities and has an inherent capability for additional new ones such as keyphone and personal-code calling. It can be used equally well in Director and Non-director areas. It has been designed so that exchanges can be extended in size more quickly and easily than with any existing system, a feature of vital importance in the rapidly growing Post Office network.

The diagram shows some of the key features of TXE4. Viewed at the system level, an outstanding feature is its simplicity – though, of course, some of the individual circuits may be complicated, just as in the conventional types of exchange. There are three principal functional areas. The switching area contains the reed-relay switches, arranged in four switching stages A to D, together with "link" circuits and the electronic switch controls used to select free switch paths and to operate the corresponding reed relays when calls are connected. All customer and junction lines are terminated at the A stage of the exchange, along with all other types of circuit requiring interconnection, such as registers, manual-board circuits, coin-and-fee check equipment, and so on. Any two of these terminations may be connected together during a call simply by operating switches to connect one side of a free link circuit to one termination and the other side of the link circuit to the other termination. This is rather like linking two jacks on a manual switchboard by plugging in the two cords of a cord circuit.



Threading a subscriber's wire in the cyclic-store area.

A reed-relay matrix showing the assembly.



The cyclic-store area contains an electronic line-scanner and an electrical store of all the necessary information relating to every customer or other termination on the exchange. The information includes such details as a customer's directory number, the identity of his location on the A switches, and his class-of-service – ordinary, call-office, shared-service, etc. A single wire connected in the store is in most cases all that is needed to record the information for any particular customer. For junction or other terminations, corresponding information is stored. In addition, the store contains all code translations and routing information for the exchange. The term "cyclic" is used because all this information is presented repetitively in a never-ending cyclic sequence along very high speed signalling paths to the main control. For instance, a customer's line is inspected by the scanner six times a second, and on each occasion the state of the line – free, busy, or temporarily out of service, etc – is indicated to the main control along with the related number and class of service information. If no action is required, it is ignored.

The main control area contains the programmed call-setting processors which master-mind the setting up of new calls. They act on information received from the cyclic-store area or dialled or keyed into registers by customers or operators, and they issue instructions at very high speed to the switch controls to cause the required connections to be made. If at any stage in these operations faulty equipment is encountered, the processors automatically repeat the necessary operations using different equipment. The customer will generally be unaware

of trouble. In addition the processors control automatic routine checks of all main items of exchange equipment, and report to fault teleprinters any failures detected by routines or in ordinary traffic. If a punched-tape unit is substituted for a teleprinter, the resulting record can be subjected to computer analysis as an aid to fault diagnosis.

The program of the main control is contained on a small number of special plug-in units. Each step of the control program is represented by a wire threaded through particular cores in an array of small ferrite cores. The pattern of threading of a wire determines the actions to be carried out at the corresponding step of the program. This type of stored program is secure against electrical interference or power failure, and yet can be readily changed when necessary by changing plug-in units.

As an example of the system operation, consider a call from a TXE4 customer to a customer at a distant exchange. When the caller lifts his telephone, the fact is detected by the scanner within the next sixth of a second, and signalled with number and class of service details to the main control, which selects a free register. Any register will do: all customers – and all other lines – have access to all registers. The main control next signals details of the A-switch locations of both customer and register to the switch controls, and a suitable free link circuit and switches are chosen. This selection takes about a thousandth of a second, during which a large number of possible paths is considered. By keeping the time short the main control can handle a large number of calls. Finally, the chosen switches are operated by the switch controls in about a thirtieth of a second, the calling line is connected to the register, and dial tone is returned.

When the customer has dialled the code of the wanted exchange via the register into the main control processor, the processor compares the dialled information with the output from the cyclic store. On discovering that the information represents a distant exchange, the processor again consults the store and scanner to identify a free junction on the required outgoing route. Subsequently, it signals the junction identity together with the caller's identity to the switch controls, and by similar actions to the earlier ones a free path is chosen and operated to connect the caller to the outgoing junction. The register remains associated with the call until it has transmitted all necessary dialled or translated information forward to the distant exchange. Other types of call are established by similar sequences of actions.

Each of the three areas shown in the diagram is built up from identical units of the appropriate type. For instance, the main control area may have from 2 to 20 identical main control units according to the number of calls made in the busy hour. All units in any one area can interwork with all units in the other areas. Thus each area of the exchange can grow independently of the others to meet the particular needs of the local telephone customers. A further benefit of this principle of standard unitization is that a customer's call can be handled by any of a number of identical units. If one of the units is faulty, the others will carry on.

To sum up. The development of TXE4 is the outcome of a lengthy period of study and design. The use of a simple standard trunking principle and a common method of connecting customer and other terminations to the exchange combine with the programmed control and the unitization of the system to give it considerable flexibility in application and usage. The large-scale use of electronic techniques, and the automatic checks and fault-print facilities, promise desirable new standards of performance for the larger telephone exchanges. All together, TXE4 should be a valuable addition to the range of new telephone systems now available, and should be able to play a significant part in modernizing the telephone network. Its potential is now subject to final rigorous and realistic validation.

Mr J. Tippler is an Assistant Staff Engineer and head of the reed-electronic exchange section of Telecommunications Development Department. He is currently responsible for technical activity in connection with TXE2 and TXE4.

New members join the Board

Mr Kenneth Young

Sir James Lighthill

Mr Derek Gladwin

Mr Robert Appleby

FOUR NEW members joined the Post Office Board on January 1.

Mr Kenneth Young will serve in a full-time capacity as Member for Personnel and Industrial Relations. He succeeds Sir Richard Hayward, the Member for Industrial Relations, who retired on health grounds. Mr Young, who is 41, has held personnel management appointments with Elliot Automation Ltd, Massey Ferguson (UK) Ltd, Smiths Industries Ltd and prior to joining the Post Office Board was Group Personnel Manager and Director of the General Electric Co. Ltd. In his new post his responsibilities extend over the whole field of Post Office personnel interests, including pay and industrial relations.

The three new part-time members of the Board, whose appointments will increase the spread of experience in the fields of technology, industry and trade union questions are:-

Sir James Lighthill, FRS FRAeS Lucasian Professor of Mathematics at Cambridge University since 1969. A former member of the Aerodynamics Division, National Physical Laboratory, Sir James has held appointments as Fellow, Trinity College, Cambridge; Senior Lecturer in Maths and Beyer Professor of Applied Mathematics, University of Manchester; Director of the Royal Aircraft Establishment, Farnborough and Royal Research Professor, Imperial College.

Mr Derek Gladwin a Regional Secretary of the National Union of General and Municipal Workers. He is a member of the Home Office Committee on Liquor Licensing, the South East Regional Economic Planning Council and the English Tourist Board.

Mr Robert Appleby, CBE, Chairman and Managing Director, Black and Decker Ltd.

Richard Stevens, design manager for Post Office Telecommunications, introduces a conversation with Kenneth Grange who was responsible for the detailed lay-out of the studios used in the new Confravision service.

DESIGN IN Confravision

FROM THE point of view of the designer the introduction of the Confravision service presented some interesting problems and a unique opportunity. As a pioneer service offering conference-by-television facilities over long distances it raised problems for which there were no real precedents. It was also an opportunity to develop a self-contained visual identity for a service that can at the same time be identified with Post Office Telecommunications.

Success of Confravision depends on customers accepting it as a satisfactory and *satisfying* alternative to travel. It is therefore important to demonstrate to them in visual terms that their needs have been carefully considered, and that they are using a fully fledged system. Nothing would be more detrimental than any impression that the set-up is makeshift.

Attention to design is thorough and all-embracing; this applies not only to the interior design of the studios and reception areas, but also in the selection of the miscellany of items used in the suites, including cups and saucers and hand-towels. The design of graphics – lettering and identification – is considered as well, from the Confravision logotype at the head of this article to the printed identification name of each studio and the labelling of the control panels. Recommendations even deal with flower arrangements – any colour according to local preference but neither mixed flowers nor mixed colours, suggests the designer.

The result is a very high standard of design associated with Confravision from the outset and a significant contribution to the establishment of a vigorous new identity for Post Office Telecommunications itself. Shortly after the opening of Confravision I recalled with the designer, Kenneth Grange, how the task had evolved:

RS: Now that the first Confravision studios have been completed I think it would be interesting to hear an account of how the design job was conceived and handled by you. First of all what did you regard as the basic problem to be solved in designing the Confravision suite?

KG: The basic problem was the need to establish in the users a sense of involvement with advanced communication techniques, but at the same time the technique should not intrude. They should feel a very direct link with those at the other end.

RS: There were not many precedents for you to turn to were there?

KG: No I could not find any at all. There was a temptation to think in terms of portrayals of 21st-century communication techniques in the cinema, but they are really non-realistic.

RS: There are the conference link-ups we see on television.

KG: True, but I never thought of television as dominating this project. Confravision really is a new communications medium. We did of course have the experience of the first trial studios to refer to, and in the same way that they allowed technical parameters to be defined they also provided pointers to the way that environmental problems could be solved.

RS: What would you say is the essence of the design solution you adopted?

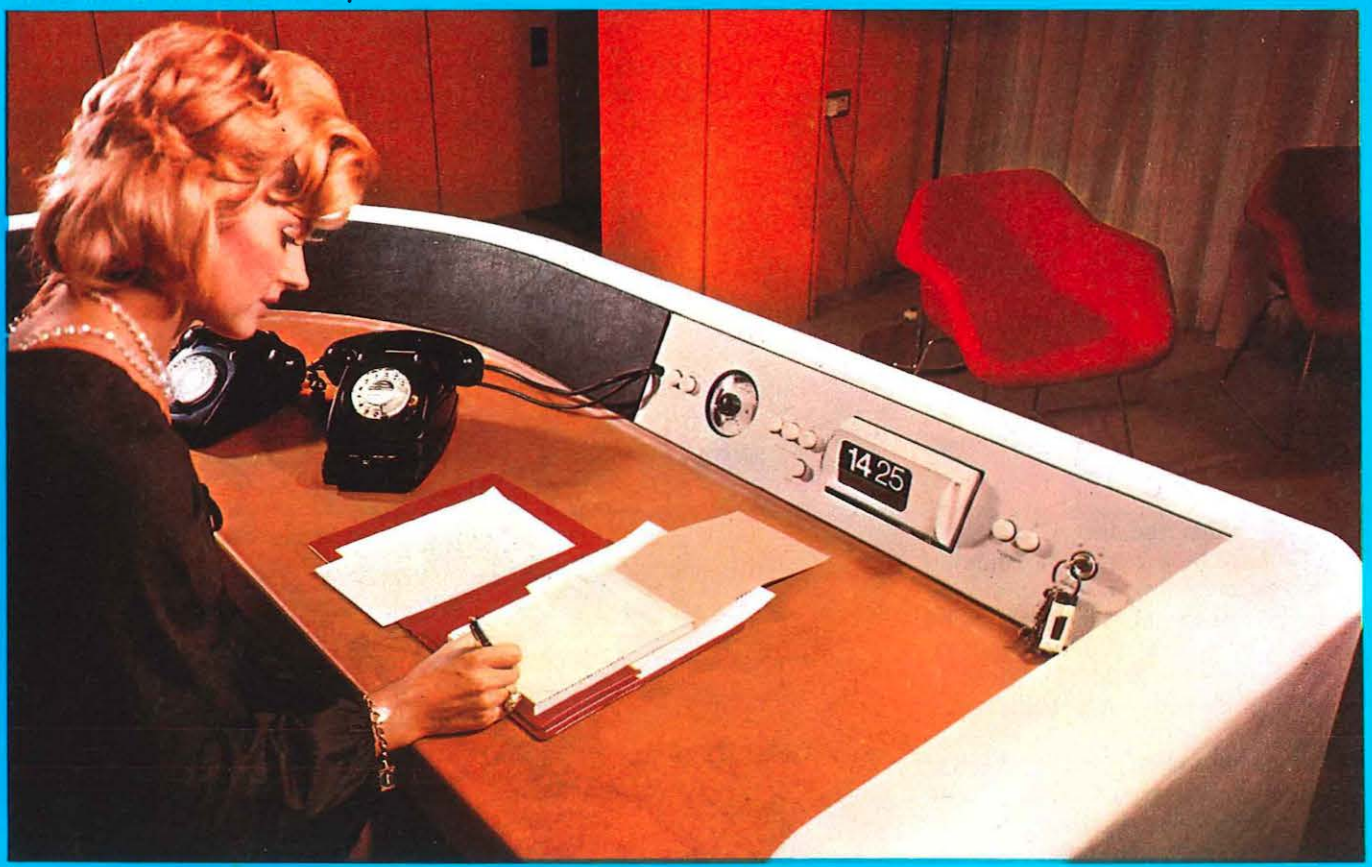
KG: That we should introduce the users of Confravision by two steps. Firstly, the step they make from the street or the other part of the building into the Confravision environment. The reception area is modern but not extravagantly so. We have used colour boldly, but there is nothing in this area that a user would find out of the ordinary in a good quality office or hotel reception area. The second step is into the more unusual interior of the studio itself. A marked difference between the two was deliberate so that the studio situation itself would have a heightened sense of quality and would reflect the advanced communication techniques that the person entering was about to use. Finishes and the treatment generally are restrained so that there should be nothing to detract from the development of his involvement with the screen image.

RS: The original design brief was very specific in certain details, like the type of fabric for the curtaining on the rear

The reception area of a Confravision studio in London.

Before the conference gets under way the receptionist explains the equipment and the simple controls in the studio. The main camera is recessed in the "communication panel" which also holds the television monitor screens and loudspeakers.

The receptionist's desk reflects the design of the conference teble inside the studio and strikes a note of continuity.



wall; or indeed that curtaining should be used there in the first place. Did you find these requirements restricting?

