## Post Office telecomputations journal Winter 1973-74 Vol. 25 No. 4 Price 9p



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### Not enough people to go round

In areas where there are serious labour shortages the Post Office, like other employers, is unable to recruit all the people it needs. The result is that service to the customer is suffering, and further deterioration is probable.

The effect of staff shortages on postal and telecommunications services has been described by Sir William Ryland, Post Office Chairman, in a recent letter to the Post Office Users' National Council (POUNC).

On the telephone side, Sir William disclosed, there is a shortage of inland service operators – about 1,000 (11 per cent) in London Region and 400 (8.2 per cent) in South Eastern Region. In recent months the average time-to-answer by operators during the day has deteriorated markedly. It is now over 10 seconds, compared with 7.7 seconds for the previous two years.

The situation is particularly serious in the international service where there is a deficiency of 1,100 operators – equivalent to 25 per cent of the staff. The time-to-answer had been held at about 20 seconds overall until last summer, despite existing staffing difficulties and shortage of switching capacity. The result of the present scale of staff shortages is that the average time-to-answer is now more than one minute.

In his letter to Lord Peddie, Chairman of POUNC, Sir William commented: "These trends are particularly disappointing after the very considerable efforts we have been making to improve the quality of our postal and telecommunications services. We are working hard to keep the standards as high as they can be in the prevailing circumstances, but there remains a risk of some further deterioration in the months ahead."

### **A PENNYAWEEK**

In common with all publications, this Journal has been faced with substantially increased production costs over recent years. Despite our efforts to keep these costs to a minimum it is plain that continued inflation will make it difficult for us to maintain the high standards that readers expect.

With regret, therefore, it has been decided that the price of the Journal must be increased to 12 pence an issue from the Spring edition this year.

All the improvements in content and production introduced in recent years will be maintained, and at 12 pence a quarter – less than one penny a week – the Journal remains very good value for money.

The revised method of deduction from pay for Post Office staff will be announced shortly in the Post Office Gazette. Details of annual postal subscription payments will be announced later.

#### Post Office telecommunications journal

#### Winter 1973-74 Vol. 25 No. 4

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

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Cover: The arrival of commercial radio stations has increased the already growing number of phone-in programmes in which telephone callers take part in live broadcasts. The picture shows the desk at Capital Radio in London where calls from the public are monitored and switched through to the studio on the air. See page 5.



## ... BUT NORTHERN IRELAND

THE AIMS of the Post Office in Northern Ireland are the same as elsewhere in the United Kingdom – to provide an efficient modern service to our customers and to expand the system to meet a growing demand for telephone service. Before the start of civil unrest in the Province the telephone service was among the best in the UK. Unfortunately, this enviable position could not be maintained, particularly when the terrorists turned their attention to Post Office installations.

In the early hours of 2 August 1970 a bomb destroyed the UAX14 telephone exchange serving the popular seaside resort of Newcastle, nestling at the foot of the Mourne Mountains in Co Down. That attack heralded a widespread campaign of destruction and disruption directed against the telecommunications services in the Province.

There has been a total of 72 bomb attacks against 50 exchanges, ranging in size from small rural unattended exchanges to Telephone House in Belfast. As a result 20 exchanges have been destroyed and service has been interrupted at 27 exchanges.

Determined efforts by Post Office staff have minimised the effects of the damage. In most cases service has been fully restored by repaired or replacement exchanges, or by the use of mobile units. Equipment manufacturers have been very helpful in supplying exchange equipment for urgent restoration purposes and Post Office engineers have carried out modifications to mobile exchanges to increase their trafficcarrying capacity.

Direct damage to Post Office buildings, plant and vehicles are only part of the difficulties faced in the efforts to maintain and expand the telephone service in Northern Ireland. Since 1969 over 3,000 bombs have exploded, causing damage to business premises, government and local authority offices. Often the destruction of one set of premises affects other customers' lines in premises not directly involved in the structural damage. Restoration of service, frequently on a temporary basis, involves the planning of new routes and new methods for serving a number of premises.

The commercial centres of Belfast and the provincial towns are special security areas where vehicles cannot be left unattended. This means that many maintenance and installation duties require two men to operate. Occasionally a thoughtless motorist, or one unfamiliar with the security arrangements, leaves an unattended vehicle within the special control zone. Such an act sparks off an immediate reaction by the security forces who close the thoroughfare and order evacuation of all shops and offices in the vicinity.

The individual security precautions of

2



## CARRIES ON NA Branagh

business establishments are also a barrier to Post Office maintenance and installation staff, many of whom are required to seek access on an appointment basis and are often denied the facility of carrying out work in the premises when staff or customers are not present. In addition, there are certain areas where staff cannot operate freely, with the result that delays occur in the clearance of some faults.

Until 1967 vandalism of public call offices in Northern Ireland was not of such serious proportions as in the rest of the UK, but since then vandalism has increased alarmingly and the Region is now seriously affected.

The number of faults arising in the underground cable network, particularly in Belfast, is proportionately higher than for anywhere else in the UK. This results from the effects of explosions and the diversion of staff from normal preventative maintenance to the restora-

tion of damaged cables and clearance of faults as they arise.

Nevertheless, the performance of the automatic plant in many exchanges stands comparison with any in the United Kingdom in respect of both local and STD calls. Every effort is being made to maintain this standard and even to improve the STD performance by reducing the level of congestion on the trunk routes.

The number of calls to the operator service fluctuates widely due to the unpredictable nature of the traffic arising after the frequent bomb and shooting incidents. Another factor which affects the operator service in Belfast is the very restricted public transport facilities available in the evenings. A secure car park has been provided for the use of night staff but, understandably, few are willing to risk bringing their private vehicles into the city in the evenings and consequently have to be released from duty to catch the available transport irrespective of the level of traffic arising on the switchboards at the time.

To help solve the problem taxis are often used to take staff home, but these arc not completely reliable either in available number or in timing. It is not surprising, therefore, that the quality of the late evening operator service often attracts strong criticism from the public – all too easy perhaps, from the comfort and relative safety of the critic's home.

Resignations among day telephonists in Belfast have increased since the start of the civil disturbances and a continuous recruitment campaign is necessary to maintain the flow of new recruits. This situation results not only because of the civil conditions, but also from the wider employment opportunities available over the past few years, despite the problems in Northern Ireland.

During the 1972/73 financial year an extensive engineering recruitment campaign was carried out and nearly 400 men have been added to the engineering labour force. When fully trained and equipped, the extra staff will be of considerable help in the provision of more telephones and in making a significant reduction in the waiting list in the Province.

Additional local line plant schemes to cope with the many new housing estates are under way, and more direct labour work in internal exchange construction will also be undertaken.

Technical Officers are in short supply at present so the annual intake of young men as Trainee Technician Apprentices (TTAs) has been increased from 50 to 70 to expand the potential source from which future Technical Officers may be drawn.

The general level of production, trade and employment has risen substantially in the Province and is reflected in a steadily increasing demand for telephone service as shown in the table.

Net	New	Waiting
demand	supply	list
14,302	14,783	1,257
20,309	18,206	2,760
18,597	16,384	4,873
22,859	18,714	6,932
25,344	23,413	8,162
	Net demand 14,302 20,309 18,597 22,859 25,344	Net New   demand supply   14,302 14,783   20,309 18,206   18,597 16,384   22,859 18,714   25,344 23,413

In particular, there has been an upsurge in applications for service from the residential sector which, in Northern Ireland, has a rather low penetration factor of about 27 per cent.

In the five-year period from 1972/73 to 1976/77 it is planned to spend about £62 million on capital works in  $\blacktriangleright$ 

the Province. In the current year it is expected that nearly  $\pounds 6$  million will be spent on more exchange equipment and over  $\pounds 4$  million on local line plant and customers' apparatus.

Work is continuing on the installation of TXK3 crossbar type equipment in the City exchange which will serve as the local exchange for central Belfast. The exchange is expected to open-early in 1975 and will enable the present local equipment in Telephone House to be recovered to make way for more trunk switching equipment. Unfortunately, completion of the City exchange contract has been delayed due to technical problems and a shortage of contractor's staff. At present some 85 Post Office staff are employed on work in the City exchange, and of this total about half are employed on work which the contractor has been unable to carry out. International Subscriber Dialling equipment came into service on 29 September 1973, bringing this important facility to nearly 100,000 telephone connections in Belfast and 30 other exchanges in the Group Switching Centre area. This means that over 50 per cent of the total telephone connections in Northern Ireland now have direct dialling access to Europe and North America.

Work is soon to start on an extension to Telephone House, Belfast, which will

With public places of entertainment badly hit the Post Office Sports Association is enjoying a boom, including (right) an archery section which started last year.

Some staff sports have been hit because the troubles have deterred teams from visiting Northern Ireland. But members of the Post Office chess section (below) found a way round that – they used a telephone link for a match against colleagues in Scotland. treble the accommodation available for trunk equipment and ensure that communications facilities within Northern Ireland, and between the Province and the rest of the UK, Europe and countries farther afield, can be provided to the highest standards. Post Office Telecommunications in Northern Ireland has a vital part to play in the realisation of the full potential of the Province and is determined to make every effort to fulfil its role.

Mention must be made of the whole range of telecommunications business staff in both Region and Area without whose loyalty, hard work and ingenuity the telephone service would be in infinitely greater difficulties than those which presently obtain. Social life in the Province has been badly hit by the disturbances, particularly in Belfast where public houses, dance halls and discotheques have suffered at the hands of the bombers. However, there is a bright side to the picture as far as Post Office staff are concerned. The Northern Ircland Post Office Sports Association is





enjoying a boom period as more and more staff become aware of the many and varied activities for which the Association caters.

Football, rugby and bowls are firm favourites, but many other interests are also looked after, including recent additions of archery and angling. The bowling section teams from Northern Ireland were very successful at the National Post Office Championships inaugurated this year. A postal team won the fours championship while a telecommunications team were runnersup in the pairs. A new sports complex is being planned at Dunmurry, on the outskirts of Belfast, to replace premises destroyed by terrorists, and new Youth Club premises have been acquired. The sum of £30,000 has been received from the Post Office to assist in providing facilities for the staff's use, and the profits from a monthly lottery run by the Belfast Sports and Social Club are placed in a fund to provide club premises when normal times return to the city.

Northern Ireland was represented at the Post Office Drama Festival held at the Birmingham Repertory Theatre early in October when a one-act play with a cast of six was presented. The Post Office First Aid competitions always feature teams from Northern Ireland, and the 1973 finals at Scarborough in November were no exception. Nineteen local teams had competed to find the best men's and women's teams to represent the Province, and in the national final Belfast HPO men took the runner-up trophy. The Belfast Telephone Area women's team were runners up the previous year.

In spite of the stress and strain of the present troubled situation in Northern Ireland due to terrorist activity, political pressures, civil unrest and the frustrating security restrictions, the telecommunications services still carry on. This is due to the determined efforts of all Post Office staff who have been an excellent example to the people of Ulster. We are ever hopeful that one day soon peace and stability will return to enable all to enjoy life again to the full and allow Post Office services in Northern Ireland to return to their previous high standards so that they may contribute to the realisation of the great potential and future prosperity of the country.

PO Telecommunications Journal, Winter 73-74

Mr N. A. Branagh is a Senior Telecommunications Superintendent in the Service Division of the Northern Ireland Postal and Telecommunications Board.



### Callers air their views

RADIO AND television audiences have always been quick to make unsolicited telephone calls to broadcasting organisations concerning the content of their programmes. In recent years this desire to express an opinion has been exploited by "phone-in" or "talk-in" programmes in which members of the public are invited to telephone radio and television stations to take part in live broadcasts about topical and controversial subjects.

Two basic "phone-in" methods are used by the broadcasters. One way is to invite the public to put their questions and views in advance of the programme. These suggestions are then vetted, and selected callers are contacted by the studio when the programme goes on the air. The other method invites audiences to telephone during the programme. Selected calls are held and connected to the live broadcast as required.

Experience in North America, where "phone-in" techniques were first employed, showed that this type of spontaneous audience participation had "Phone-in" programmes are becoming a popular feature of broadcasting in this country. The Post Office has designed special installations for connecting calls from the public telephone network to live broadcasts.

### **R Hedgecoe**

both an educational and entertainment value. It led the various broadcasting organisations in this country to request the Post Office to provide similar facilities for connecting public telephone calls to certain live broadcasts.

The BBC and IBA companies run "phone-in" programmes, and recently the Post Office has provided facilities for London's two new commercial radio stations. Their success can be gauged from the fact that one of these stations, Capital Radio, received 90,000 calls in the first three-and-a-half weeks after it came into operation.

"Phone-in" installations produced by the Post Office, using mostly standard equipment, provide for any number of lines to be terminated at a radio or television station. Specially designed Post Office units allow up to seven of those lines to be extended to the live broadcast equipment.

All calls for a "phone-in" programme are answered by telephone operators in the studio. Each operator is provided with a key and lamp unit to which a maximum of five lines are connected. When a call is received for a show on the air, the operator first confirms that the connection is of good audio quality – ic, it is not faint or noisy – and that the caller has a useful contribution to make. Accepted calls are then extended to a line connecting unit, where each line is terminated on a separate push-button key. When the studio sound engineer

presses one of these keys the line associated with it is connected directly to the programme, simultaneously releasing any other line which had previously been on the air. When more than one simultaneous input to the programme is required, an additional key is provided for each line.

When calls are extended to the line connecting unit, the studio sound output is automatically connected to the telephone lines. This enables waiting callers to follow the programme on their telephones, prior to being switched through to the live broadcast.

All callers need to listen to the sound on the telephone and not their radio or TV as the volume must be turned down to prevent output of their sets being fed back to the studio. Additionally, in the case of radio, a delay is built into the broadcast system to give the studio staff an opportunity to cut into programmes. The delay, which is usually seven seconds, occurs between what is actually said in the studio and what is broadcast. Therefore it would be impossible for a caller to carry out a conversation by listening to the broadcast on his own radio set.

Any system which invites a large number of people to call a particular telephone number initially produces a very high calling rate. This surge inevitably produces congestion in the switching equipment and junctions at the local telephone exchange. As the high calling rate is only of short duration, disruption to the normal working of the exchange can be

tolerated, especially as the broadcasting organisations can be instructed not to operate their "phone-in" services during the exchange's busy period.

However, experience has shown that some telephone users hold on when hearing engaged tone, believing that they will eventually be connected to the number they have dialled, while others ring off and call again. The combined effect of these actions causes exchange congestion to be increased for an unacceptable period. To counter this problem, broadcast companies are required to connect a recorded announcement to a number of the lines used for "phone-in" programmes.

The recorded announcement, when connected during a "phone-in" programme, advises callers that their calls are not required. This has the advantage of informing callers quickly that more calls are being received than the broadcast staff can handle, thereby reducing the holding time of unwanted calls and congestion in the local exchange.

When the public dial a "phone-in" number the first lines used are for incoming traffic only, and the operators answer these calls using headsets. The remaining (bothway) lines have telephones associated with the operators' key and lamp units to enable calls to be dialled. If people have been invited to make calls into a programme, the recorded announcement is connected to the bothway lines, leaving the incoming lines free for the callers. When the broadcasting company wishes to call back people who phoned in prior to a programme, the announcement is connected to the incoming lines. This reduces the holding time of unwanted calls, which tends to keep the bothway lines free from incoming calls.

All "phone-in" lines are terminated on a control unit at the broadcasting studio. This is a key and lamp unit, with a telephone attached, which allows a member of the studio's production staff to monitor the progress of all calls, to speak when necessary to a caller or to connect the recorded announcement to any line. The studio sound feed and recorded announcement may also be monitored from this unit, and standby sound distribution equipment can be actuated if these outputs are not satisfactory.

At times when the installation is not being used for "phone-in" programmes, the recorded announcement facility may be used for general announcements or for advertising. For example, a manufacturer may pay for a brief advertisement to be broadcast which requests listeners to telephone the "phone-in" number for more details. The recorded announcement is then used to give a longer, more detailed "commercial". Response to an advertisement can be measured by meters which record the number of calls. PO Telecommunications Journal, Winter 73-74

Mr R. Hedgecoe is an Executive Engineer in Telecommunications Development Department. He is currently engaged in circuit design for special installations and educational aids.





Top left: Calls to a "phone-in" programme at one of the new commercial stations - Capital Radio, London - are answered by operators in a room adjoining the broadcast studio. Selected calls are switched to a holding unit for connection to the studio.

Left: A member of the production team briefs a caller before connecting the call to the live broadcast. The call is switched through to the studio by pressing a key built into the desk top.

Above: Disc jockey Sean Kelly plays a record request on his Open Line programme. Callers are invited to air their problems.

## FOUR-IN-ONE NETWORK

The day Courtauld's new network came into operation also marked a switchover at the group's communication centre in Coventry. Overnight there was a transition from the old, plug-in switchboards (above). Each operator now has push-button controls on the new, streamlined console, which has eight operating positions. All calls are monitored on units mounted on the supervisor's desk (left).

WIDE-RANGING interests of the large Courtaulds group include fibres and textiles, chemicals, paints and engineering, and it has some 400 manufacturing units at 230 different locations in the United Kingdom. With such broadly based and different activities the group tended over the years to provide a number of small, independent private-wire systems.

More private networks became superimposed on the existing systems as other organisations joined the group, and its communications became a complex and illogical "birdcage" of systems. Changes in the group's structure resulting from the need to centralise or decentralise interests, to expand or close factories and to redeploy staff, also clearly demonstrated the inflexibility of a divided pattern of communications based on manual systems designed for fixed locations.

A new, nationwide private network has therefore been set up to meet both the present and future communiA nationwide, private communications network has been set up to provide fast, direct links between

premises in the vast Courtaulds industrial group. It can handle four different types of transmission. The Post Office helped to install the network and is to maintain the system.

### **VWG Rogers**

cation needs of the Courtaulds group. The network is sufficiently flexible to allow for changes in the location of premises, and has been designed to handle four different forms of transmission at the same time. It enables telephone calls, together with telegraph, data and facsimile transmission to be made between the main group premises at present connected to the network. Initially the network is being used only for telephone calls. Operator-tooperator calls between switchboards at any of the premises can be connected within five seconds by dialling three digits. The system also provides automatic alternative routing of calls. The net result to the customer is increased flexibility, greater speed of call connections and a substantial saving in communication charges.

The Post Office trunk transit network provided a pattern for the Courtaulds network. It is based on five automatic switching centres, equipped with Swedish Ericsson crossbar apparatus, which are located in the major areas of the group's activities in London, Coventry, Spondon (Derby), Manchester and Aintree (Liverpool). Group premises in each area are linked to the switching centres by Post Office private circuits and each centre is given a zone control number. For example, the London centre (2) covers London and the south-east, while the Aintree centre (6) is linked to group premises in Liverpool, Wales and parts of Lancashire.

Switchboards at each company or plant connected to a centre are allocated a three-digit number of their own, the first digit being its zone number. To make a call from one location to any of the other locations on the network the switchboard operator simply dials the appropriate three digits.

Each switching centre has been installed in a Courtauld building but is quite separate from the switchboard. Post Office 48 kHz wideband circuits link the centres in a way that provides alternative routing of calls between any two centres. The number of centres required and their location was decided following a detailed examination of call tickets prepared by the group's telephone operators.

Not all Courtaulds group premises are connected to the network, although steps are in hand to extend the scope and treble its size. Private circuits and external extensions do exist between some locations and minor premises which are not at present connected to the new network.

Overall co-ordination of the nationwide project presented a major problem. The network involved Courtaulds local management at the various locations, contractors concerned with the privately owned switchboards, the main contractor providing the tandem switching apparatus, and the Post Office at Telecommunications Headquarters (THQ), in Regions and Telephone Areas.

Responsibility for providing the wide-

band circuits was accepted by THQ, but a special co-ordinating committee was set up to deal with the rest of the network. The committee comprised the Deputy General Manager of Coventry Telephone Area as chairman, and a coordinating officer, project engineer, traffic liaison officer and the Courtaulds company representative from the Area. Regional liaison officers were appointed to head Telephone Area teams of sales and engineering staff.

When the co-ordinating committee was set up an analysis of the project indicated that it was already six months behind schedule to meet the ready for service date of 31 December 1972 required by Courtaulds. However, a target of February 1973 was set and by working closely together the Post Office and the main contractor were able to overlap on lining up and testing throughout the country so that the network was available for live traffic testing and operator familiarisation, zone by zone, from the middle of that month. The network was handed over complete and working on I March 1973.

It was quickly appreciated that the fewer Regions and Telephone Areas involved the better would be the control. By making the switching centres the "A" ends of all circuits to the locations they served only three Regions and five Telephone Areas were directly concerned in this control. The regional liaison officers were responsible for action at the "B" ends of these circuits, irrespective of the location addresses. To ease the effort in later stages of the project the private wires were ordered for installation and testing some months before the proposed opening date of the network. The wideband circuits linking the switching centres were also installed and completed well in advance.

Early work was also needed on the many and various types of switchboard equipment where the private circuits terminated. At some installations the work was not completed as programmed, and it was here in particular that close liaison between the Post Office and the customer was of great benefit in resolving problems arising from the different interests involved in the project.