KG: I think they were restricting. I also think it is part of a designer's job to question these restrictions. After some elaborate explanations it was interesting to find out that some of these were not so inflexible as they at first seemed. It is often at this stage of questioning that the beginnings of a good design solution are found, when the designer, the engineers and others involved in a project grasp what is important to the other person and what he is really trying to achieve. Indeed, in these circumstances often the most restricting situation results in the most ingenious design solution.

RS: What do you think are the salient features of the conference studio itself?

KG: One is the clear linking in physical terms of the front wall of the studio, which is the communication interface area, with the people who are making the other side of the contribution. It was actually not in accordance with the original brief, but from a lot of discussion we arrived at this and I think the final result shows that it was justified.

RS: How was this achieved exactly?

KG: It comes from the way the tables are now combined into one working area. There are divisions to stop papers used by the conferees from straying, but the table and the general form of the seating does run right round with first the secretary then the display table and then the conferees facing the screens. The link runs right through to the wall and, so to speak, completes the circle.

RS: What I like is the way the treatment of the screens, the loudspeakers and camera avoids reference to any other use of these devices which users might know and the way the camera virtually disappears.

KG: Yes, that seemed very important. We were concerned that the camera should not intrude, and that the user should be presented with a completely new communication situation.

RS: Was everything specially designed for the studio?

KG: Everything except the chairs. We were lucky at the last moment to find standard chairs available that fitted the very exacting requirements.

RS: Are all the studios identical in the five cities in the Confravision network?

KG: Within an inch or two. The studio interior is identical regardless of the site although construction has been varied slightly.

RS: This doesn't apply to the reception area.

KG: No, that changes quite a lot. I thought it was too good a trick to miss in the reception area to furnish the whole of the walls in Post Office yellow which I know from conversation with you is in fact being re-energised rather than diluted in its future use. I think that it works very well. A feature that is common between the reception areas in the different sites is the detailed design of the reception table. The design form reflects the studio table in the conference area and is the note of continuity that people will find as they go from the reception into the studio. It also reflects the importance of the receptionist. She has a major control function as she has final responsibility for maintaining the link continuity. She has the master switch at her disposal and has ultimate responsibility for the continued running of the conference. At the same time she has got to be there to receive enquiries and to make tea and coffee for visitors.

RS: Detailed attention even went as far as the selection of tableware and towels.

KG: It is all part of the quality of the environment; if you are hoping to encourage the captains of industry they will expect to find a continuity of attention to detail.

RS: In fact all the furniture and furnishings in the reception area are standard.

KG: They are all available. It was a question first of selection and then buying the related products.

RS: What was your main concern in getting the job done as opposed to conceiving what should be done?

KG: It was a very tough timescale to work to and it was a question of keeping a lot of balls in the air at the same time. It was also a complicated job, but fortunately there has been a very high level of cooperation between the engineering installers, the builders and so on. There was again this necessity to attend to small details. A job of this kind can very easily be marred by the mass of small things that inevitably will go wrong through nobody's fault.

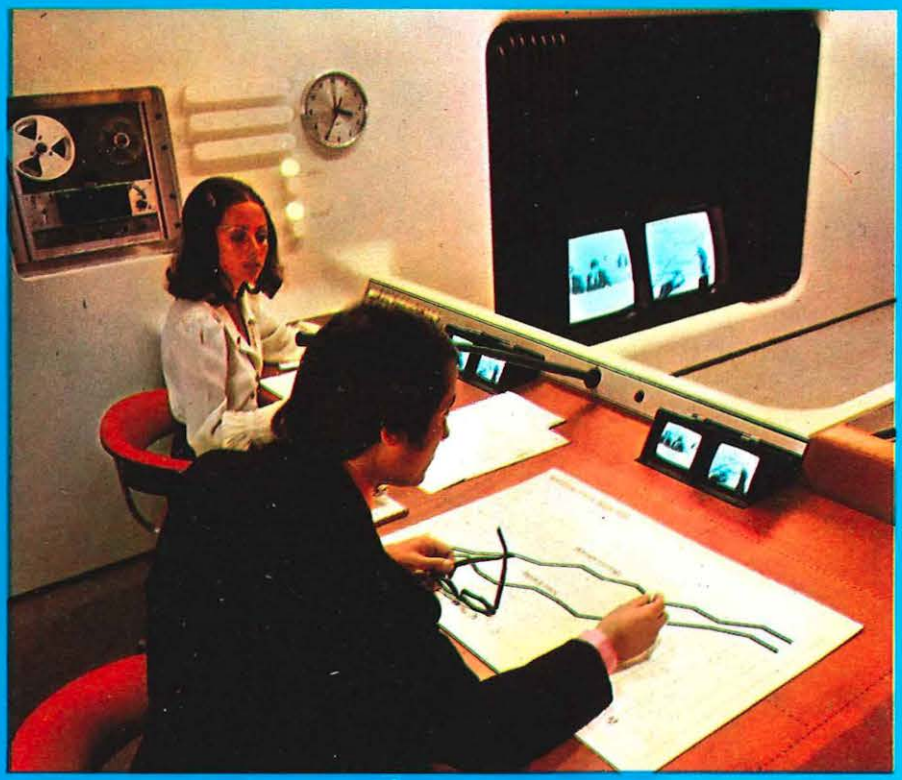
RS: Are you happy with the result?

KG: I am never really happy with a result; there is a degree of satisfaction obviously, but there are a number of aspects I would now like to reconsider.

RS: Since this is a field trial there may be an opportunity to re-think some aspects. One last question: Do you think this service will be of use to designers and architects – yourself for example?

KG: Yes, I think so; it will be interesting to see if clients think so as well.

Design of interiors and custom-made furnishing: Kenneth Grange RDI FSIA
Design of graphics material: Banks and Miles



A second camera, also out of view, is used for displaying charts, documents or small items of equipment. It is directly above a display table, and is fitted with a remotely controlled zoom lens. The conference secretary is seated next to the display operator; on the wall is a sound tape recorder which she can operate to play pre-recorded messages or for recording the conference. The secretary and the display operator are out of range of the main conference camera.

Mr R. W. Stevens, Head of Design Division, is responsible for advising on all aspects of design affecting Post Office Telecommunications.

COPING WITH CONGESTION

KW Hix

A Regional Congestion Officer has been appointed in London to help identify and clear trouble spots in automatic exchanges and trunk lines

ONE CALL in every five returns an engaged signal to the calling customer during a normal busy day on a large London exchange. One of the major reasons for this is that very often when a number is dialled the required line is already engaged with a conversation. Another reason is that the call may have failed to get as far as the final selector to call the customer's line because it has got "lost" in congested Post Office equipment at some stage in the setting up of the call.

In London, however, congested equipment affects, on average, less than one per cent of local calls and normally under five per cent of STD calls, although these figures can increase during busy periods or because particular problem areas will occur in the network from time to time.

Well established machinery exists which allows service staff to keep a close eye on the efficiency of plant and equipment. Calls passing through exchanges, for example, are continuously monitored by the Telephone Service Observation (TSO) service so that there is always some indication at hand as to why calls are failing to get through. Exchange maintenance staff and Area trunking and grading teams are also constantly measuring and checking the volume of traffic carried by exchanges and are responsible for initiating action for ordering and installing additional equipment in sufficient time to cater for growth of the network and any expanded local requirements.

Nevertheless, in a growing system as large and complex as London's, where regular extension work is always in hand, it is difficult to ensure that at all times the proper records are taken, scrutinised and acted upon with the appropriate degree of urgency. Delays and omissions can occur, while sudden increases of traffic that could not be foreseen will arise and the normal procedures may be too slow to secure additional equipment with sufficient rapidity.

And while service observation measurements do give a good idea of the extent of overall congestion of the net-

Top: Compact and portable traffic measuring equipment has aided the speedy analysis of congestion problems. It can be connected to up to 150 individual items of equipment to give a total of the traffic carried. The operator is Mr Graham Boyse, assistant to the Regional Congestion Officer.

Left: Regional Congestion Officer Mr Peter Chessell (holding the chart) discusses fault conditions at Howland Exchange, London, with Technical Officer Mr William Sillitoe.

MORE HORSES FOR POST OFFICE FLEET

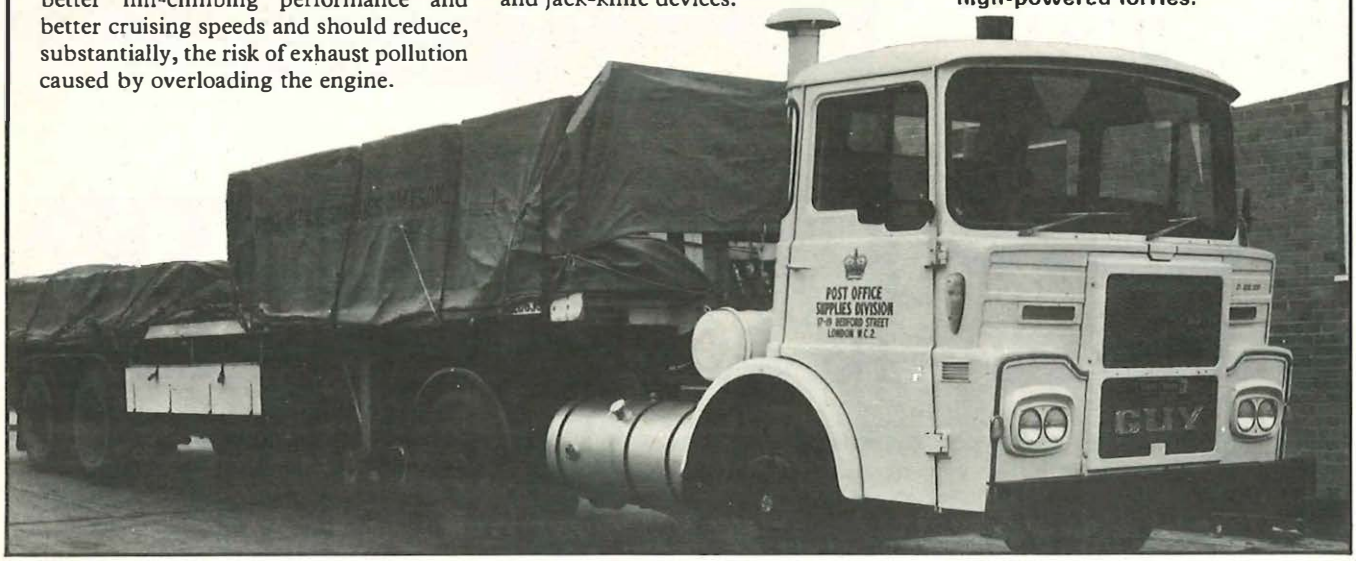
One of the agonies of modern motoring is to be stuck behind a queue of heavy vehicles grinding their way uphill. As motorists peer through a belching cloud of fumes to spot the culprit they can, in future, be sure that the delay is less likely to be caused by a Post Office vehicle. For the Post Office has set higher power-to-weight ratios for large vehicles in the Telecommunications fleet.

The new standards affect medium and long-distance lorries operated by the Post Office Supplies Division. More powerful engines will give these vehicles better hill-climbing performance and better cruising speeds and should reduce, substantially, the risk of exhaust pollution caused by overloading the engine.

Heavy vehicles now coming into service with Post Office Telecommunications – which has the biggest road fleet in the country with 45,000 vehicles – must have an engine that will give at least eight horse power for every ton of weight fully loaded. Since 1965 the Post Office has operated a seven horse-power-a-ton minimum for its vehicles.

The first vehicle to conform to the new standard is a 32-ton Guy articulated lorry fitted with a huge 265 horse power Rolls-Royce diesel engine. Each of 14 new vehicles on order is fitted with anti-skid and jack-knife devices.

The first of the new high-powered lorries.



work and some indication of local difficulties, they do not locate precisely the points at which congestion is occurring.

It is to speed up the precise identification of the blackspots and to help Area staff to devise expedient measures for solving the problems, even to applying a "tailor-made" scheme for a particular situation, that a Regional Congestion Officer has been appointed in London. He is able to move around from Area to Area to investigate problems and to bring in help from outside a particular Area where necessary. And as a member of the Regional service team he works closely with other Regional trunking and grading staff in examining returns from Areas and studying congestion results.

The Congestion Officer's investigations have been helped greatly by the use of portable traffic measuring equipment built within the Region to designs originated by staff in the North Western and North Eastern Regions. Easily moved about from exchange to exchange and requiring none of the often prolonged programming and setting-up time of its bulky predecessors, the new equipment enables measurements to be taken much more rapidly and provides a more detailed analysis of congestion situations than was ever possible before.

A particular problem which has been of concern is that of the below-standard service between director exchanges and the outgoing trunk switching units. Exceptionally high call losses have been occurring in many units with the result that many customers have had difficulty in obtaining access to the main trunk network. The investigations into this problem have indicated that circuit defects, failures of co-operation between units and equipment held out of service by subscribers have resulted in the loss of many calls. As a result changes have been initiated to overcome design faults in the trunk switching units while additional circuits have been provided wherever possible and circuits transferred from over-provided to under-provided routes.