Naturally Courtaulds wanted the existing private wires to remain undisturbed until the new network was completed, but at certain locations spare capacity did not allow for the existing and new facilities to be working at the same time. Subsequently agreement was reached with local management for changes to be made to the existing facilities and for the changeover to the new circuits to be phased so that an adequate service was always maintained at the locations.

Setting up of the Area-based coordinating committee was one of several departures from normal Post Office practice associated with the project, and the use of privately owned switching equipment presented problems in establishing and maintaining the network. The Post Office project engineer, working closely with both the customer and the contractor, accumulated an intimate



Installation work is carried out on the crossbar apparatus at the Coventry automatic switching centre.

knowledge of all aspects of the network, and this proved invaluable when unforeseen design problems appeared while the full-scale network was under test.

As a new type of equipment was involved, considerable training was required for Post Office installation and maintenance staff. The contractor provided lecturers and literature for courses at the Post Office training school at Stone, Staffs. The commitment of the Post Office to overall maintenance of the entire network also resulted in the need to make agreements with the various Regions concerned to meet the customer's requirements, and to issue maintenance instructions by the opening date of the network. Fault reporting procedures also had to be worked out and agreed with the customer, together with an accounting method to cover the rental and maintenance charges for the entire communications network in a single, composite bill.

The success of the project has demonstrated the close co-operation possible between the Post Office, its customers and contractors. It has also emphasised the benefits to be gained from regular meetings of a small committee having direct responsibility and authority for a large undertaking.

PO Telecommunications Journal, Winter 73-74

Mr V. W. G. Rogers, a Sales Superintendent in Coventry Telephone Area, was formerly the Area's company representative for the Courtauld group and a member of the Post Office co-ordinating committee.



The old private wire system used by Courtaulds – a "birdcage" made up of independent systems.

A simplified diagram of Courtaulds' new network based on five zone switching centres.



"This project was a fine example of close co-operation between the Post Office, the customer and the contractor," said Mr F. A. Hutton, Courtaulds Group Communications Manager. Mr Hutton, the project manager, is pictured (centre) with Mr W. D. Pettit (right), Deputy General Manager at Coventry who led the Post Office\_co-ordinating committee, and Mr A. Parr, Divisional Manager for Swedish Ericsson.



and the



PERHAPS Ossett isn't a place many people set out to visit. Lying just off the MI and almost in the centre of a triangle formed by Wakefield, Huddersfield and Dewsbury it isn't really on the way to anywhere. But a walk through its tidy streets, past its modern shopping centre and its newly cleaned Town Hall makes one realise that Ossett is far from being a West Riding backwater. It is in fact a thriving community with a social awareness which shames many of its larger neighbours.

The town has a population of about 18,000, nearly 17 per cent being of pensionable age. Some 1,000 are over 70 years old and a high proportion of them live alone. Ossett's social awareness reveals itself in the free old people's bus which provides a frequent service by day between the town centre and bungalow complexes occupied by the elderly. Other transport is used in the evening to take pensioners to various local entertainment activities. The Council organises a library distribution service for the elderly and a Day Centre

# Lifeline for the old B Howes

This Christmas pensioners in the West Riding town of Ossett were given a telephone lifeline by the Post Office and the local Council. A new communications system enables the elderly to summon aid from their homes.

is shortly to be opened for their use. There are about 500 Council bungalows for the elderly, grouped in complexes of various sizes around the town, and plans are in hand to increase this number to 600. Some 14 wardens are employed full-time – and supported by another six, part-time deputy wardens – to provide social services for the occupants. Each warden is responsible for a certain group of bungalows, and helps in such ways as visiting the occupants, shopping for them, and calling doctors or ambulances.

The Ossett Council had accepted the need for intercommunications between



the elderly and their wardens, and three small schemes had been provided to link small numbers of bungalows with the homes of wardens nearby. However, extension of these local schemes was not practical because a Council report disclosed that only four wardens lived among the bungalow complexes. In all other cases wardens lived some distance away from the old people for whom they were responsible.

This raised problems of wiring and connection for intercommunication schemes, which would continue to give problems as wardens terminated their employment. The Housing Committee also recognised that it was unreasonable to expect wardens to be in attendance for 24 hours a day. As the master intercom units have to be situated in the wardens' homes, relief arrangements would be difficult and it would not always be possible to guarantee a 24-hour service, seven days per week.

Against this background the Post Office was asked to devise and tender, in competition with other contractors, for a comprehensive scheme to provide communications for 400 of the Council's bungalows in 25 different complexes. The scheme was to enable the elderly residents to summon round-the-clock assistance from a central control point in the town, which in turn could contact the warden responsible for a particular group of bungalows. The scheme was also required to be capable of doubling in size in the future.

The Post Office's plan was to install key and lamp units at the central control, housed in the controller's combined working and living accommodation at an old military barracks in Ossett. Initially it was planned to provide a separate circuit from the control units to each bungalow, terminating on wall-mounted telephones, but it quickly became apparent that the number and length of circuits required would make the cost excessive.

It was therefore decided to provide multipoint circuits, in which a single circuit is connected to one of a group of bungalows and then loops off to the Using a special telephone in her bungalow, 77-year-old Mrs Elsie Bird (far left) calls the central control point of Ossett's communication system. Mrs Mary Judge, the central controller, takes the call on the key and lamp unit which has links with 400 pensioners' bungalows.

remaining bungalows in turn. This method brings down the costs dramatically but has the obvious disadvantage that the central control cannot determine which bungalow on any multipoint circuit is requesting assistance unless the caller is able to speak.

One answer to the problem is to provide lamps in the front window of the bungalows which come into operation when the handset is dislodged. The central controller, knowing which addresses are served by each multipoint circuit, can then send the local warden to look for a lighted lamp in one of the bungalows on that particular multipoint circuit. As each circuit serves a fairly close geographical area, the method enables assistance to be provided within 15 minutes of the call being made.

Unfortunately, the savings from providing multipoint circuits are largely offset by the cost of mains operated equipment necessary for this type of lamp system and by the additional costs to the Council of providing power points, lamps and flasher units in each of the 400 bungalows. However, this was the scheme submitted to the Council, and it was looked at in competition with other contractors.

The Council considered the Post Office scheme to be the most practical and effective, but asked whether the costs could be reduced. The basic speech path (multipoint) could not have been engineered or costed any cheaper, and it was apparent that any worthwhile savings would have to be made with the lamp system. The Post Office suggested that a strip of low-voltage lamps be installed in a nominated bungalow or bungalows in a group, with wires linking each bungalow in the group to its own lamp on the strip. This would show a warden, who had been alerted by the central control, which bungalow on a circuit was calling.

A preliminary costing of the method indicated that it would be approximately one-tenth of the cost of the original lamp system, and the suggestion was enthusiastically received by the Council. The Circuit Provision Group in Leeds Telephone Area, which had been involved in the scheme from the beginning, then set about the task of bringing the idea into the realms of reality. About 75 of the 400 bungalows



The system was designed by Mr Denis Turner, a Technical Officer in the Leeds Telephone Area circuit provision group. Here Mr Turner examines auxiliary apparatus for the central control units.

in the scheme were nominated to display the lamps. Strips of 10 lamps are housed in a plastic box and mounted in the windows of the nominated bungalows. The boxes are placed so that curtains cannot be drawn across them and are watertight to prevent faults being caused by condensation and window washing. A large pilot light, which lights whenever one of the lamps on the strip glows provides the warden with a quick check of the displayed lamps as he drives past. The pilot light is also used as an indicator under faulty lamp conditions.

Lamp testing facilities were also necessary, and these are provided by test buttons on the telephone in nominated bungalows. Each button operates five lamps on the strip, and the occupant simply presses the buttons to check that all the lamps glow. Any faults are reported to the central control using the emergency telephone. Much thought has been given to

situations where the caller cannot



Strips of warning lamps in a bungalow window locate which telephone has been used in a group of bungalows. A large pilot light at the top of the window enables the unit to be checked from the road.

identify himself or state the nature of the assistance required. To this end it was decided to use wall telephones as standard instruments in the bungalows and to mount them in a position where anyone in a collapsed condition can still dislodge the handset.

If the central control receives an alarm call on a circuit but is unable to obtain any coherent information, the controller first checks the addresses of the nominated bungalows on the circuit. He then sends a warden to these addresses to see which lamp in the strips is glowing and therefore which handset is off its hook.

Multipoint circuits are normally limited to only 10 spurs or terminations, but permission was obtained from Post Office Telecommunications Headquarters to engineer circuits with up to 20 spurs for the Ossett scheme. Therefore, as up to 20 bungalows can be connected on one circuit and 10 lamps can be accommodated in each window box, in the event of an emergency on a fully utilised circuit the warden has a

Simplified diagram of communications to a bungalow complex.



maximum of only two addresses to visit before he can identify the calling address. In some cases more than one strip of lamps has been fitted in the nominated bungalow, thus requiring only one bungalow to be visited before the caller can be located.

The central control unit is designed to detect a loop signal from the multipoint circuits. No outgoing signalling is required on the multipoint circuits, although this could be provided to selected bungalows. Telephones in the bungalows do not have dials, and residents cannot use the system to telephone one another.

Other circuits terminating on the central control unit are an exchange line for use in summoning doctors or other emergency services, a direct private line to the local police station and a direct private line to a relief central controller. These private lines may be used for speech and for extending the alarm from the key and lamp unit to the part-time relief controller. In the event of an alarm call being received by the relief controller he has to go to the central control to see which spur is calling. Leeds Circuit Provision Group is currently looking into the possibility of duplicating the whole of the central control equipment in the premises of the relief controller, thus providing him with full facilities.

It should be emphasised that in considering these schemes the Council had no thoughts of replacing the wardens. There is no effective substitute for the valuable service which these people give, but it was considered essential to provide an additional emergency cover.

The Post Office's intercommunication scheme finally submitted was accepted by the Council in May 1973. Just six months later, the first 100 bungalows had been connected to the system and the Post Office was committed to connecting the remaining 300 bungalows before Christmas.

In the season of goodwill, the scheme is a timely present from the Council to its pensioners. The gift of security, confidence and the knowledge that they are never alone is one to be cherished by the elderly. Ossett recently lost its battle with the Ministry of Transport to have the town signposted on the MI motorway, but there are more ways than one to put a town on the map.

PO Telecommunications Journal, Winter 73-74

Mr B. Howes, a Sales Superintendent in charge of special services in the Leeds Telephone Area, was responsible for overseeing the Ossett project.



### **NEW WAYS TO CLOSE THE GAP**

UNDERGROUND telephone cables cannot usually be made or laid in one complete length, so it is necessary to join separate sections to provide the required length. These joints require similar protection to the rest of the cable, which is sheathed to protect the wires forming the core of the cable from damage and to prevent water entering. The sheath is therefore reformed over a joint in what is known as a sheath closure.

For many years lead was used to sheath telephone cables and it was natural that these cables should be closed by using a suitably sized lead sleeve plumbed to the sheath at each

### **RH Derbyshire**

Modern materials used for covering telephone cables have created problems in jointing lengths together. A number of techniques are being developed for closing joints and repairing damage, and some promising methods are being introduced nationally. end of the jointed sections. This method was used from the early days of the telephone network in the late 1800s until about 1950. Lead plumbing was a well known art and the Post Office often recruited skilled plumbers as cable jointers.

Lead sheaths have a number of disadvantages. The material is expensive, and in common with most metals it is subject to corrosion, which allows water to enter the cable. Lead is also heavy, making the cables difficult and very cumbersome to handle.

By 1950 progress in plastics technology resulted in a number of plastic materials becoming available which seemed suit-

able for cable sheaths. In particular experiments were carried out with polyvinyl chloride (PVC) and polyethylene. Subsequently, polyethylene was chosen to replace lead for most external cable sheaths.

Polyethylene is much cheaper and lighter than lead. Being an inert substance – that is, without active chemical properties – it also resists corrosion. The material therefore overcomes the major disadvantages of lead, and the increasing use that has been made of this plastic over the last 20 years or so has brought great benefits.

Unfortunately, the inertness of polyethylene makes it very difficult to obtain a reliable seal when closing joints in cables sheathed with this material. Several methods have been used with varying degrees of success and the present standard methods, although by no means perfect, appear to give a better performance than the lead plumb.

The main requirements for a good closure are mechanical strength and a reliable seal. Unless a closure is sufficiently strong, strain on it may weaken the seal to the extent that water is allowed into the joint. The outcome is failure of the circuits carried in the cable.

The most significant improvement in the reliability of main cables has probably been due to the pressurisation



Eurodata, the massive study of Europe's data-communication needs up to 1985, is to be updated during the next three years. A contract to incorporate extensive fresh information into the original study, completed in 1972, has been agreed by the 17 telecommunication organisations – including the British Post Office – which commissioned the original report.

Eurodata was commissioned to determine future data-communication requirements throughout Europe. The addition of new information over the next three years will provide Europe with comprehensive details of data terminals, computer installations and applications, and the international flow of data.

The original Eurodata study was prompted by the urgent need for basic information on the probable growth of demand for data-transmission facilities following the dramatic expansion in the 1960s. The aim was to provide the sponsoring authorities with the information needed for the planning and development of their future services.

The study took about 18 months to complete and cost  $\pounds$ 700,000. The results are in the form of 10 volumes of Study Reports which were formally accepted last May by a special committee representing the sponsoring organisations.

The project methodology required a great deal of research in the general areas of economics, computer applications and technology in addition to a large interview and questionnaire programme directed at present and potential users of data communications. Detailed information gathered in the course of this research is included in the Study Reports as well as the specific data traffic and terminal forecasts.

Great emphasis was placed on the geographical distribution of traffic flows. Each participating country was divided into a number of regions (29 in the UK). Traffic forecasts, in units of millions of

bits per average day, were produced for each region-to-region link and for the international links between each region and the rest of Europe and North America. Terminal forecasts were made at a national level, classified by industry sector and transmission speed.

The task of updating Eurodata is being undertaken by the international group of four companies which carried out the original survey – PA International Management Consultants, in conjunction with Quantum Science Corporation, Italsiel, and Generale de Service Informatique.

Under the updating agreement PA International Management Consultants are to use some of the original study data for their own commercial use. In return they will make no charge for updating the study.

The Eurodata study committee is chaired by Mr Freddie Phillips, head of the British Post Office's data communications division. Other countries taking part are: Belgium, Denmark, Germany, Finland, France, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland.

In the Eurodata countries as a whole the study predicts that data traffic volumes will grow at a rate of over 20 per cent per annum to give a twelvefold increase by 1985. The number of terminals installed will reach 1.4 million in 1985 and 60 per cent of these will be generating traffic on telecommunications networks. The growth rate for the UK will be slightly lower than in most other countries because of the relatively advanced level of datacommunications usage now. Nevertheless in 1985 there will be about 200,000 terminals generating 480,000 million bits of data traffic on an average day. This represents a total growth on 1972 figures in excess of 700 per cent.

of these cables with dry air. Any damage to the cable sheath or closures results in air leakage which can be detected on the cable pressurisation equipment. Generally the pressure of air in the cable is sufficient to keep out water until the fault can be repaired. This system has enabled many sheath or closure faults to be detected and repaired before circuits in the cable have been affected.

Difficulty in obtaining a seal to the sheath when closing joints on pressurised cables is overcome by using a foil which is a sandwich of polyethylene and aluminium. The plastic side of the foil is fused to the cable sheath, and a resin putty is bonded to the aluminium to bridge the gap between the sheath and the sleeve. This method can be used to close joints between a wide range of numbers and sizes of cables using only a few standard items. The main failing is a tendency for the bond between the putty and aluminium to rupture if the joint is moved.

Joints between smaller cables used for telephone connections to small groups of customers are sealed by tapes which adhere to the plastic sheath. Again the main cause of faults is the limited mechanical strength of the joint, and the method is never used on pressurised cables because the pressure of air in the cable would be likely to burst the joint. However, it is cheaper and quicker than the resin putty method, and has been used on smaller, unpressurised cables. New methods are being developed in

a continuing effort to remove the



Adhesive tape is used to seal the joint on a small telephone cable which feeds lines to small groups of subscribers.

weaknesses of the current closures. However, development tends to take a long time, one reason being that joints are required to last for at least 40 years, preferably without maintenance. A lengthy programme of testing is therefore required before a new type of closure can be introduced.

Joints between the small cables feeding subscribers may be required between more than 20 different sizes of cable, and up to eight cables may enter one joint. These requirements would make the use of special fittings for each size of cable very unwieldy and expensive. A new closure for small cables, which is being introduced at present, overcomes the problem. As often happens, it is an adaptation of earlier techniques rather than a novel design.

The method uses a polyethylene sleeve and quick-setting resin to achieve a reasonable compromise between the strength of the seal and the complexity of closure, provided sufficient care is taken in preparation and cleaning of the cables. Final sealing of the closure is simple, and the method therefore has the additional advantage of giving easy access to the cable pairs for testing, and the joint can be easily re-closed.

After so many years of development most of the existing possibilities for improving closures on cable joints have been tried. New designs usually result from different materials becoming available, and one recent innovation is being applied to the repair of damage to cable sheaths. This damage is often caused by work on other services, such as



Resin putty is moulded round the joint on a pressurised cable. A foil fused to the cable provides a surface to which the putty can be bonded. drainage, electricity, gas and water. Of more than 100,000 cases of accidental damage to cables that the Post Office deals with each year, about 75 per cent affect polyethylene sheathed cables. Damage can cause considerable loss of revenue to the Post Office as well as great inconvenience to telephone users, and for some time a fast, economic repair process has been sought.

The new repair technique uses a heat shrinkable plastic which is treated chemically or by radiation and stretched to about double its original size during manufacture. This treatment has the effect of building in a memory so that when the material is heated above a certain temperature it tries to shrink to its original size. One side of this material is coated with a low-temperature, meltable adhesive.

When a damaged sheath has been cleaned a piece of the plastic sheet is wrapped round the area under repair, clipped in place and heated. The heat shrinks the material and melts the adhesive. A temperature-sensitive paint on the outside of the wrap changes colour to indicate when the correct amount of heat has been applied. When cool the adhesive hardens to form a firm, water-resistant bond between the sheath and the repair material.

In addition to speed and simplicity, this method provides another great advantage in cable repairs. As the repair is only fractionally larger than the original cable, the cable may be returned to its underground duct. Normally a polyethylene sleeve must be used to carry out this type of repair, and a small joint box has to be built around the bulky repair which will not fit back into the duct.

The heat shrink method of carrying out cable repairs is being introduced nationally, and the application of similar techniques for closing cable joints is being explored. The method of closing complex joints on distribution cables, using the device officially known as Sleeve Polyethylene No. 31A, is also being introduced on a national basis. It is hoped that both techniques will enable a further improvement in the reliability of the underground telephone cable network. Development is continuing with the aim of making closures as reliable as the cable sheath itself.

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**Mr R. H. Derbyshire** is head of a group in Operational Programming Department at Telecommunications Headquarters responsible for the development, introduction and application of jointing techniques in the exchange area cable network. A plastic stretched to double its normal size which tries to shrink back to normal size when heat is applied provides a fast and economic repair of polyethylene-sheathed cables.



The damaged area is first bound with a plastic-backed aluminium tape and then wrapped in a length of the heat-shrinkable plastic.



A metal clamping rail clips the edges of the plastic wrap together to form a tube round the cable.



Heat is applied to shrink the plastic wrap on to the cable. Specks of temperature-sensitive paint on the wrap change colour when the correct amount of heat has been applied. Adhesive on the inside of the wrap melts during the heating process and forms a firm bond between the cable and the wrap.

# Switching on the charm



Sandra Millington – the 1,000th switchboard operator to complete a special training course run by the Post Office in the north-west. Sandra, 22, who works for a textile firm in Altrincham, was presented with a suitcase.

A leaflet circulated to companies by the Post Office bears the slogan : "One of your firm's most important frontmen is a girl." The "frontmen" are the girls who operate the firms' switchboards, and they are often the first contact a customer has with a company. The impression given by the switchboard operator colours a caller's attitude to a firm. And the way she uses her telephone equipment affects not only the efficiency of the firm but also Post Office services.

So the Post Office has decided that it is in everyone's interest if the private switchboard operator knows as much as possible about her job and the equipment she is handling. The "frontmen" leaflet offers companies a three-day course for their operators, run by Post Office instructors.

There has been an enthusiastic response and the course organised by Manchester Central Telephone Area (featured in our photographs) recently celebrated the arrival of its 1,000th student. Subjects include, in addition to information about switchboard techniques and efficiency, the importance of the operator in business, organisation of work, effective speaking, grooming and deportment. An expert from a model agency is brought in for the "charm school" subjects which include make-up, dress and walking and sitting correctly. The idea is that if you feel you look right you are more likely to make a better job of the day's work.

Apart from a visit to a telephone exchange, most of the course is spent in an hotel in discussion and demonstration sessions.

Right: Learning the A to K of deportment with the aid of a directory is Jean Shields, who works for a textile firm in Northern Ireland.