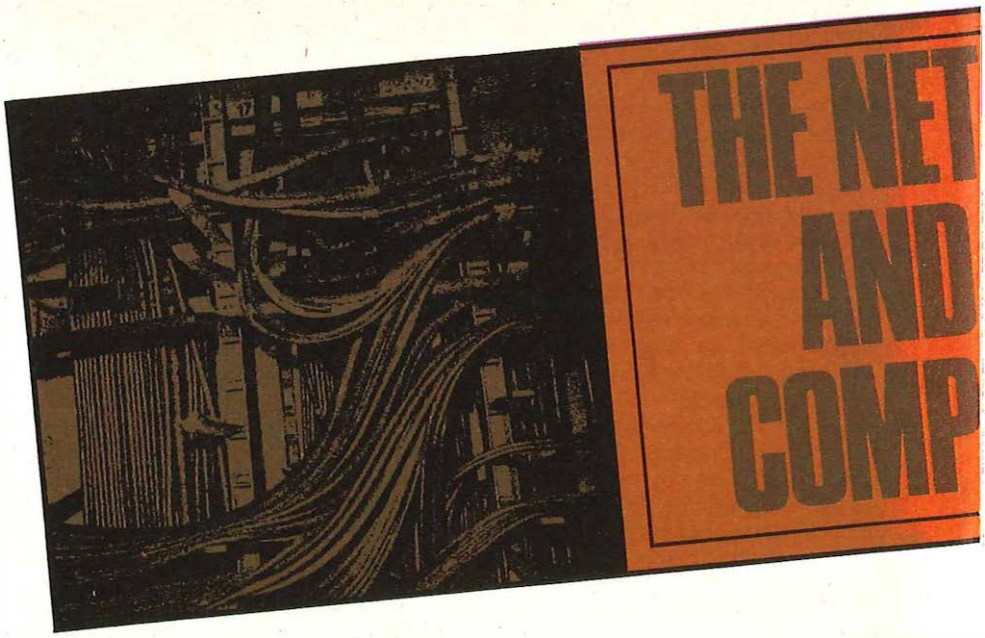
It has been established that the basis of provision at some of the large units has been such that finally it will be necessary to put in hand a considerable re-arrangement of equipment with the provision of additional junctions, and the Regional Congestion Officer will act as liaison officer.

Another activity of the Regional Congestion Officer has been the investigation of congestion caused by the unbalanced traffic conditions on the larger units. In some cases it has been possible to obtain a greater traffic-handling capacity by providing a different form of grading, known as a skipped grading, designed to suit local conditions.

The creation of a Regional Congestion Officer post in London has, in just over a year, proved to be well worthwhile. In a network which is continually changing and expanding it is essential to have a liaison duty to oil the wheels of the existing machinery and ensure that congestion problems receive the urgent and enterprising interest that is necessary if bottlenecks are to be avoided and telephone traffic is to flow with sufficient freedom to give a good service to the customer. It is relevant, perhaps, that the service given by the London network during the postal strike proved to be adequate, while the overall congestion at the present time is at a lower level than it was a year ago. More significantly, the number of specific problem areas and public complaints that arise from their existence has reduced.

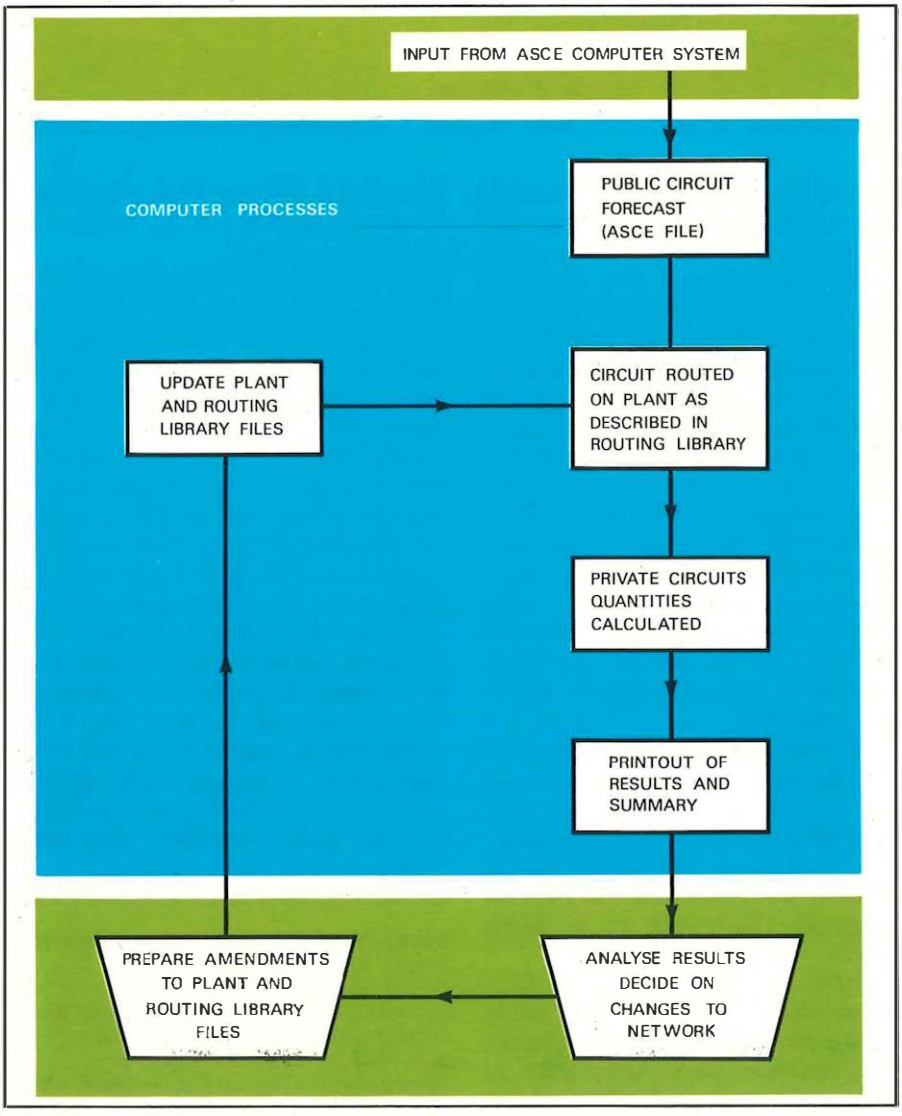
Mr K. W. Hix is a Deputy Controller in the Service Branch of London Telecommunications Region with responsibilities for the maintenance of the London automatic network. He was previously at Telecommunications Headquarters where he was concernd with the design of automatic exchange test equipment and maintenenace problems.

Two articles discuss the impact of computers on network planning and provision. The first describes an experiment in junction network planning which has been successful in the Midlands Telecommunications Region and is to be introduced nationally. The second is about the production of circuit estimates.



Cable planning mad

FW Storey and HT Harvey

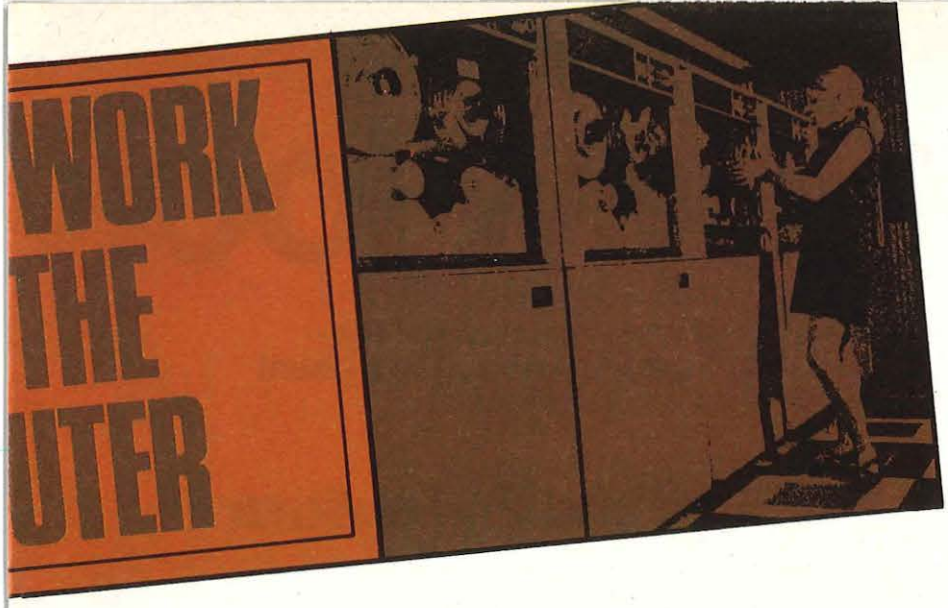


A diagram of the planning processes in the junction network computer system.

THE MAIN function of the network planner is to forecast plant exhaustion and determine the type, size and location of relief that is to be given. On a small, technically simple network this is relatively straightforward. Today, however, the size of the junction network has become so great and the technical aspects so complex, that the paperwork and arithmetic calculations involved are such that the planning engineer is less able to devote his time to the more important practical and economic problems involved in meeting the changing demands on the network.

Any system which enables the engineer to give more of his time to these problems must lead to an improvement in planning productivity and network efficiency. In the Midlands Telecommunications Region the use of a computer as an aid to cable planners has been of significant benefit. It has rid the planners of much of the time-consuming manual study necessary to determine their basic objectives – where and when changes will be required, the type and size of the changes, the timing of their implementation and the communication of their effect to the various engineering groups involved.

Before he can start to plan, the engineer must examine in detail the spare pair returns, cable appropriation records, annual works programmes, Annual Schedules of Circuit Estimates (ASCE) and long-term circuit forecasts. This the computer can do for him and process the results to highlight where his attention is most required; the results can also be stored for future reference. The planner is thus provided



e easier

with a concise and complete series of planning documents which can be supplied to various users in the format best suited to their needs. This has resulted in a much closer relationship between the Annual Schedule of Circuit Estimates, which determine the number of additional circuits required to be provided in any year, the resultant plant changes, and the use to which this plant is put.

The ease with which statistics can be produced by the computer in a standardised presentation has also made the system a very attractive tool for management. Although the determination of the size and type of changes needed still requires some consideration by the engineer, the computer printouts are produced in such a way that his attention is drawn to the critical areas of the network and further analysis of these provides the timing for the resultant changes. Communication of the effect of changes can also be achieved much quicker since the computer will produce such calculations much faster than could ever be achieved manually and will present them in a format which can quickly be circularised.

The computer requires three basic files of data – Plant File (spare pair returns plus planned plant), Routing Library File (practical routing plan designed on a Regional or Area Basis), ASCE File (future demand on junction plant). The computer sequential processes the records on these files, and stores the results on magnetic tape.

At present the ASCE data is collected and input manually. In the near future this will be unnecessary as such data will be input directly from the computer system that processes the ASCE. The Plant and Routing Library Files are maintained and updated as required. An updating suite of computer programmes for the basic Files accepts new data, performs the normal sorting and vetting functions, copies the existing computer Files and injects the new data to create an up to date version on a new magnetic tape. When the planning engineers are satisfied that the Files are correct the main processing is performed.

This process enables the planning engineers to distribute public circuit forecasts from the ASCE over a "model" of the existing network (Plant File) according to a Routing Plan (Routing Library File) which they themselves have specified. The Plant File is thereby fully loaded with the future requirements for public circuits on a year by year basis. Built-in processes then calculate the growth for private circuits on a "link" by "link" basis relating public circuit growth to present private circuit utilisation and growth trends specified by the planning engineers. The end product of the operation is a series of printouts indicating areas of plant exhaustion for the current ASCE years and forecasts of the exhaustion dates for the remainder of the network plant by extrapolation of the ASCE and private circuit quantities for years beyond the fifth year.

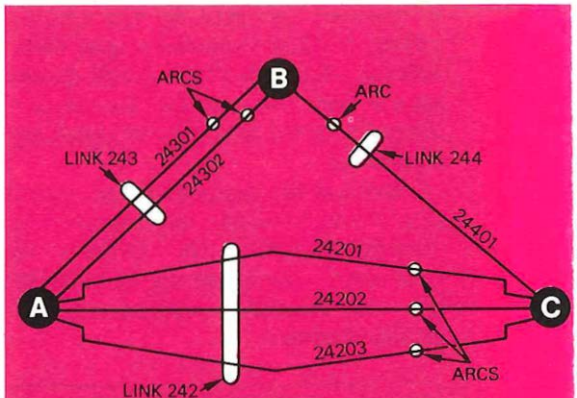
The planners then devise the best methods of relieving the congestion by providing new plant or re-routing traffic, but before finalising their plans they use the computer as a model to test their effectiveness. Proposed plant changes are carried into the "Plant File" together with re-routing plans in the Routing Library File. The planning process is then repeated with amendments as necessary until the most practical and economic solution is found. The final printout of the Routing Library can be used as an interface between the Planning engineers and Circuit Provision Groups indicating how the plant is intended to be utilized.

The main advantage to be gained from the use of the computer is in shortening the time-scale; it distributes the data of the network very rapidly and presents a summary of congestion points that would take weeks to produce manually. Thus the Planning Engineer can investigate each alternative – a task virtually impossible without a computer.

An "Automatic Routing" computer programme has also been written that will operate on the Plant File and produce "Ideal Routings" between any two buildings (nodes) in the network, based on economic, transmission and signalling parameters defined by the planning engineers. These ideal routings can be used as a guide when compiling the Routing Library.

The first stage of the main process is for circuit quantities from the ASCE to be associated with records in the Routing Library. Each record in the Routing Library relates to an exchange-to-exchange route where all the circuits have similar transmission and signalling requirements. A number of ASCE entries, each concerned with individual traffic routes, may be associated with one Routing Library record. The association is indicated by "keys" (numbers to link the Routing Library data to the ASCE) that are inserted against ASCE entries by the planners.

The second stage of the process is for



This diagram illustrates the "links" between stations and their sub-division into "arcs". Each arc is a cable or a group of pairs in a cable with similar electrical characteristics, and has a unique number.

the Routing Library file to be processed sequentially one record at a time. The circuits between any two exchanges may be routed over a number of paths and the circuit quantity for each exchange-to-exchange route is apportioned over the alternative paths as specified in the Routing Library. Each path may be over one or more links in tandem, a "link" being a direct connection providing a number of pairs between two buildings. Each link is given a unique number in the Plant Model and is further sub-divided into one or more "arcs", each arc being a separate parallel path within a link. An "arc" may be a cable or a group of pairs in a cable with similar electrical characteristics. The routing descriptions in the Routing Library give a reference to specific link/arc numbers.