Sue Graham, from a Manchester model agency, shows her tricks of the trade to girls on the course.





Instructor Larry Bostock talks to Susan Carsley, an operator for a St. Helens glass firm, and records their telephone conversation. A voice expert gives the girls advice on effective speaking.



Telephone service representative Edna Windows answers questions during an illustrated talk on switchboard technique. Films are shown about the right way to operate a switchboard.

THE DAY the London Stock Exchange moved house marked the successful completion of a massive communications project by the Post Office. To enable the new building to open for business last year nearly 7,000 circuits for telephone, closed-circuit television and paging services were brought into operation at the same time.

The move was the final stage in a plan to provide the Stock Exchange with a modern building and a communications system to meet the present and future needs of a rapidly expanding market and growing interest in world-wide stocks and shares. In the first stage of the project, completed in 1970, the Post Office provided the Exchange with one of the largest and most efficient private telecommunications systems in the world. (See Telecommunications Journal, Summer 1970.) But at that time the Stock Exchange was housed in temporary accommodation while the new building was being constructed. To complete the project the Post Office had to transfer the communications facilities from the temporary building to the new Exchange and provide new equipment and additional services.

As the network provides vital links between dealers and stockbrokers, as well as access to the public telephone network, detailed plans had to be prepared for the move and to ensure there was no interruption of Exchange business. A project team was set up in the City Telephone Area to plan and carry out the changeover, and installation work included public circuits, private wires, internal PABX lines, telegraphs and security lines, as well as facilities for closed-circuit television and a paging system for members. To provide all these facilities for the changeover about 180 miles of cable had to be installed.

Dealers at the Exchange – traditionally known as the house – work from pitches on the floor of the house. Pitches have telephones for communication with stockbrokers in offices, called boxes, around the floor of the house and in the City. A major part of the project was to equip 20 dealers' pitches and 139 members' boxes with key and lamp telephone units, each with between 10 and 80 lines. The work had to be phased with architects and contractors over a two-and-a-half year period.

Installation staff were faced with the problem of providing equipment in the pitches and boxes to members' individual requirements. Although the pitches were similar in layout, no one member's box was identical to another either in shape, furnishing or telephone requirements. As dealers specialise in particular shares and commodities, it was necessary to arrange the key and lamp units so that certain circuits were in precise positions in the boxes.

A wide variety of switching arrangements also had to be provided. For example, it may be necessary for telephone calls to a member firm's office in the City to be switched to the Stock Exchange when the market is open, and the circuit switched back or to other premises after the house closes.

In the temporary house member firms were provided with key and lamp units

### Stock Exchange moves house J Gillespie



and associated apparatus racks in their boxes and on pitches, and direct incoming and outgoing telephone circuits on the market floor. For the new house key and lamp units for the boxes and pitches were required to be served from a centralised apparatus room. It was agreed to provide the apparatus room on a service floor beneath the floor of the house, and special apparatus racks were built and wired in the City Area workshops.

To cope with the high room-noise level, arrangements were made for lamp signalling instead of bells on 550 telephones used in the house. To provide this facility lamp signalling equipment used for the temporary house was removed from the main PABX room in the basement of the building and transferred to the centralised apparatus room. Call facilities around the perimeter of the market floor have been provided for brokers by fitting black (incoming) and grey (outgoing) telephones on special hinged stainless steel panels.

The paging system which is used to get Stock Exchange members to the telephone quickly necessitated the installation of special circuits. Each member carries a multi-tone radio locator in his pocket which gives out "bleep" signals when he is wanted. The signals are set up by a colleague depressing a button on the wanted member's telephone. The signal then goes out over a wiring system installed in the Stock Exchange building and is picked up by the member's locator.

In addition to the telephonic systems, several closed-circuit television (CCTV) networks were installed for the new house. The Stock Exchange operates its own Market Price Display Service using video circuits from a computer at St Alphage House, close to the Exchange, to various display points on the market floor. At these points a member can key into the computer to request the market price of any share. Four member firms also operate their own CCTV systems, and video circuits were provided by the Post Office between various boxes and the members' offices outside the Stock Exchange.

To co-ordinate the activities of the contractors involved in the construction of the new house and to determine access for Post Office installation staff, a Critical Path Method network was constructed. Updated progress assessments produced every five weeks by a computer enabled the project to meet the ready for service date in June 1973. Post Office sales staff consulted with

the Stock Exchange administration office and its 200 member firms during



Left: Trading floor of the Stock Exchange. Dealers work from the hexagonal "pitches".

Above: The closed-circuit TV system displaying market prices.

Right: Technicians pull out wedges in the centralised apparatus room during the changeover.

Below: Post Office staff check installations in a stockbroker's ''box'' – a small office.





the whole planning and installation period so that internal and external planning engineers could determine the cabling and apparatus requirements for the changeover. Throughout this time normal business activity at the Exchange continued, companies moved offices, mergers took place and changes of equipment were made.

A continuous sales effort was therefore needed to ensure that up-to-date information of requirements for the new house was available. As the project neared completion it was necessary to insist on a date after which no changes could be guaranteed until after the changeover. This achieved a measure of stability and contributed to the ultimate success of the move.

Problems did occur in meeting the target date owing to industrial action by contractors, which resulted in building work being continued during equipment installation.

The changeover to the new house took place during a weekend. At close of business on the Friday afternoon engineers began to disconnect the power and to cut away the circuits to the temporary house. In preparing for the operation a thorough testing programme covering every public and private circuit had been carried out. Each task to be performed during the transfer had also been scheduled, together with the person responsible for carrying it out.

During Saturday and Sunday the whole programme was closely monitored and every circuit transferred was tested. Faults were reported to a control point in the centralised apparatus room, and as each pitch and box was completed staff were redirected to those areas having difficulties.

Altogether some 2,800 key and lamp units were installed, on which were terminated a wide variety of direct exchange lines, private lines and extensions. There were also 550 lamp signalling telephones, 3,000 ordinary telephones, 25 Post Office teleprinters and 738 paging circuits.

About 200 Post Office staff were in the Stock Exchange building to carry out the changeover. As a result of the teamwork between contractors and the Post Office, when the new house opened on the Monday morning only four of the 7,000 circuits failed to be immediately operational.

PO Telecommunications Journal, Winter 73-74

Mr J. Gillespie is head of service section in the City Telephone Area, London. He was project manager for the second phase of the Stock Exchange network project.



1973

Manohester (south) Yellow Pages Classified

## BRINGING YELLOW PAGES UP TO DATE

### **B**Coyle

A computer system is helping the Post Office to produce more up-to-date classified telephone directories. The system streamlines the task of updating and compiling entries and enables the directories to be printed by modern techniques.

CLASSIFIED telephone directories are a unique source of reference for people who know *what* they want but not *who* they want. More than two million businesses, classified under headings ranging from abattoir equipment to zoos, are listed in the 62 editions of Yellow Pages directories and sections produced each year for telephone subscribers. In addition, the London, Midland and Northern commercial classified directories provide information primarily of interest to business subscribers.

Every business customer is entitled to a free, single-line entry in his local Yellow Pages and some may also appear free of charge in a commercial classified directory. However, some businesses pay to be more prominently displayed, or to appear in editions outside their immediate area, and in recent years classified directories have been developed into a major national advertising medium.

Compiling entries for classified directories is a huge task, and beginning with the 1973 edition of the Stoke Yellow Pages section the Post Office took over the whole job from Thomson Yellow Pages Ltd. The Post Office is also now responsible for producing and distributing bills, and collecting revenue, for the advertisements. Thomsons continue to sell advertising space in all telephone directories and special entries in the classified editions.

Stoke-on-Trent Area Yellow Pages Jlassified Directory

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1978

The Post Office has taken on the tasks of compilation and billing to obtain full benefit from a computer system, set up in 1969, to produce more up-to-date public telephone directories and Directory Enquiry records. In the system the names, addresses and telephone numbers of every customer in the country are filed on magnetic tape at the Post Office computer centre in Leeds and updated daily with details supplied by staff in Telephone Areas.

When an alphabetical directory is produced, computer programs ensure that the appropriate entries are copied in correct order from the computer files on to another magnetic tape. This is then used in highly sophisticated typesetting and printing techniques by the Stationery Office, which is responsible for the production of telephone directories. (See Telecommunications Journal, Winter 1969.)

In the past classified directories have been compiled manually and, owing to the many and frequent alterations arising from changed numbers, new connections, ceased lines, etc, much information has been out of date by the time an edition has been published. Now Yellow Pages are being produced with computer assistance, using for the first time the daily updated records in the existing system for alphabetical directories, and details of entries in Yellow Pages - and commercial classified directories - are as accurate as possible at the time of compilation. The new method also enables the Stationery Office to speed up printing by using the photo-typesetting techniques employed for alphabetical directories.

Details of business customers are already held on the existing computer files for inclusion in alphabetical directories. To aid compilation of classified Directory Enquiry records these file entries also include a code to indicate under which heading they should appear. With this extra information,



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Left: Information about advertisements in the Yellow Pages is stored in a computer. At the Post Office Directory Advertisement Control the details of an order are entered on a card for computer processing.

Top: Details of an "inch listing" advertisement for Shell-Mex prepared on a card for transfer to the computer. The card shows text of an inch-deep entry.

Bottom: In the first stage of the printing process a computer tape containing directory entries is fed into a special photo-typesetting machine. It produces galleys of Yellow Pages text on photographic paper.



therefore, standard entries for Yellow Pages may be compiled in a manner similar to that for other directories.

About 90 per cent of Yellow Pages entries appear in a standard form, free of charge. During the first year of production by the new method Telephone Area staff have been involved in checking the accuracy of classification codes for these entries held on the computer files. As a result, most of the contents for each edition are available from the computer files on demand, fully up to date.

To deal with the other 10 per cent of entries in Yellow Pages an operational unit was established at Post Office TeleLeft: Galleys are assembled manually into complete pages. The remaining production processes are similar to those used for alphabetical directories. (See the pictures overleaf.)

Below: The Shell-Mex advertisement as it finally appears in the Yellow Pages.



communications Headquarters. Known as PODAC (Post Office Directory Advertisement Control), the unit is responsible for handling all paid entries and other aspects of classified directory compilation. Each day Thomsons forward details of orders to the PODAC office in London. Orders may be for display advertisements in any directory or for a single line in bold capital letters, extra standard entries and special entries in classified editions. Special entries consist of one-inch deep typographical advertisements, known as 'inch listings", and other small displaytype advertisements, called trademark listings.