The final printout process shows the total utilisation of the network with a description of each route and the total number of circuits routed via each link and arc, together with their capacity and estimated date of exhaustion. Typical computer processing for a MTR Area of 1,000 Plant Records and 1,200 Routing Library records are Update and Printing of Files = 20 minutes; Planning Process and Printing of Schedules = 30 minutes.

Further development is now being carried out to explore the possibility of assessment of transmission equipment requirements using the Plant, Routing Library and ASCE Files. For the Audio Cable Network, output is available that shows which routing requires amplifiers, the type and how many. The final stage will be to total the amplifiers for each amplifier station and forecast the future requirements, listing the routes that make up that requirement on a similar basis to that achieved for the cable network.

It is quite possible that the basic information conveyed by the present system could be extended to give more detailed information to exchange design groups and so provide for greater efficiency in the allocation of signalling equipment.

Continued development of the system should lead to further improvements in planning, allowing the engineer to concentrate on engineering by relieving him of repetitive calculations and documentation.

Mr F. W. Storey is an Executive Engineer and has been involved in system analysis work in Network Planning Department since last year.

Mr H. T. Harvey is an Executive Engineer working on junction network fundamental planning in Midlands Region.

A new look

A computer is now being used for the preparation and production of the Annual Schedule of Circuit Estimates.

GT Pritchard and PA Faulkner

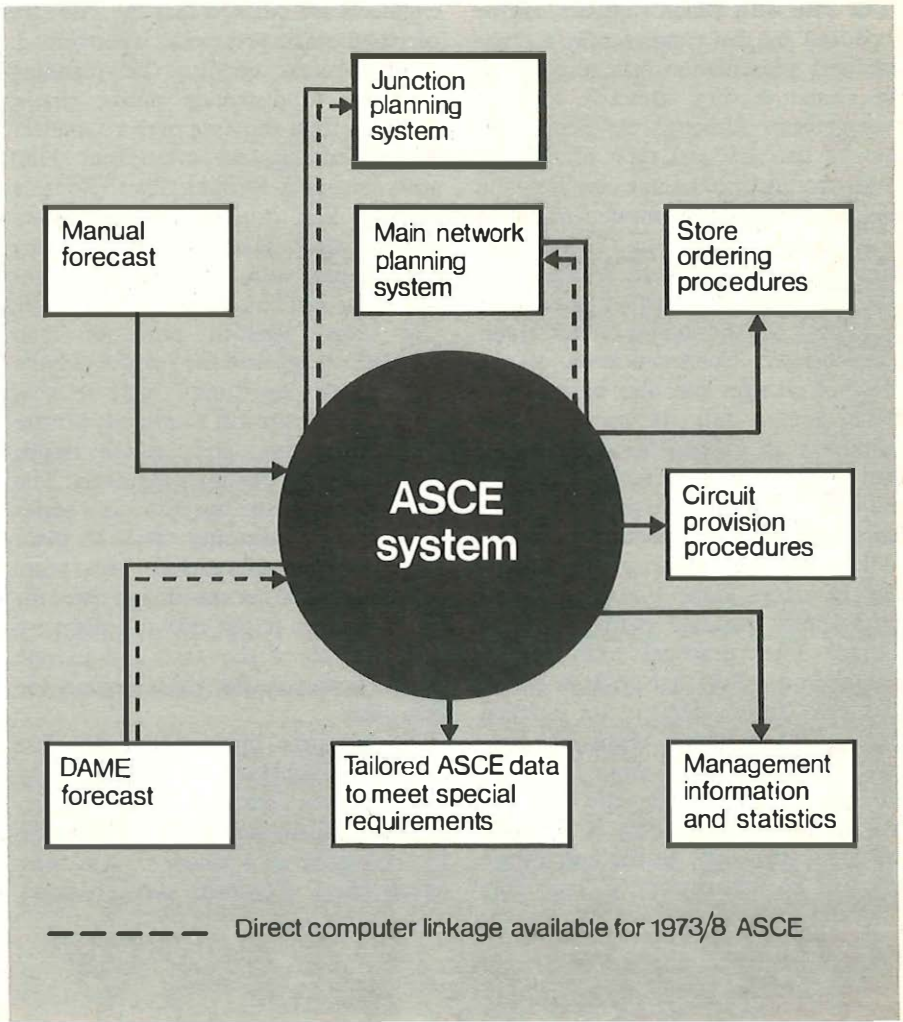
EVERY YEAR Telephone Area staff set about the enormous task of estimating the numbers of circuits that will be needed to carry the forecast traffic to and from every telephone exchange in the United Kingdom in order to maintain an efficient telephone service. These estimates are published as the Annual Schedule of Circuit Estimates (ASCE) and show, year by year for five years ahead, the requirements of each Telephone Area in respect of the local and main network routes.

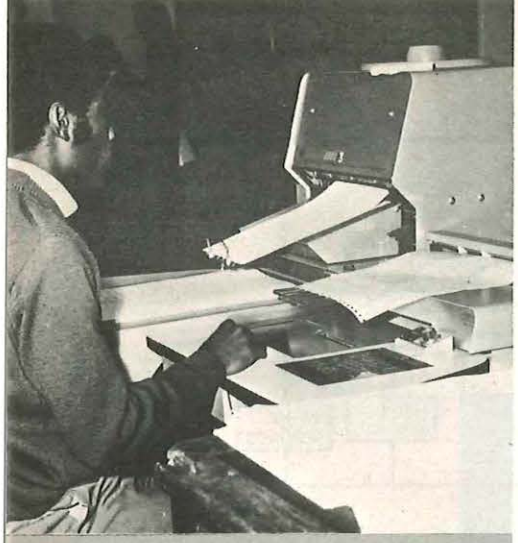
The job is an exacting one and has been made no easier by the fact that it has always had to be accomplished by a totally manual effort to a tight timescale. Recently, however, a computer has been used for the first time in the compilation and publication of the ASCE for each telephone area.

The computerisation of the ASCE is one step in the ultimate need to provide a comprehensive mechanical system which will maintain a data bank of all records showing the current status of plant and equipment required to provide public and private circuits nationwide.

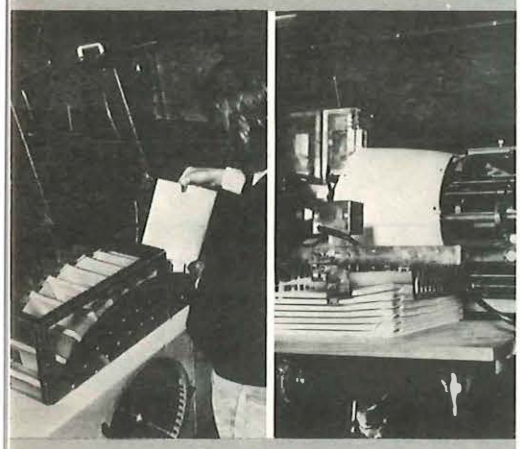
Under the manual system preparation of the ASCE is devolved to Telephone Managers' offices where staff estimate future trends for all routes and for each telephone exchange in their Area with an extensive use of graphs. In the computer system estimates will continue to be prepared manually in the Telephone Area and these plus other circuit data will constitute the input for the ASCE

The computerised ASCE system is shown in relation to other planning systems and management procedures.





A sheet of computer printout (right) is fed into a copying machine from which a master sheet on the left is reproduced in smaller A4 size which is easier to handle. Thirty thousand master sheets are required for the production of a complete set of ASCE. From the master sheets thousands of pages of the ASCE reports are printed on litho machines at the Post Office Reproduction Unit.



Printed pages are loaded into this revolving drum and are automatically sorted into appropriate sections as on the right. Below, the printing job completed, the ASCE report is punched preparatory to binding.

for ASCE

computer. Although the job of estimating circuit requirements will ultimately be dealt with to a great extent by computer it will remain very much a manual exercise for some time to come. A step towards computerised estimating, however, has already been accomplished through Director Area Mechanised Estimating (DAME) described in Telecommunications Journal, Autumn 1971. DAME has been successfully used in Glasgow for junction circuit estimating and is now undergoing further trials in three Manchester Director Areas. This system produces the input data for the ASCE System, which at present is produced manually.

Trials of a system for the direct transfer to the ASCE files of estimates produced by DAME are also now being undertaken with a view to being utilised in the next ASCE published in October this year.

The output from the ASCE computer consisting of lists of required routes, termination and distances between exchanges, authorised and estimated circuit quantities plus a much more detailed statistical breakdown than was ever possible manually of the categories of circuits required, could in turn provide the input for utilisation and planning systems. The first computerised ASCE was produced in October last year for the period 1972/77 and was run in parallel with the established manual exercise. Telephone Managers have now been instructed to discard the manual ASCE and, in future, only the computerised version will be produced.

The computer system is designed around a weekly updating of the computer magnetic tape files. As route estimates are completed by the Telephone Areas week by week, the data is recorded on forms which are forwarded to London where the information is transferred to punch cards for input at the Barbican Computer Centre. The computer vets this data for errors and transfers it to the master file. Reports are returned for checking to the Areas within 12 days. Analyses of the information on the computer files are also sent each week to Telecommunications Headquarters, Regional Headquarters and Areas so that a continuous monitor on the progress of the quantity and quality of the input is available as the master file builds up. These analyses show how much information has still to be entered on the files before the ASCE can be completed and also the error rate and type of errors in the input data. They also give a guide to the likely growth rate.

Annually, the completed master files are used to produce the ASCE on an Area by Area basis in the required format. Sorting all the entries into Area schedules and printing 30,000 master sheets in the seven days permitted by the time scale of the whole operation is a mammoth task. Even this is overshadowed by the task of printing 70 copies at a reduced size from each sheet, collating them with preface sheets and covers and distributing them to Areas and Regional and Telecomms headquarters within the 14 days following the computer processing. The Post Office Reproduction Unit undertake the major part of the task.

Following annual publication each quarter the computer system produces a complete list of amendments to the ASCE for each area. The system also gives the consequential changes in statistics, again something that was never possible with the manual system because of the vast amount of calculation and other work it would have involved.

It has also eliminated the source of discrepancy in the records of routes, which has often occurred in the past. In the manual system two records have always been kept for a route – one for each terminal exchange. The computer keeps only one record, the input being provided by one of the two Telephone Areas concerned, although all estimates, subsequent updating and error corrections are approved by both. This record is then printed in both Area ASCEs.

An interrogation facility has also been applied to the computer files which enables management information and statistics to be readily obtained. This makes use of SPECOL (Special Customer Oriented Language), a specially designed interrogation language, which enables a question to the computer to be programmed by the customer or on his behalf in something like half-an-hour compared with some two days required by traditional methods. SPECOL will also make it easier for non-specialist Area and Regional staff to obtain information from the ASCE computer files when direct access becomes available to them through the use of visual display units.

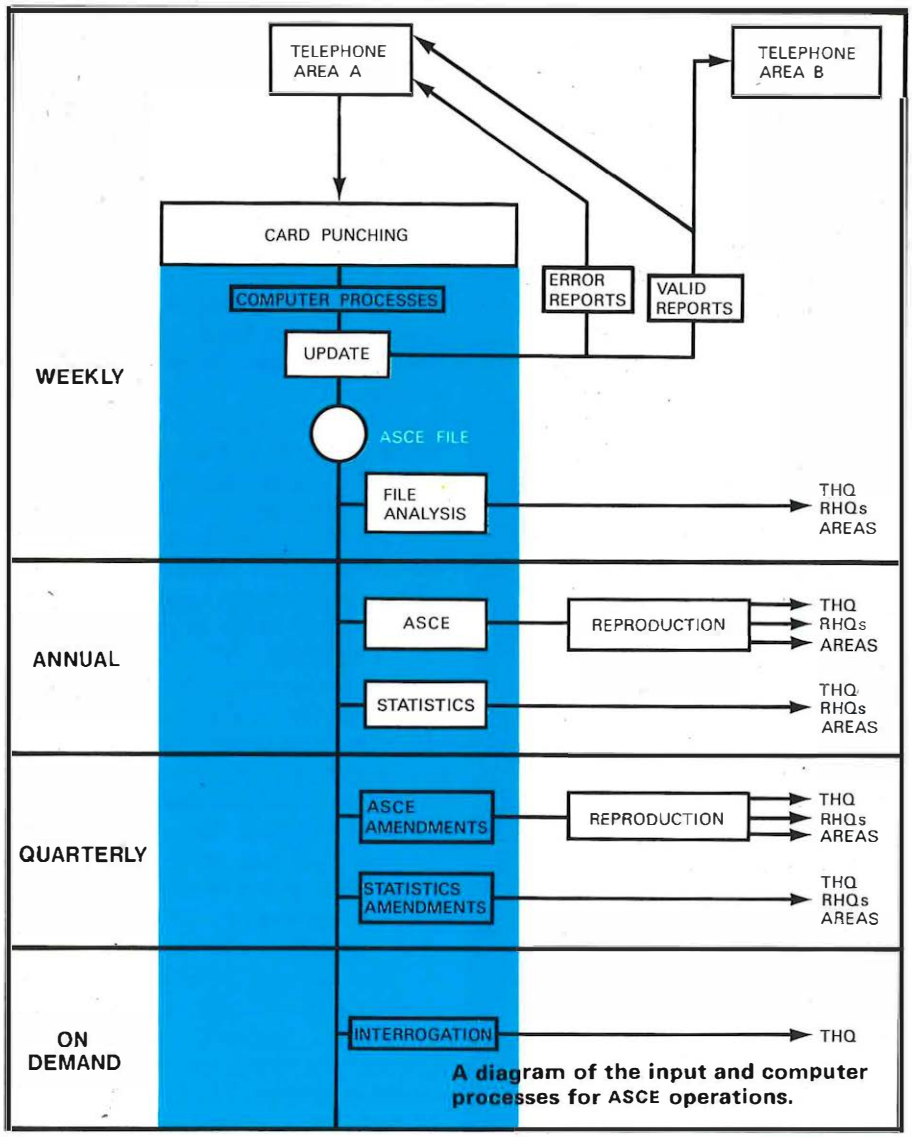
Apart from the production of the printed ASCE and the control statistics, the principal advantage of the ASCE system lies in the complete ASCE in-

formation available on its easily accessible files. The system is now firmly established in its own right and could ultimately feed this data direct to other systems for further processing. It has also been possible to carry out detailed analyses of the data to aid further thinking, eg the listing of two link routings between selected centres. This *ad lib* approach is likely to continue until experience is gained in the use of data and individual groups are able to specify their requirements. It will then be possible to produce ASCE information in the format tailor-made to meet their needs and thus to reduce the numbers of printed ASCEs required and the time wasted in their use to extract limited information.

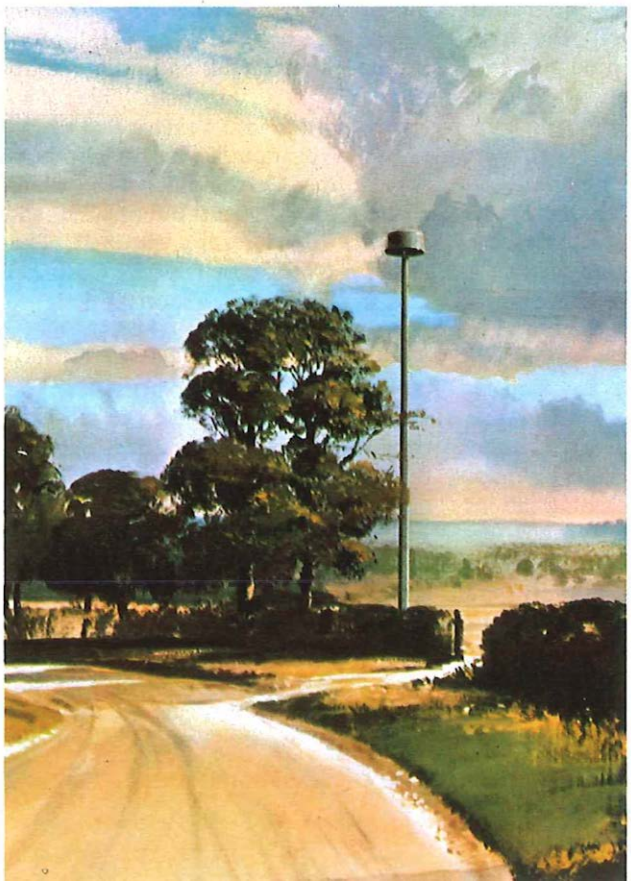
Already Areas have taken the changes in their stride, and THQ is now able to consider complex developments such as the design of a sub-system, which would enable THQ to exercise control over the levels of growth on selected routes before the ASCE is published.

Mr G. T. Pritchard is an Executive Engineer who was involved in the system design, programming and operational aspects of the ASCE computerisation. He is now involved in computer systems engineering in Telecommunications Development Department.

Mr P. A. Faulkner was involved with the user implementation aspects of ASCE. He is now a Senior Telecommunications Superintendent in South East area of London Telecommunications Region.



A diagram of the input and computer processes for ASCE operations.



A microwave 'lamp-post'

Slender towers like this may be the microwave stations of the future. Engineers envisage a line of poles up to 75 feet high, each with a masthead canopy carrying all the electronic equipment and two dish antennae. For maintenance work the pole-top unit could be lowered to ground level by winch and cable housed inside the pole, in a similar way to motorway lighting columns.

The "pole-line" system would operate at far higher frequencies than those used at present, and at these millimetric wavelengths weather conditions can have a serious effect on the standard of transmission. The Post Office and the Science Research Council are now carrying out the most comprehensive microwave-propagation study ever mounted and this will indicate how limitations imposed by weather, particularly rainfall, can be overcome.

This work (described in Telecommunications Journal, Winter 1970) has led to plans for two specific systems:

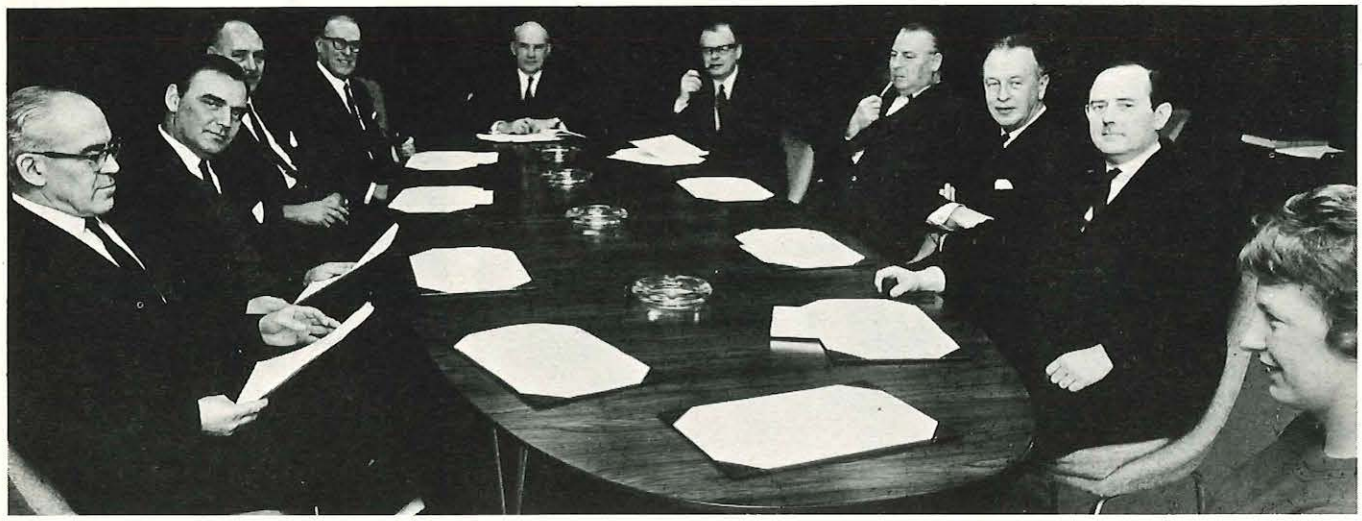
1. An 11 GHz system transmitting digital information at rates of about 100 Mbit/s on several microwave carriers, suitable for line-of-sight path lengths of about 30 km. This is intended for use on the existing microwave network.

2. A 20 GHz system transmitting digital information at rates of up to 500 Mbit/s on several carriers. This is the short-hop pole-line system, suitable for path lengths of only 5 to 10 km.

Wales and the Marches led the way in the setting up of a Regional Telecommunications Board which includes part-time members from outside the Post Office. This article from Cardiff discusses the problems which have to be resolved and the challenges to be faced.

WHEN THE RULES ARE CHANGED OVERNIGHT

R Chivers



The Board which launched the successful experiment in Wales and the Marches. From left – S. D. Mellor, Controller Planning and Works; D. Rogers, who has since been succeeded as Controller Service and Marketing by B. Cross; R. Chivers, Controller Finance and Management Services; merchant banker Sir Julian Hodge; T. H. Davies, Chairman; businessman D. Morley-Smith; G. Dawson, Controller Personnel and Industrial Relations; Professor T. E. Evans; accountant M. W. Rosser and Miss V. J. Kyte, secretary to the Board.

A LOT has been written about the "management of change" but it is not so easy to find guidance when the management has to change itself. Basically this is what the experiment of setting up the Wales and the Marches Telecommunications Board has meant.

All the members of the old-style Regional Board had walked in the paths of tradition for something more than 30 years, as had the Telephone Managers. They all knew the rules and were competent to play the game in accordance with them. Then, almost overnight, the rules were changed. We were to introduce outside businessmen as part-time Board Members (Non-executive Directors in business school parlance); we were to seek maximum devolution of powers to the Director who was translated into the Chairman and we were to introduce maximum devolution to Telephone Areas.

The basic ideas were that the man on the spot knows best what needs to be done and should have the power to do it; that the telephone business should have a closer identity with the community it serves and that regional management should be better equipped to reflect the special requirements of its territory.

That the rules were changed overnight is hardly an exaggeration. We had to move very quickly indeed and the first task was to select and appoint (or persuade) the part-time members into office. This was no easy task as we required people of high calibre for the personal contribution they would make, and not as representatives of any sectional interest. Obviously it was also desirable to have men whose expertise lay in different fields and, if possible, men who were representative of the whole region. In the event we were very fortunate in finding men who were willing to serve who met all our desiderata. One was a financier based in Cardiff, one a partner in a firm of accountants who lives at Swansea, one a director of several companies from Wrexham and one an academic working at Aberystwyth and living at Bangor. We could not have had a better spread as each of our telephone areas now had a Board Member as a customer!

At this time the four Controllers were formally advised of their appointment to the Board with suitable caveats to the effect that being a Controller did not carry any prescriptive right to Board Membership. What it did carry was a burst of feverish activity. It was obvious that a big task in communication lay ahead of us and we decided to make a gesture which was symbolic of the change in the status of the Region as one means of drawing everyone's attention to the fact that something was happening. This was basically why Wales & Border Counties (an imprecise description) became Wales and the Marches. Everything seemed to be happening at once. Meetings were held with all union interests and meetings of staff were convened in all the Areas in order to explain as much as we could as soon as we could. But not only was there a problem of identifying all our staff with the experiment, we also had to educate the part-

Regional Boards which include part-time members from outside the Post Office are being set up in every Region in the country. They will be similar to two experimental Boards which have been operating since April 1970.

Each Board will have a Chairman and Secretary and up to four other members from the Post Office. There will be not more than four part-time members from outside the Post Office and their appointments are initially for a year.

Announcing the plans, Post Office Chairman Mr Bill Ryland said the new Boards would ensure that the customer was better served with more consideration given to his local circumstances and needs, and that the Post Office would become more crisp and business-like without in any way eroding its public service traditions.

Local managers had to be allowed to use their discretion and, operating within national guidelines, do what was best for their customers, said Mr Ryland.

"We must push down the day-to-day decision-making nearer and nearer to where the customer is served," he added.

The men

Sir Julian Hodge – one of Britain's best known financiers and merchant bankers, chairman of the Hodge group of companies.

time members in Post Office ways and Post Office jargon. Before our first meeting they were given briefs on all our main procedures, statistical information about the Region and as much as we could tell them about the organisation as a whole.

At the same time we were negotiating with Telecommunications Headquarters over devolution. We had agreed that the method to be used would be for THQ to issue a list of powers which they reserved to themselves. This went to and fro for several months. Our first bids were considered excessive but eventually the reserved powers were published with the very important proviso that they were only mandatory when they affected service outside the Region or a national union agreement. Whilst we were settling our powers with THQ we were going through a similar process with Telephone Managers. What we have achieved may not look very significant if one just reads the schedules. Many powers have been devolved over the years by the simple act of usurping them until such times as they become the normal course, and we know that many regions being bolder or more reckless than ourselves, depending on the point of view, have given considerable powers to Areas. This, however, is rather different – making decisions as cases arise – from sitting down in cold blood and seeking or giving further powers across the whole field of our activities. You go through the painful process of asking why is a Senior Executive Engineer in the Region any wiser than an Area Engineer? Does he not bleed? as Shylock puts it. And subconsciously one is wondering "where do I fit in if I give him all the authority?"

We had been in existence for several months before it was possible to issue full guidance on devolved powers and we felt that this tended to hold up our progress. Whether it did in fact impede our development is hard to say because it is not everyone who is willing to accept new powers or who is willing to surrender his powers without a struggle. There is obviously still a great deal to be done in this field. More powers must be devolved but people have got to be encouraged to throw away the crutch of reference to higher authority and learn not merely to stand on their own feet but to run about and do things.

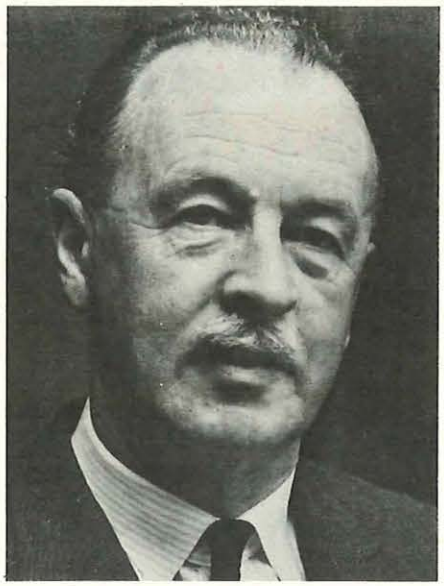
This activity was of course good old Post Office stuff and we could have happily filled our days discussing the niceties of interpretation. But in the shiny new Board Room the new image was emerging. A secretary to the Board had been appointed and faced a task requiring tact and resourcefulness and an ability to know what people wanted when they weren't really too sure themselves.