PODAC staff check the details of each order to ensure that the subscribers' names, addresses and telephone numbers appear correctly. This is necessary because many advertisers supply incorrect information about themselves, and some changes occur in the time between the sale of an order and its processing by PODAC. Details in advertisements, like those of standard entries, must also be kept up to date until as late as possible in the production process. For example, if an advertiser changes his address or telephone number, or ceases business after placing his order, the unit amends or cancels the entry.

To carry out these thorough checks PODAC makes use of a reference file extracted from the computer records. The computer print-out is produced on 8 in. by 5 in. cards, each holding details of one business entry. Most of this file is housed in six large filing machines which can each hold over 400,000 cards in rows of trays. (These purpose-built, power operated units are described in another article.)

Over 250,000 entries appear each year in directory advertisements, and the record card of every one must be checked by PODAC when the orders are processed. This means that more than 500,000 "searches" are required annually to extract and later re-file the cards. The reference file must also be kept up to date, and about one million cards with information on changed entries, new connections and ceased lines are dealt with each year. The filing units are therefore kept in constant use, and 15 staff are required to keep the system functioning.

To produce a computer file of advertisements for use in compiling the classified directories PODAC staff prepare documents containing details of entries and billing information. At the Leeds computer centre information on the documents is punched on to cards for computer processing and output on to a magnetic tape file. Almost 3,000 business classification headings and over 1,000 cross-references to these headings are also held on the file.

Information on the advertisement file for single-line entries (which may appear in ordinary or bold type) includes the full text together with a business classification code and a code to indicate in which directory the entry is to be published. "Inch listings" are also compiled by means of input from PODAC, and the computer file includes the full text of the advertisement. Display advertisements require extra processing, and the compilation information on the advertisement file is limited to the business classification code, directory code, and a reference number to indicate to the Stationery Office where the display material should be inserted. The text of display advertisements is handled separately, and is usually a combination of artwork (illustrations) supplied by Thomsons and text and border details added at the printing works.

When a Yellow Pages directory is compiled the free entries are extracted from the main computer files and merged with headings, cross-references and data on paid entries from the advertisement file to produce a directory compilation tape. Typographical editing of the entries on the tape is carried out by a Stationery Office computer at Norwich. The tape is then processed through a photo typesetting machine at the Gateshead printing works where the information emerges as the directory





Above: A large camera photographs a unit of pages to produce a negative which is used to make printing plates.

Right: Printing plates mounted on the cylinders of a press which prints the directory pages on both sides of the paper at the same time. Above left: The sophisticated printing techniques now employed in the production of Yellow Pages were first used for alphabetical directories. The text for an alphabetical directory, unlike Yellow Pages, emerges from the typesetting process in complete pages. Above right: The pages of a directory are assembled in units for printing.



text on a single-column strip of bromide paper – material similar to that used for photographic prints.

The bromide paper is assembled into pages manually by Stationery Office staff who add display advertisements in the places indicated on the bromide as well as page numbers, continuation headings, etc. From compilation to completion of production takes about two-and-a-half months. Progress is being made towards producing bromide in page format similar to that used for alphabetical directories. The need to leave gaps in the pages to insert specially prepared display advertisements will, however, prevent compilation from being fully computer-based.

At the compilation stage of Yellow Pages billing information on advertisements is transferred by computer from the advertisement file to a charges file where it is held until production and distribution of the directory is completed. Bills for advertising have been designed to resemble normal quarterly telephone bills in the expectation that this would encourage prompt payment. Although some 65 per cent of advertisers have to be sent reminder notices - and 30 per cent final reminders - there is some reason to believe that the idea has been justified. In the 10 per cent of cases where advertisers do not pay after receiving a final reminder the accounts are passed to a debt collection agency.

Improvement in the standard of classified directories achieved by the computer-assisted system of production is already being indicated by the relatively low number of customer complaints received on editions published to date. The system also provides detailed statistics on free entrics and advertisement sales revenue. More information is therefore available to management, and work is being carried out to assimilate the data into its most useful form.

With the growing popularity of Yellow Pages as an advertising medium the demands on PODAC clerical effort will continue to increase. Thomsons sold over 150,000 orders for 1973 editions – amounting to more than  $\pounds 6,000,000$  in revenue – and a  $12\frac{1}{2}$  per cent increase in sales is forecast for 1974, with further improvements in following years. PODAC management is currently preparing for this expansion.

PO Telecommunications Journal, Winter 73–74

Mr B. Coyle, a former member of the PODAC team at Telecommunications Headquarters, was responsible for liaison with the Post Office Data Processing Service on the design and implementation of computer aspects of the project.



### **Power to their elbow** TG lves

At the touch of a key a clerk can gain access to any one of 400,000 Yellow Pages record cards without leaving her seat. She uses a filing cabinet in which rows of trays are carried on a chain-driven conveyor system.

A POWER-ASSISTED filing system, one of the largest of its kind in the country, has been specially designed to house a reference file of every entry appearing in classified telephone directories. Developed for the Post Office Directory Advertisement Control unit (PODAC), the installation provides easy access to more than two million records of business subscribers for use in compiling Yellow Pages.

The filing system consists of six cabinet-like machines, each capable of holding up to 400,000 record cards. Inside each unit the 8 in. by 5 in. cards are held in trays which are arranged in rows on a series of shelves. This shelf assembly resembles a vertical, loop-shaped conveyor belt and is rotated by an electrically-powered chain drive. Its operation is controlled from a small panel over a table top on the front of each machine, and access to the trays is gained through an aperture at table-top height.

To select one of the 38 rows of trays in a machine the operator presses a key on the control panel. The shelf assembly revolves, automatically taking the shortest route to present the selected trays in the aperture. The nine trays presented can be pulled from their shelf on to the table top.

Safety features built into each machine include two electronic-eye beams which guard the aperture. If a beam is broken for example, by an operator's hand while the equipment is in motion, the mechanism is automatically halted. As an additional safeguard pressure-sensitive bars have been incorporated across the top and bottom of each aperture. If pressure is applied to either bar while the equipment is in operation it will again stop automatically. Each safety system is linked through a dual electrical circuit so that if a failure occurs in the primary circuit a machine can still be operated, with all its safety features, using the auxiliary circuit.

Office machinery specialists at Post Office Telecommunications Headquarters faced several difficulties in providing a suitable system for the PODAC file. The need for quick access to such a large number of records presented an immediate problem, and the use of microfilm to produce a compact file had to be ruled out because of the difficulty in extracting individual records for updating and directory compilation. File amendments alone, resulting from changes of address or telephone number, new subscribers and ceased lines, arise at a rate of about 4,000 per day. "Hard copy" records, with details of each business printed on a separate card, were therefore regarded as the most efficient method for maintaining and making use of the file.

The 1,800 sq ft of floor space in the PODAC office allocated for filing space was insufficient to accommodate the

Right: Side view of a power-filing unit. The shelves containing rows of trays are revolved by an electrically powered chain drive.

Below: A total of 2,400.000 reference cards like this are housed in six powerfiling units at the **PODAC office and** occupy only 350 sq ft of floor space. If the records had been housed in drawer cabinets over 2.000 sq ft would have been required. The computer-produced reference cards show details of all businesses entitled to free entry in Yellow Pages.





complete file in conventional drawer cabinets. It would have been necessary to locate about 25 per cent of the file on another floor, with the effect of lowering operating efficiency. Adopting a poweroperated filing system allowed advantage to be taken of the 15 ft high ceiling in the PODAC office to reduce the floor space required. The six machines, specially built to Post Office specifications, each measure about 7.5 ft long, 3 ft deep and reach to ceiling height. They are grouped back-to-back in two rows, and the entire system - including operator working space - occupies a total of only 350 sq ft of floor space.

While the units overcame space limitations, however, the 330 lb per sq ft floor load they produced created a weight problem. The PODAC office is on the first floor of a building which has a floor loading limit of about 50 lb per sq ft. With the help of consultant engineers at the Department of the Environment and Post Office accommodation officers this problem was solved by using a steel platform base beneath the machines, supported by pillars which pass down through the building to its basement.

In addition to making economic use of accommodation, the mechanised PODAC system requires considerably less staff ime and effort than conventional filing equipment. For example, it eliminates the need for staff to walk up and down rows of cabinets, bending and stretching to file and retrieve cards, access being possible from a seated position. The advantages have also been shown in the Glasgow Telephone Area, where similar high-profile, power operated units have been installed to replace conventional cabinet files.

In 1970 approximately 320,000 record cards were being used in directory compilation work at the Glasgow General Manager's office. The 8 in by 5 in cards were housed in 36 four-drawer cabinets along one wall of a long narrow room, which meant that all clerks engaged on the work had to walk from 90 to 180 ft every time they needed to refer to a record. With the approximate 10 per cent annual growth in the file, an even larger room would have been required at the latest by 1973.

To overcome the problem two 9 ft long by 4 ft deep power-operated filing machines, capable of holding a total of 600,000 cards, were installed along an end wall of the room, fitting up to the 10 ft high ceiling. One clerk is now able to perform all the filing and retrieval work, from a seated position. The two machines are similar in design to the PODAC units, having rows of trays, a control panel and all the built-in safety features. If operated under random retrieval conditions the machines give an average presentation time of 5.5 seconds. In practice much quicker access times are achieved by pre-sorting required records so that trays can be selected in the order in which they are stored. PO Telecommunications Journal, Winter 73-74

Mr T. G. Ives is a member of the group in Telecommunications Management Services Department which deals with the evaluation and recommendation for purchase of all types of office machinery. He had special responsibility for the installation of the PODAC and Glasgow power-filing systems.

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### **Design** with a computer AE Pullin

Computer graphic systems are ideal for projects involving complex designs and extensive calculations. Through the visual display connected to the computer the designer can immediately see the effects of any change he makes and hours of checking are saved. The design can be stored on tape and printed by a reproduction device. In the picture a light pen is being used to modify the layout of an electronic circuit. When completed the circuit is produced as a photographic negative (like the one on this page) which is used to prepare a printed circuit board. COMPUTER AIDED design is a general title for the use of data processing techniques to assist in design work. It is, for example, widely used in the preparation of electrical, mechanical and architectural designs. Currently the aim of most Computer Aided Design (CAD) work in the Post Office is to help design engineers with various types of electronic circuits used in telecommunications equipment.

With the development of new data processing facilities it has become practical and economic to analyse electronic circuits and systems by using computers. A circuit or system manually designed on paper can be analysed in its working condition by a computer without having to build an actual model. For many



types of circuit the design time and cost can be considerably reduced, typically to one-fifth of the original.

To design an electronic circuit manually without the aid of a computer the designer first uses his experience and knowledge to select a circuit that might satisfy the required electrical performance. A set of mathematical equations which accurately describe the circuit's behaviour must then be formulated. These equations are complex and are frequently simplified to avoid laborious calculations.

If the results of the equations meet the required electrical performance of the circuit, the design is complete. Where the results are not suitable, the equations must be modified to change the component values – for example, capacitance, resistance, or inductance, and occasionally the circuit interconnections. The analysis is then repeated. This procedure is continued until the required solution is found.

The next step is to construct and test a laboratory model of the circuit. Trial and error methods are usually necessary at this stage to obtain the optimum design because of the approximations resulting from the carlier use of simplified equations.

By using CAD facilities to analyse the proposed circuit design, much timeconsuming, costly and laborious laboratory testing can be eliminated. The computer analysis is carried out before models of the circuits are built, with the result that the models will often meet the required specification without further modifications. On most other occasions only minor amendments will be required. All the designer requires is access to a teleprinter terminal which is linked by ordinary telephone line to a distant computer.

To carry out a circuit analysis the computer uses a specially prepared program of instructions, and the designer must first code his circuit design in a form required by the program. The coding is fed into the computer by typing on the teleprinter terminal, together with commands for translating the coding, performing the required analysis and printing out the results on the teleprinter. While sitting at the terminal the designer may analyse and modify his design as many times as needed until he is satisfied, and the computer can process work from a number of terminals at the same time.

There are many types of commercially available computer programs for circuit analysis, and some have also been developed by the Post Office. A number of these programs have additional facilities which are useful to the designer. For example, a sensitivity facility in one Post Office program enables the electrical value of each component forming the circuit to be increased and decreased, one at a time, by any required percentage. An analysis of the circuit is performed after each variation in the component values, and the results are printed out on the teleprinter.

A graphical presentation related to each component can also be printed which gives a clear indication of those components that will cause the largest change to the circuit's operating conditions when their values are changed. This information enables the designer to make quick modifications to a circuit to meet the specification.

Manual design of circuits containing active components such as transistors is generally more complex than those with passive components like capacitors, resistors and inductors. However, active components in a design can be electrically represented in a simpler form, known as an equivalent circuit.

Some computer analysis programs contain the equivalent circuits for a number of different active components. The designer simply specifies the name of the required equivalent circuits in his complete circuit coding, and the computer will automatically insert it before performing an analysis in the normal way. In some programs the designer has to provide the equivalent circuit himself, and this is often difficult to achieve.

At present the most used Post Office CAD facility is a program for the analysis of logic circuits. These circuits consist only of components called gates which can be switched on or off, and they are used extensively in telecommunications switching equipment. There are many types of gates with different input requirements to cause the gates to switch on and off.

The logic circuit analysis program developed by the Post Office is based on work done by the United Kingdom Atomic Energy Authority, and has a number of advanced facilities. For example, a fault facility enables each of the gates in a circuit design to be switched on or off in turn, and an analysis is performed automatically on the complete circuit at each setting.

With current technology it is mostly uneconomical to use computers to design an electronic circuit or system merely from a given specification of the electrical input and output. This technique, known as synthesis, is used only for a few simple and well defined forms of circuit and system. For example, it is an economic means of designing electrical filters. These are devices which allow electrical signals only at particular frequencies to pass through them. Filters are used extensively in telecommunications systems, and the Post Office has implemented a suite of computer programs for designing simple types of filter.

The programs will automatically design a filter when given only basic specifications, such as the bandpass (that is, the range of frequencies which are allowed to pass through the filter). From this information the computer will calculate the filter circuit which will have an electrical performance to meet the required specification.

All the CAD programs described in this article assist in the design of different types of circuits which could be linked together to form an electronic transmission system, such as a long distance telephone connection. They do not indicate how the complete transmission system will behave, but to meet this requirement the Post Office has developed a program based on work done at the Signals Research Development Establishment of the Ministry of Defence.

This program will enable telecommunications designers to assemble the proposed communications system from standard circuits such as filters and amplifiers. The assembled system can then be analysed by extracting the waveform and spectra of the signal at the output of these individual circuits. Provision is also made in the program for deriving conventional types of measurement at any required point in the system and printing out information such as voltage and peak power.

When the design of an electronic circuit has been completed the designer is faced with the problem of laying out the components and interconnections. The most common constraint is to build the circuit within the smallest possible physical dimensions. As an aid to minimising the size it has become common practice to build circuits on printed circuit boards (PCBS). The boards are made of an electrical insulating material and the electrical interconnections between components are made by copper tracks. The positions of the tracks and components on a board are variable, and it is a tedious task to design the optimum layout.

To make this work easier the Post Office will soon be making use of a computer graphics system. To produce a circuit layout on a PCB the designer first codes his design in a similar way to that for the circuit analysis programs, together with other information such as the size of the board. This information is prepared on paper tape and fed into the computer for automatic processing. The PCB with all the electrical interconnections and components within the board's outline is then displayed on the screen of a visual display unit connected to the system.

By using a light pen, which enables lines to be drawn and deleted on the screen, the designer can make modifications to the displayed layout. When the design is completed to his satisfaction, he types a command for the computer to output the design on to paper tape. This tape is fed into an automatic plotter which draws the PCB design on photographic material with a light beam.

The drawing is developed as a negative and subsequently used for preparing the copper track layout on a board. The mask is placed over a board, which initially is completely coated with copper, and light is exposed to the unmasked parts. Chemical processes are then used to etch away the masked areas, leaving only the required copper tracks on the board.

Another type of computer graphics



Automated draughting systems help designers to prepare complex drawings. The designer places the hand-held cursor over one of a number of design symbols displayed on his drawing board and presses a button. By moving the cursor to the required point on his design and again pressing the button, the symbol will appear in the correct position on the graphical display. The system converts all the elements of a design into computer form and when required the finished design can be printed automatically. system soon to be employed in the Post Office on a field trial basis is an automated draughting process. The system is designed to aid the draughtsman in preparing complex drawings, especially those which use standard components such as electrical symbols. It automatically scales the symbols to correct size, produces accurate copies and can store the drawing on computer tape for later use or amendment.

The draughting system consists of a digitiser, control computer, graphical display and a plotter. The digitiser is a tool that converts information on drawings, maps and the like, into digital form for computer input. It is used to record the co-ordinates at selected points on a drawing, and by digitising a sufficient number of co-ordinates a complex drawing can be described.

All basic symbols - solid line, dotted line, circle, arc, etc - necessary for drawing the design are stored in the computer system together with other required symbols such as those for electrical circuits. To prepare a drawing the draughtsman uses a cursor which is connected to the system. He first places the cursor over one of the symbols in a tabulated list on the side of the drawing board. After pressing a button on the cursor it is then moved to co-ordinates on the drawing board where the symbol is to be drawn, and again the button is pressed. Immediately the symbol is displayed on the graphical display, together with previously prepared symbols. The television-likescreen of the display therefore provides the draughtsman with a constant check on his work.

Dimensions are calculated and drawn automatically by the computer, and as digitising of the graphic information progresses the digital data is processed and stored in the computer file. Symbols can also be deleted from the displayed drawing by a similar process to that for inserting them.

When draughting is completed the operator instructs the computer to produce his drawing on the automatic plotter. Alternatively, a punched paper tape record of the drawing can be produced. Later amendments can be made to the design by feeding the tapc into the computer to display the drawing on the screen, ready for modification by means of the cursor.

PO Telecommunications Journal, Winter 73-74

Mr A. E. Pullin is head of the group in Telecommunications Development Department responsible for computer aided design studies and applications in the Post Office.

## GROWING GOOD MANAGERS DJ Sharp



Edwards: Ten minutes from now? Well I don't know . . . Oh very well.

These scenes are from the Post Office film "A Frank Rundown" which shows a counselling interview between Ron Edwards, a middle manager in his fifties, and his boss John Hopkins. Edwards needs advice and assurance if his career is to prosper, but Hopkins is pressed by domestic problems and the interview does not begin well. Just as things begin to improve the interview is interrupted by a phone call. The main roles are played by Richard Leach and Derek Francis. The script was by novelist Tony Gray, and the film was directed by John Durst of Rayant Pictures Ltd.



Edwards: That's a bit thick. I thought the drill was two days' notice at least for a counselling interview.



Hopkins: Ah, come in, Ron. Sit down . . . while I see what old George has to say about you.



Edwards: As I was saying, I do feel ready to take on a little bit of extra responsibility . . . (the telephone rings).



**Hopkins:** What I'm after is a frank rundown on how you feel the job has gone during the past year.



Hopkins: Now let me see, where were we? Oh yes, the Granby forecast. Your section nearly dropped us in it there.

IT HAS BEEN SAID that developing managers is like gardening – given the right environment and climate fine healthy plants will develop. With managers much of the activity is sparked off within the individual himself and self-help is the order of the day. However, there is a need for aid and encouragement from outside of the individual if the development is going to be purposeful and in the right direction.

For the past five years or so the task of a few people in the Post Office Management Development Department has been to float ideas which might help both create the right environment for managerial growth and encourage people to develop along lines which would be beneficial to themselves and also to the Corporation. Some of these ideas are being worked upon in the Personnel Departments who, with further thoughts of their own, are evolving management development "machinery" appropriate to the needs of their Businesses.

One way in which younger managers have been helped to develop in the past few years has been through the Scholarship Award Scheme. The aims of the scheme were recently revised as follows: "To assist Post Office people, who have not had earlier opportunities and who show promise, to acquire a high level foundation qualification which will serve as a base for their future development in Post Office service . . ." Over the last few years arrangements have been introduced to enable selected Post Office people to undertake fulltime courses of study at Polytechnics and Universities leading to First Degrees in non-engineering subjects and the Higher National Diploma in Business Studies. Higher level qualifications are catered for by scholarships for the Diploma in Management Studies and Master's Degrees in Business Management subjects.

While it is true that the number of awards made each year has been modest - a total of 82 in 1973 - the impact of the scheme is not confined solely to those who gain the awards. The mere fact that the awards are advertised to staff shows that the Post Office places value on the attainment of these qualifications. As a result those who are not successful in gaining awards, or who perhaps are not eligible to apply for them, frequently follow equivalent courses of study at evening classes.

A new venture last year was the granting of day-release facilities for study leading to the Ordinary and Higher National Certificates in Business Studies to a limited number of junior staff who appear likely to benefit from the opportunity. This is seen as very specifically a management development type of activity enabling staff who left school early, but have developed well since then, to gain an acceptable qualification which is related to Post Office needs and which should form a useful platform from which they can progress further – either through additional academic, or professional, qualifications, or through greater efficiency on the job, or both.