We were very fortunate with our new colleagues. The businessmen joining us were quick to recognise their limitations but equally quick to recognise familiar situations which had parallels in their own experience. It soon became apparent from the direction of their interest that whilst we could well have increased devolution without part-time Board members we could not have part-time Board members without substantially increased powers. These were men who were used to making Board decisions and although they accepted our explanation of special constraints which affected us because of the integrated nature of our service or our position as a monopoly one could sense in the early days a certain frustration. This may still exist on some issues, but they rapidly assessed the situation and recognised the limitations.

It was quite important to define their status. All decisions had to be the sole responsibility of the Chairman who is

who 'joined' the Post Office

Mr Melvyn W. Rosser – Swansea-born accountant and a partner in the accountancy firm of Deloitte Plender and Griffiths in Cardiff.



Professor Trefor Evans – 30 years in the diplomatic service and now Professor of International Politics at Aberystwyth.

Mr David Morley-Smith – managing director of Rogers and Jackson, Wrexham-based complex of 11 companies with wide interests.

answerable to the Managing Director, Telecommunications, yet we wanted more from the members than just acting as an advisory committee. We feel that we have been fortunate in striking the right balance. We don't want the part-time members to become Post Office people to the extent that they would lose their capacity to criticise us. Their views are stimulating and sometimes frightening in their unorthodoxy, but always pertinent. The full-time members have at times felt guilty of being wet blankets advancing rule-book reasons against some course of action. They have had to learn that as Board members they do not have to toe any party line, but are free to express their personal views on policy and to interfere in each other's domains as much as they wish.

We have been meticulous in ensuring that at no time would there be any semblance of presenting a united front. The Board, while being interested to monitor current progress, has not concerned itself with day-to-day affairs but has concentrated on policy and particularly on long-term planning. This is where they see their real function – making a contribution from their knowledge of marketing, finance and industry to the long-term allocation of our resources.

The day-to-day business is run and Board decisions are carried out by the old-style Board meeting as an Executive Committee.

It has been almost impossible to evaluate the experiment in quantitative terms and subjective judgements are particularly fallible when you are part of the events. We may even have lost a little ground in some ways because of the dispersal of effort. Some positive statements can however be made.

There is no doubt at all that our relationship with the business and industrial community has been markedly strengthened. The part-time members, although having no formal links with the Areas, have shown the greatest willingness to participate in significant events and have joined us in experimental sessions with the unions. On the whole we feel that consultation on an informal basis has been increased substantially as we have been at pains to ensure that the unions fully appreciated the purpose and function of the Board.

We are now running into a period almost of adolescence. Our first difficulties are over and we can begin to plan more confidently without the "experimental" axe hanging over our heads. Our first and perhaps most important task is to re-examine the working of devolved powers. We must persuade people to accept their responsibilities confident in the knowledge that they will suffer less for doing something wrong than for doing nothing at all. As devolution is increased, the role and structure of the Regional Office may need to be reconsidered. Areas may need strengthening in specialised fields and this may give rise to different concepts of Area organisation. In this sphere we must not be hampered by arbitrary productivity measures which do not tell the whole story. We want to consider ways of measuring productivity in revenue terms rather than stations when the mix of work may be changing.

There is so much to be done and we welcome the opportunity to face the very real challenge which this novel situation poses. Perhaps we have done nothing that we couldn't have done before, but the plain fact is that we have done many things that we didn't do and this must mean something.

Mr R. Chivers was appointed Controller Finance and Management Services at Cardiff in 1969. He previously served with the Post Office at Chester, Liverpool, Leeds and Glasgow.

Sniffing for a fault

Highly sensitive tracer gas equipment is being introduced by the Post Office to detect faults in pressurised cable.

DW Finch

WATER HAS always been a hazard to underground telephone cables. If it penetrates a sheath it can result in loss of service and possibly costly cable replacement. For some time the Post Office has protected many of its cables from the ingress of water by filling them with dry air at a pressure of 9 lb per square inch. A warning system has also been developed so that when a cable pressure leak occurs it can be brought to the attention of engineers and speedily repaired.

This involves monitoring conditions in cables by flow meters, which give a visual indication; and by gauges or pressure-sensitive contactors which raise an alarm – a flashing lamp or bell – at the nearest exchange whenever pressure falls below a specified level. The leak is then often located by injecting a tracer gas into the faulty length of cable and "sniffing" for the gas issuing from the leak with a suitable detector.

In the past detectors have not always been able to locate a leak with precision largely because they could not readily differentiate between varying concentrations of tracer gas. In a manhole, for example, where the gas pervaded the whole area it was often difficult to pinpoint a leak.

The Post Office, however, has now introduced a detector with a radioactive cell which is so sensitive that it can readily "sniff" and indicate different concentrations of gas in any circumstances . . . even if the gas is present in only one part in a hundred million.

The radioactive source is tritium – also employed in the illumination of Trimphone dials – but only a minute quantity is used and the radioactive emission from both the detector and the Trimphone is less than that from a luminous watch so there is no radiation danger to operators.

Technical Officer Eddie Belcher uses the detector to "sniff" for tracer gas at a hole bored directly above a cable which has been laid without duct. Any gas leaking from the cable would rise through the hole. Right: The detector "sniffs" for tracer gas at the outlet on the pump which is sucking air from a cable duct.

The new instrument has a number of advantages over its predecessors which were bulky, costly to maintain and had a heavy power drain. In size and shape the new detector is similar to a small electric drill and is about half its weight. It can therefore be held in the hand and easily moved about. With the tritium providing a self-contained source of energy within the detector, such additional power as is required is provided by a rechargeable battery housed within the handle. This eliminates the use of an exposed element operating at red heat and which in previous detectors constituted an explosion hazard in an inflammable atmosphere.

In the field, the approximate area of a pressure leak is usually found by identi-

fying the contactor on the faulty cable which indicated the falling pressure. It is standing practice then to take a preliminary series of pressure readings in this area at valves which are fitted at intervals along the cable. By plotting these readings on a graph it is often possible to locate the leak, especially if it has occurred at a joint.

It is where the graph proves to be imprecise that the tracer gas equipment is most valuable. The mouths of the ducts carrying the suspect lengths of cable are then sealed off and sulphur hexafluoride gas (SF6) is injected into the faulty cable through a valve at one end of the section. Eventual detection of the gas at a valve opened at the far end of the suspect cable length will prove that it has passed through the whole of the section to be tested. By then partially removing the duct seals individually and testing the duct atmosphere the duct length in which the cable is leaking can be found. Once the faulty length has been positively identified the duct seals are removed and an electric blower is used to disperse all tracer gas up to the leak point.

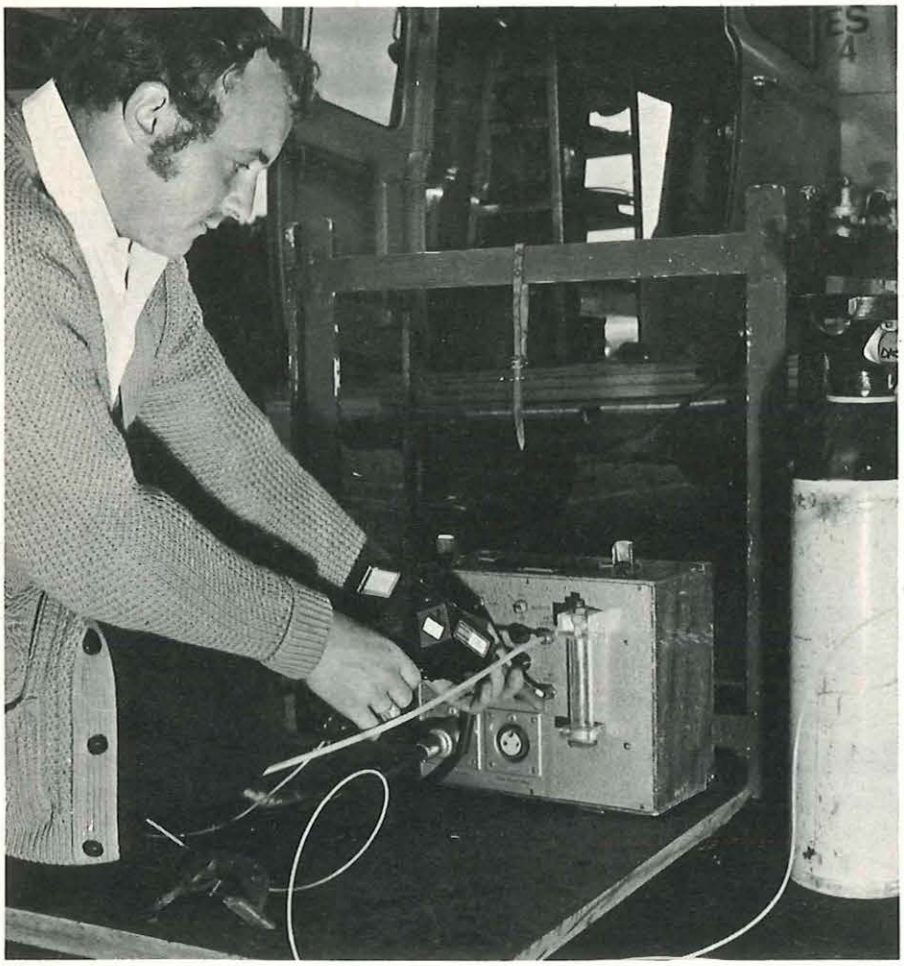
A flexible plastic tube attached to rods is then thrust into the duct alongside the faulty cable. The fixed end of the tube is attached to a pump which sucks air out of the duct. By placing the detector at the pump outlet the duct atmosphere is continuously monitored and when the plastic tube reaches the leak point the gas will be detected. By measuring the amount of tubing inserted into the duct the leak can be pinpointed.

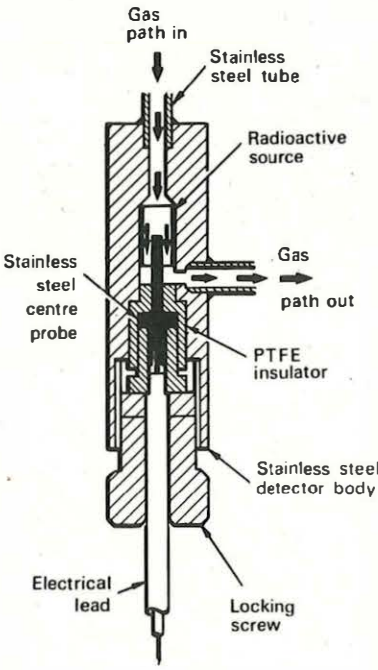
In the case of cables buried without ducts, SF6 gas is injected into the cable as before and seepage holes 6 to 12 inches deep are made in the surface of the ground directly above the cable. Each hole is then sampled with the detector and excavation is carried out where the highest degree of gas concentration is detected.

As well as being used for tracing cable sheath faults the SF6 equipment can be used for detecting pressure leaks in such items as air blocks and terminal pressurising apparatus.

Trials conducted under the Experimental Changes of Practices Committee proved the new equipment to be a big improvement on its predecessors and it should make the tracing of pressure leaks easier than before. The equipment was first introduced for full-scale field operations in October last and is now in use throughout the country.

Mr D. W. Finch is a Senior Executive Engineer in Service Department with responsibilities for trunk and junction cable maintenance. Before taking up this post in 1970 he was employed on main line planning duties.





The electron capture cell, the vital part of the new tracer gas equipment, consists of a stainless steel cylinder lined with a tritium radioactive source. A small polarising voltage is applied between the cylinder and an electrode placed centrally within it, and pure nitrogen is fed through the detector cell. Because nitrogen, unlike air, allows the electrons being continually emitted by the tritium to pass freely to the central electrode, a maximum standing current results. This is represented on an instrument meter as zero.

When electron-capturing gas, "sniffed" into the detector cell through a probe on the nose of the instrument, mixes with the nitrogen some of the electrons from the tritium are "captured" and the standing current as a result is reduced. The reduced current is represented on the meter as a positive reading directly proportional to the amount of electron-capturing gas present. When all the electrons are "captured", that is there is no standing current, the meter will give a maximum reading.

The tracer gas used with the new equipment is sulphur hexafluoride (SF6). This has very strong electron-capturing properties and is thus detectable in minute quantities. The SF6 is normally diluted in a ratio of one part in 23 with air. The dilution is achieved by a simple tee piece, one part of which is connected to an air supply and another to the SF6 gas container. Calibrated constrictors automatically ensure that the gas-air mixture is in the correct ratio.

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ICL machines are already being used for CAD applications by both The British Aircraft Corporation and Plessey. BAC are using CAD for aerodynamics research on the Concorde programme and Plessey for telephone exchange simulation.

As questions become more complex, and the answers to them more sophisticated, advances in all spheres of technology are benefiting from ICL 'problem solving power'.

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MISCELLANY

Staff at Leicester wait their turn for vaccination against 'flu.

Needled

OUTBREAKS of influenza cost commerce and industry millions of pounds in lost working time each year and, as Britain's biggest employer, the Post Office is a major victim. Any attempt to reduce the annual 'flu toll would capture Post Office interest, but an immunisation experiment which started in December has come under particularly keen scrutiny.

It has involved some 30,000 Telecommunications staff who were offered free vaccination against 'flu. Private industrial firms and students are also taking part in the experiments to test the effectiveness of mass immunisation in cutting time lost through sickness. Telephonists, engineers and office staff from all over Britain who accepted the offer of free vaccination have been treated by Post Office medical staff during working time.

The experiment, organised by the Epidemiological Research Laboratory of the Public Health Laboratory Service, is the biggest anti-'flu campaign to have been undertaken in this country.

Each of a number of Post Office test centres is compiling a weekly record of the number of sick absences and an analysis of the results will provide a comparison between people who were vaccinated and a control group of untreated people in similar jobs in similar areas.

The cost to the Post Office of vaccine and equipment is expected to be about £6,000. Conclusive results from the experiment could well repay this several times over.

Super cable

THE Post Office's 60 MHz coaxial cable system, the largest capacity cable in Europe (see Telecommunications Journal, Summer 1970), originally planned to link London, Birmingham and Manchester is to be extended to Leeds.

Work on the first stage between London and Birmingham which will involve laying 110 miles of underground duct is due to begin this year. It is planned to come into service in 1975 with the Birmingham-Manchester link following in 1976.

The additional Manchester-Leeds section of the super cable system is expected to be working by 1977.

Because of its huge capacity of 97,200 circuits carrying 100,000 telephone calls simultaneously the new cable is to be specially protected. It is to be laid at twice the usual depth and the route will avoid major towns and cities to keep it clear of other telephone cables and underground utilities.

During cable-laying operations two ducts will be prepared so that a second high-capacity system can be installed quickly when it is needed to meet the demands of the 1980s.

Men at the top

Mr Thomas

Mr Harper

NEW senior appointments involving six Post Office directorships have been announced.

Mr Frank Thomas, formerly Deputy Director, has become Director of Network Planning in succession to the late Mr Hubert Barker. Mr Thomas is also a former Deputy Director of both Service and Planning in London Telecommunications Region. Earlier in his career he helped to develop the first transatlantic cables laid in the 1950's. Mr Thomas is a member of the Editorial Board of Telecommunications Journal.

Mr John Harper, Director of the North Eastern Telecommunications Region since 1969, moves to London as Director Purchasing and Supply Department. Now 41, he is the youngest Director appointed in the Telecommunications business. Mr Harper helped to shape the legislation which gave the Post Office corporation status. He succeeds Mr Jack Baldry who has retired after 42 years' service.

Mr Hubert Holmes succeeds Mr Harper in the North East. He was the Region's Controller of Planning after service in Scotland, Leeds and Headquarters in London. He returned to the North Eastern Regional Headquarters 14 years ago.

Mr H. G. Lillicrap, Senior Director Customer Services and a former Chairman of the Commonwealth Telecommunications Council, has taken over as Chairman of the Government-owned Cable and Wireless Ltd. The new post is a half-time appointment. Although Mr Lillicrap is not due to retire from the Post Office until early next year he will be seconded to Cable and Wireless and will be free to devote some time to Post Office affairs.

Two senior appointments have been made dealing with financial and audit matters of the Post Office.

Mr William Kember, a Chartered Accountant, has been appointed to a new post of Senior Director, Central Finance. He will report to Mr A. S. Ashton, Board Member for Finance and Corporate Planning and will be responsible for all financial and corporate planning activities in the central headquarters of the Post Office. Prior to his appointment Mr Kember had been working for the Post Office on loan from the accountants Cooper Brothers & Co.

Mr Harold Ball has been appointed to another new post, Director, Central Audit. Mr Ball, formerly company internal audit controller of Rolls-Royce (1971) Ltd, has had wide experience on audit and design of computer systems.

Computer pages

ALL Yellow Pages and Commercial Classified telephone directories published after December 31 1972, will be compiled by the Post Office instead of by Thomson Yellow Pages Limited, as at present. The move, which is the result of an agreement between the Post Office and Thomsons, is designed to take full advantage of computer-based production and give customers more up-to-date directories.

Thomsons will continue to be responsible for selling advertising space in all telephone directories and special entries in classified directories.

Trunk growth

THE Post Office installed 12,032 telephone trunk circuits in 1971 – an increase of 12·7 per cent – bringing the total to 106,942 by the end of the year.

It's impossible! This is how it works

London on the 'phone to Rio (or it could be New York, or Bootle). Words aren't enough– you need to show them a document, map or picture. So you transmit it to them, there and then. On the telephone.

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Railway phones

NEW-STYLE open telephone booths which have replaced the old wooden boxes at Waterloo Station, London, are proving popular with travellers. People who took part in a special survey said that they found the booths more convenient, cleaner and easier to use than the wooden boxes with folding doors – and the number of calls made from the booths has increased by 30 per cent.

The open-plan design is a deterrent to vandalism and makes it easier for people to keep their luggage by them when making calls.

The Waterloo booths will provide the basis of a new national design for public telephones on railway stations. There are about 1,700 call boxes on stations, mostly the wooden box type, and the new-style booths will go in as stations are modernised.

The new booths at London's Waterloo Station. See "Railway phones".

Research awards

THE Christopher Columbus Prize Fund, which makes annual cash awards to Research Department staff, has been renamed the Gordon Radley Fund (Christopher Columbus Prize) in memory of the late Sir Gordon Radley, its founder. Sir Gordon, a former Director General of the Post Office, died suddenly a few weeks after presenting the 1970 awards.

The 1971 awards were presented by Lady Radley, Sir Gordon's widow.

The Scientific Premium of £10 was won by Mrs M. A. G. Halliwell, a Senior Scientific Officer in Materials Branch, for her paper on "Measurement of specimen tilt and beam tilt in the Bond method". The paper was published in the Journal of Applied Crystalegraphy in 1970.

Mr J. T. Young, a Technical Officer in Training at Dollis Hill, won a £10 Craftsmanship Premium for his work on the production of moulding tools.

Prizes of £7.50 each went to Martlesham Technical Officers Mr P. J. F. Ryecraft and Mr S. E. Cooke and Mr R. T. Anderson, who was a Temporary Assistant Executive Engineer when the entry was made, for a multiplexer-demultiplexer used in circular waveguide research, and to Mr M. J. Benton, a Scientific Assistant at Dollis Hill, for work on a telephone handset-setting gauge.

Technical Officers Mr R. F. Gibson and Mr M. W. Jacobs, both stationed at the Radio Laboratories at Backwell, near Bristol, receive prizes of £5 each for a transistor test-mounting jig.

Telex USA

TELEX customers in Britain can now dial direct to all telex numbers in the United States – with the exception of 90 in New York – following the introduction of automatic service to 41,000 lines on Western Union's TWX (Teletypewriter Exchange) network. About 10,000 calls a month are made from this country to TWX lines.

Other new international telex services from the United Kingdom: an automatic service to Botswana and Bulgaria and a through-the-operator service to the Somali Democratic Republic.

A phototelegraph service to the Philippines has recently been introduced.

Statistics

FROM this issue we are changing the presentation of telecommunications statistics. Instead of publishing figures each quarter, there will be a tabular presentation of end-of-year results in the Autumn edition only. Comparisons with previous years and corresponding percentage growth figures will be included. In the Spring edition a graphical comparison of international telephone statistics will be given. The first of these comparisons is on page 34—*Editor*.

BOOK REVIEWS

Test your knowledge of –

Physical Electronics by T. Wilmore

Applied Electronics by R. W. J. Barker

Telecommunications by L. Ibbotson

Published by the Butterworth Group. 80p each

These little books, of 96 pages each, contain sets of multiple-choice questions and answers in their respective subjects. They are revision texts, aimed at first degree, Higher National or CEI examination level, and are based on a series devised by one of the authors which appeared in Wireless World.

On the face of it, multiple-choice questions might be thought a rather trivial approach to the higher technologies, but quite searching tests are possible given the ingenuity in devising alternative answers which the authors display. In most cases the choice of the correct answer is not apparent but requires a certain amount of working out to be done. An excellent feature of each answer is the inclusion of a short explanation in addition to the indication of the correct choice.

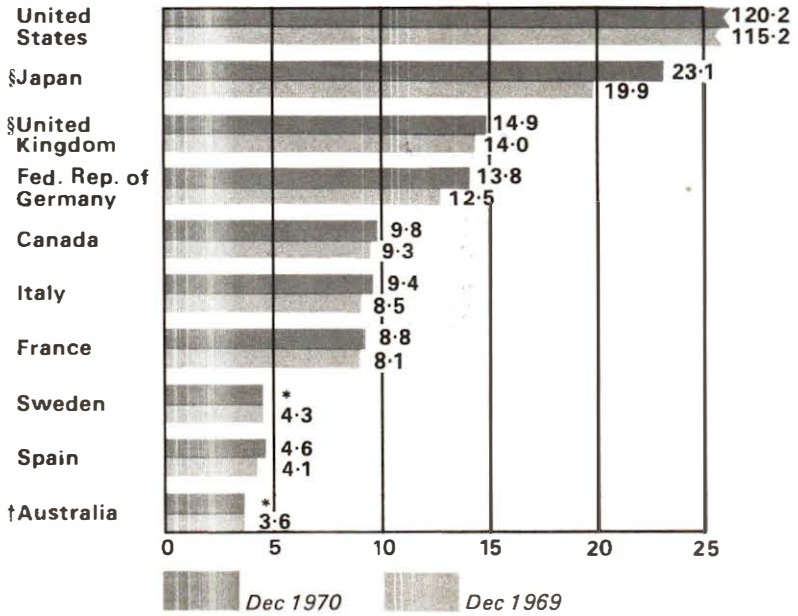
The scope of the questions in each set follows reasonably from the title. However, the scope of "Telecommunications" is somewhat restricted to the syllabus of the conventional university option, and essentially comprises general principles of signal processing together with line and radio transmission theory. Switching and traffic theory and telecommunications systems are not covered.

The books can be recommended as revision texts and teaching guides for students on formal courses; they will interest also those having passed their student days but who like to find problems to test their knowledge. **MBW**

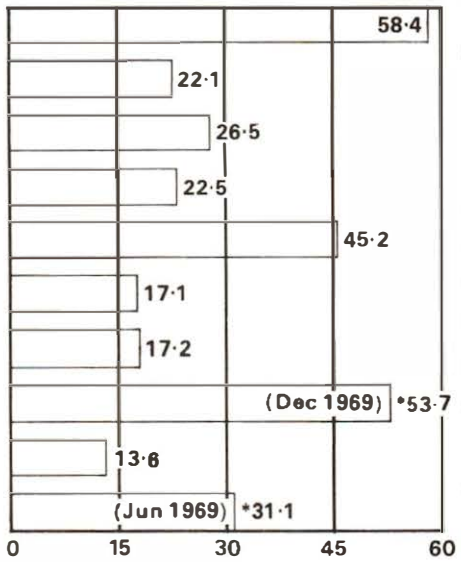
International comparisons of telecommunications statistics

Total telephones in service (millions)

Countries with highest number of telephones

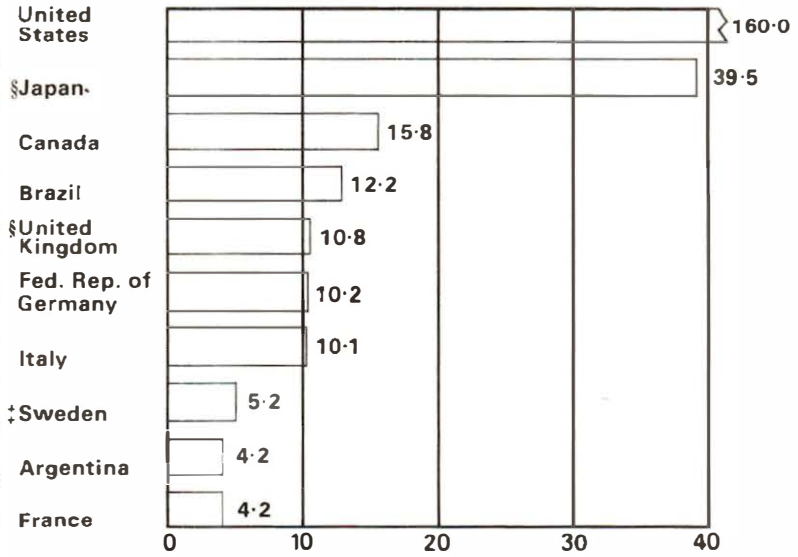


Telephones per 100 population, Dec 1970

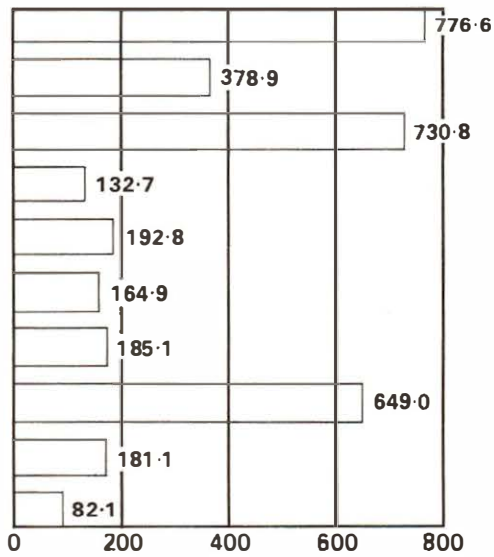


Telephone conversations during 1970 (in 1000 millions)

Countries with highest number of telephone conversations



Conversations average per person



1970 figures not yet available † As at June 1969 ‡ Relates to the year July 1969–June 1970* **Source: ITU

§ Figures relate to the years ending 31 March 1970 and 1971. UK figures include Hull Corporation **Telecommunication Statistics**

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Contributions:
The Editorial Board will be glad to consider articles of general interest within the telecommunications field. No guarantee of publication can be given. The ideal length of such articles 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.

Correspondence:
Communications should be addressed to the Editor, Post Office Telecommunications Journal, Public Relations Department, Post Office Central Headquarters, 23 Howland St., LONDON W1P 6HQ.
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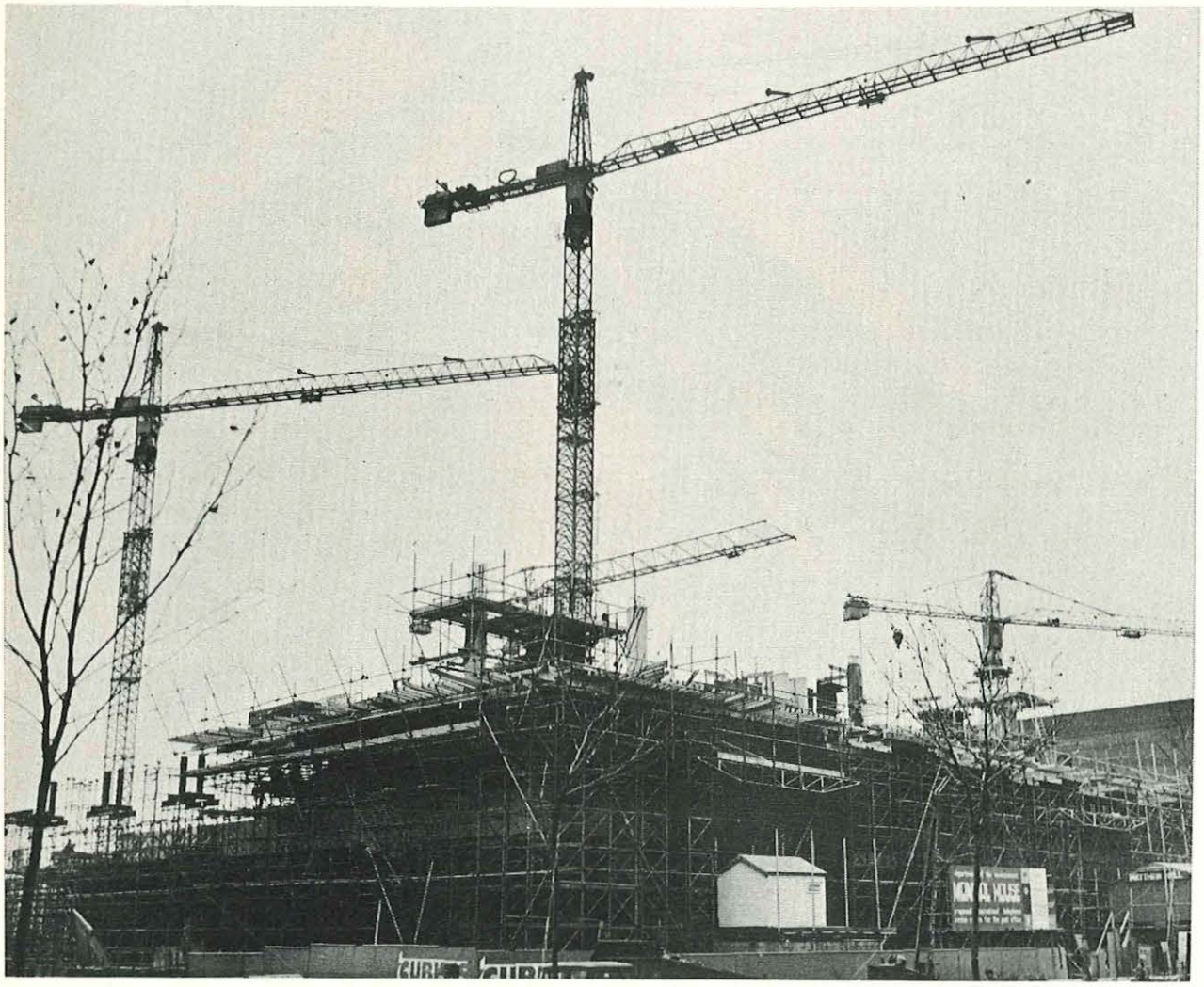
Remittances should be made payable to "The Post Office" and should be crossed "& Co.". The Giro account number is 535-1006.



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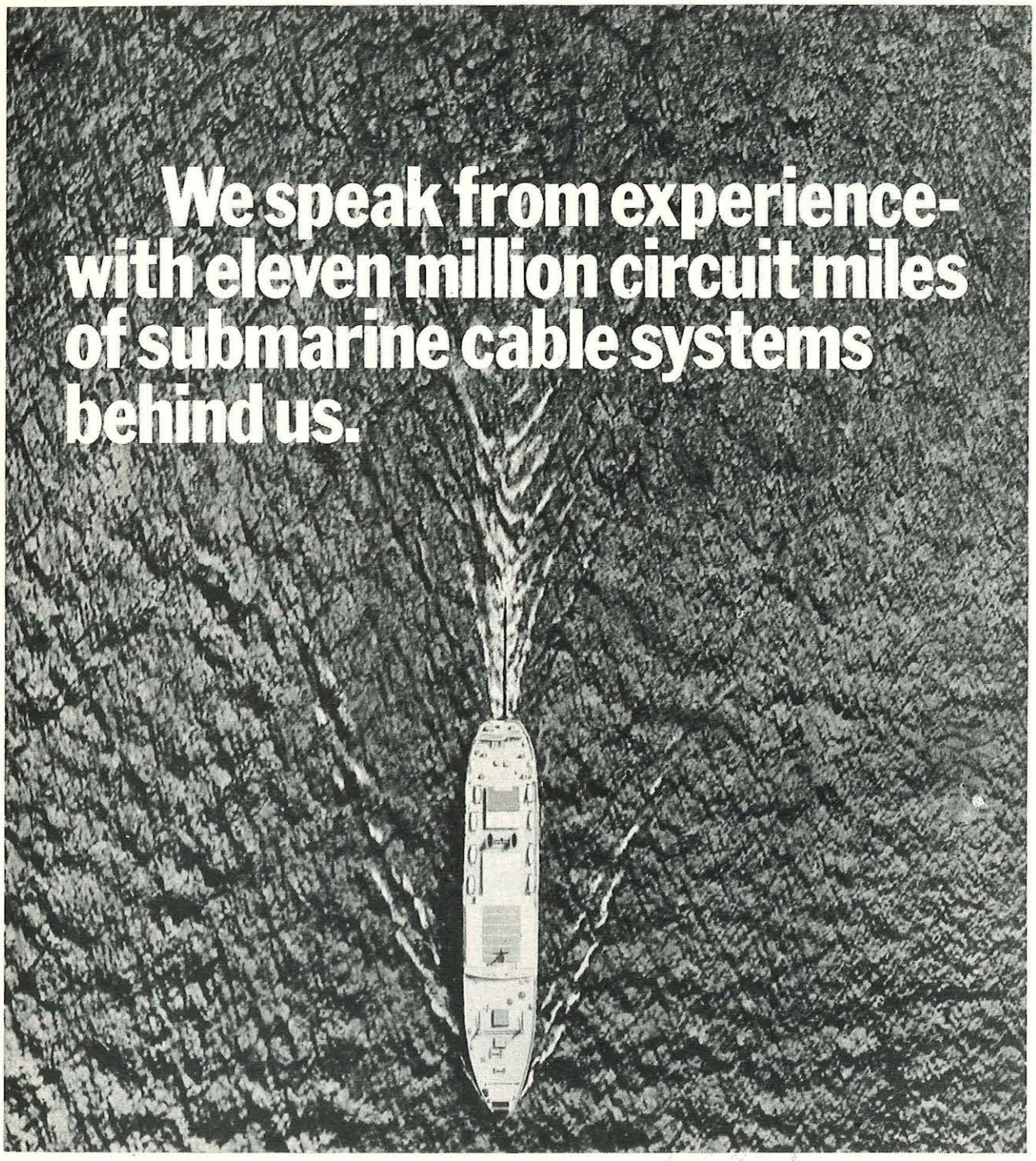

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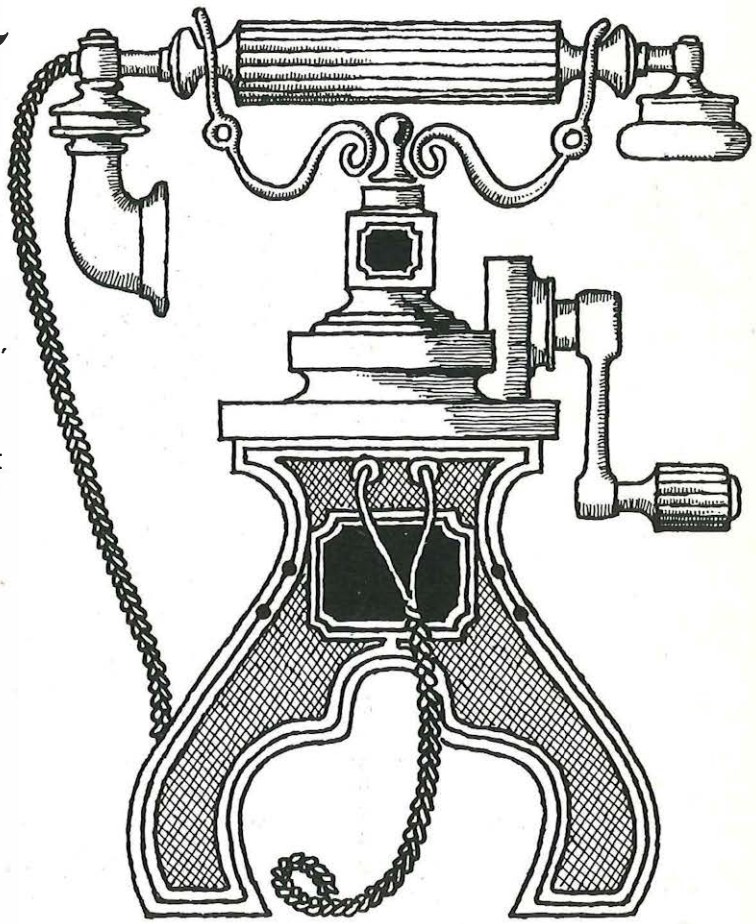

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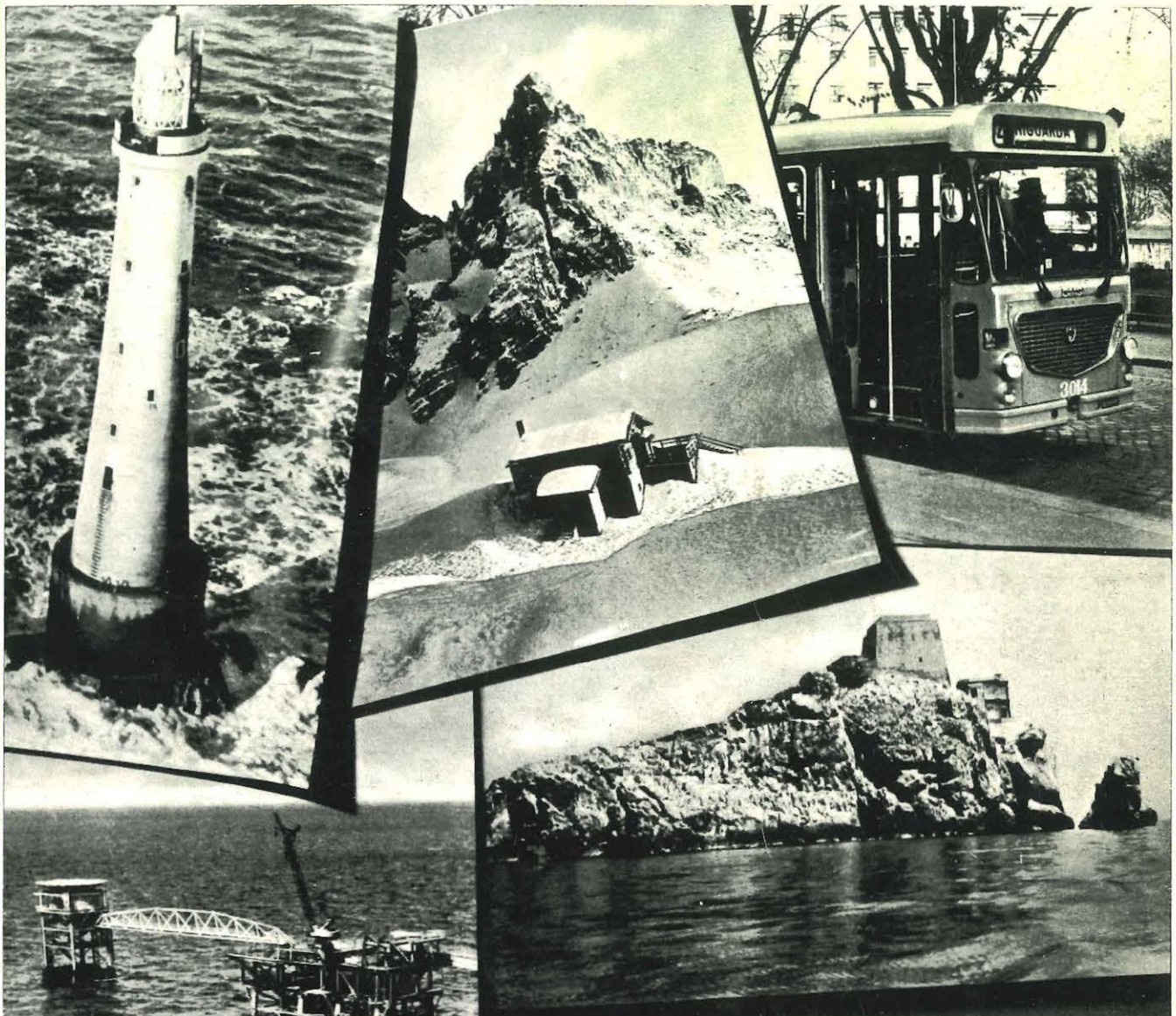
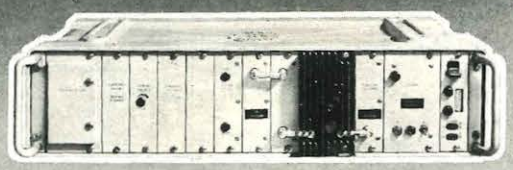


SINGLE-CHANNEL RADIO LINK



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