At more senior levels the process of sending managers on business education courses at some 16 Business Schools and Management Colleges (including the Civil Service College) has supplemented the useful training given within the Postal and Telecommunications Management Colleges. Over the past five years about 350 middle and senior managers - nearly a quarter of the total number in post - have attended such a course. Many, but by no means all, of these managers are in the age range 45-55 and, having for the most part spent much of their career within a traditional civil service environment, welcome the opportunity to obtain a new perspective on their job by gaining an appreciation of current business methods and techniques and by exchanging views with managers from other public corporations, private industry and commercial firms. Frequently they return with the added satisfaction that, in many functional areas, Post Office practices are ahead of much that is done elsewhere.

The developing of managers in appropriate ways is, however, very much dependent on relevant advice by a helpful higher level manager at the right time. A man needs to know his weaknesses as well as his strengths if he is to attempt to do anything to improve his current performance and his potential for the future. It is perhaps in this area of personal advice that some of us have been rather hesitant in the past - particularly in pin-pointing weaknesses. We have been unwilling to risk day-to-day personal relationships built up, perhaps, over a number of years, and hence we have either dodged the issue entirely or so disguised critical advice with a verbal gloss as to mask its relevance, both to performance on the present job and to prospects for future advancement. At lower levels day-to-day supervision generally provides opportunity for weaknesses to be brought to

light and for ways of overcoming them to be discussed at the time failures occur and with the evidence readily to hand. At more senior levels the opportunities are generally less frequent and an annual counselling interview at which performance is discussed assumes greater importance. With the greater emphasis on achievement-based appraisal as part of the recently introduced Senior Salary Structure arrangements in the Post Office, managers at middle and senior levels can be expected to be more sensitive than before about how their boss sees their performance.

To suggest to senior managers some of the dangers to be avoided in this area of staff development, and to give a few signposts to satisfaction in the counselling interview situation, a film has been produced which portrays the counselling of a middle manager in his early fifties. He is shown in the film as conscientious, reliable and hard-working, but because of certain weaknesses is unlikely to progress further unless he displays a significant change in attitudes. His boss, who has his own domestic problems, is only partially successful in counselling a man with whom he has worked closely for a number of years.

The film, called "A Frank Rundown", has been devised to show quite frankly that emotional overtones are of great consequence in the counselling interview situation, and that the recognition of their existence is a key factor to the handling of the situation.

"A Frank Rundown" has been made available to Post Office training divisions for inclusion in courses and seminars dealing with counselling interviewing. In supporting documentation significant developments in the film are pinpointed and topics for discussion are also suggested.

In the future, as job requirements are more precisely defined in respect of both experience and qualification requirements, we can expect to see more courses of management development action specifically aimed at matching the manager more closely with his job. In time new courses will embody the results of research into broader aspects of management development, such as the capacity for constructive inter- and intra-group behaviour and the effects of organisational structure.

PO Telecommunications Journal, Winter 73-74

Mr D. J. Sharp is head of the education and training section in Management and Organisation Development Department at Post Office Central Headquarters.



#### **Scattered links**

The Post Office is to spend up to  $f_{.5}$ million on a project to provide reliable, high-quality communications for gas and oil production platforms operating in the North Sea. It will include a type of radio communication - tropospheric scatter which the Post Office has not used before.

At the heart of the communication system will be two new radio stations, due to come into service in about 15 months' time. They will be sited at Scousburgh in the Shetlands and probably Mormond Hill, north of Aberdeen.

Equipped with 40-ft dish aerials, the stations will provide communications for production platforms working gas and oil finds over 200 miles from the shore.

The Post Office has supplied communication links between the off-shore gas and oil operators and the UK mainland since 1965. The new project is to meet much more demanding needs during the production phase due to begin in 1975.

Because many of the gas and oil fields are well out of sight of land, the Post Office is to use a communication technique known as trans-horizon radio (tropospheric scatter) with powerful microwave-radio signals beamed into the troposphere to become "scattered" by atmospheric turbulence so that a very small but still usable signal reaches the receiving aerials.

The two new radio stations will provide direct communications to "master" pro-

duction platforms which, in turn, will relay signals to other production platforms in their area by ordinary line-ofsight microwave, using much smaller dish aerials. Production platforms acting as "master" communication centres will be equipped with 25-ft diameter dish aerials to communicate with the Post Office's land stations.

"In choosing this system the Post Office was very much alive to the need for highly reliable communications," said Mr Edward Fennessy, Managing Director of Post Office Telecommunications. "Although we shall be handling communications with production platforms well out to sea - which is notoriously difficult - we shall be able to guarantee a quality of service which comes close to the reliability of our systems on land."

#### Two degrees

Professor James Merriman, Post Office Board Member for Technology and Senior Director of Telecommunications Development, has been awarded the honorary degree of Doctor of Science (DSc) by the University of Strathclyde, Glasgow. Professor Merriman is Visiting Professor in the Department of Electronic Science and Telecommunications at the University.

Professor Merriman is Senior Deputy President of the Institution of Electrical Engineers and is mid-way through a four-year appointment on the governing body of Imperial College of Science and Technology, University of London.

Mr Dennis Richards, head of the telephony transmission performance sec-



This is an artist's impression of the first stage of a satellite communication station which the Post Office is seeking permission to build at Madley in Herefordshire. The intention is to add a sister earth station to the one existing at Goonhilly in Cornwall to keep pace with the dramatic growth of satellite communication. A 140-acre site at Madley has been bought by the Post Office and outline planning permission for an earth station is being sought from Herefordshire County Council. Initially one 120ft-high aerial is planned for operation in 1977, to be followed shortly after by a smaller aerial. It is possible that four more aerials would be needed in the 1980s.

tion of the Post Office Research Department, has been awarded the degree of DSc by the University of London.

The doctorate recognises Mr Richards' substantial research contribution over the past 25 years into speech transmission. The award follows publication of his most recent work, Telecommunication By Speech, which was reviewed in the Autumn 1973 issue of Telecommunications Journal.

#### Vacation school

A two-week residential vacation school on signal processing in modern telecommunication systems is being organised by the Electronics Division of the Institution of Electrical Engineers in association with the Telecommunications Group of Hatfield Polytechnic. It will take place from 15 to 26 July at the Polytechnic,

The school is intended for recent graduates and for those of graduate or equivalent standard with some experience in telecommunications. Participants may attend either the first, the second, or both weeks. The first week will be concentrated on theoretical aspects, and the second week will be devoted to practical applications.

#### **Confravision first**

The world's first international Confravision link has been established successfully between London and Sydney. The experimental link was used for a conference by television between staff of the British and Australian Post Offices and the Australian Overseas Telecommunications Commission.

The INTELSAT IV satellite over the Indian Ocean carried sound and vision between the Post Office Confravision studio at Euston Tower, London, and the Australian Post Office Confravision studio in Sydney. The satellite link was from the British earth station at Goonhilly to the Overseas Telecommunications Commission earth station at Ceduna, South Australia. The land links in England and Australia were made over the microwave systems.

Mr Edward Fennessy, Managing Director of Post Office Telecommunications took part in the experiment and said later that further tests between Britain and Australia were envisaged.

Both Britain and Australia are operating experimental Confravision services providing audio-visual conference facilities for businessmen in special city-centre studios so that face-to-face meetings can take place without the need to travel long distances.

Both the British and Australian Confravision systems use 625-line, 50 frames a second television standards, but the internal studio arrangements differ. British studios have a table with five places facing the television camera. This has a remotely-controlled zoom lens to give views of all five places or a close-up of the centre three. Australian studios



Mr Edward Fennessy (centre), Managing Director of Post Office Telecommunications, taking part in the international Confravision link with Australia. On his left is Mr W. J. Bray, Director of Research, and right is Mr R. Martin, Marketing Director. have a table with six places facing the camera. The picture signal it provides is split into two – each close-up covering half the table – and is displayed in the distant studio on two screens. (In the experimental transmission, the London studio showed a single, six-person, picture of the Australian participants.)

The value to businesses of Confravision has been demonstrated by the British School of Motoring. The service was used to break the news that the parent company of Britain's biggest driving school, and other subsidiaries had been acquired by Mansion House Finance.

Working from the London studio, the president of the new controlling company of BSM used Confravision to introduce company executives to managers throughout the country. The executives were linked in turn to studios in Glasgow, Manchester, Birmingham and Bristol.

#### **Ski service**

Recorded telephone information about ski-ing conditions in Scotland is again being provided by the Post Office in conjunction with the Glasgow Weather Centre. The service, which is available until 30 April, provides up-to-date details of the depth of snow, state of the main runs and weather conditions from each of the three main ski centres.

#### More 'flu jabs

Post Office volunteers are again taking part in an influenza vaccine trial this winter. For the third year staff have been vaccinated against 'flu as part of a controlled experiment.

The Post Office is co-operating with the Public Health Laboratory in a fiveyear trial to assess the value of large-scale vaccination. This experiment is unique in that it compares whole offices which have had vaccine against those which have not. Other 'flu trials compare the health of individuals. (See Telecommunications Journal, Winter 1972-73.)

Results have shown that staff receiving the vaccine – which protects against all the current types of 'flu virus – generally have a cleaner bill of health than those in specially monitored telecommunication and postal groups whose health record is closely watched for comparison.

#### **Car phone boost**

New equipment and transmitters have been installed to improve the Car Radiophone service outside London. They serve the South Lancashire area, covering Liverpool, Manchester and Preston, and enable radiophone calls to and from motorists on the road to be connected more quickly with greatly improved reception.

South Lancashire is at present the only area outside London with a Post Office



car radiophone service. Its capacity will be increased this year to handle 700 customers – more than double the present number.

The Post Office is to provide car radiophone services for the first time in six other major centres outside London during the next 15 months. The first, covering a large part of the Midlands, is due to come into service early this year. At first it will provide a service for up to 350 users in the Birmingham and Coventry area. The Midlands service will be controlled from Birmingham and new transmitters at Turner's Hill (near Birmingham) and Charwellton (south of Rugby) have been installed.

This will be followed with services for South Yorkshire, including Leeds, Bradford and Sheffield, the Glasgow-Edinburgh area, the Bristol area and South-East Wales. Newcastle-Middlesbrough will have radiophone service in early 1975. Each centre will initially be able to provide a service for up to 350 users. Once the new services are established the Post Office is to look closely at the possibility of providing radiophone coverage for motorists using the motorways which link the radiophone areas.

Until now radiophone users in London and South Lancashire have been able to receive and make calls only when in their "home" area. The modernised and expanded service will enable motorists with a phone in the car to use the facility whenever they are within the range of any of the areas covered by the Post Office radiophone service.

#### Appointments

Mr Alfred Levell, Head of the Inland Finance Division of Post Office Telecommunications Finance Department, has been appointed Director of Telecommunications Finance, responsible for the accounting, budgeting, costing, billing processes and internal auditing of the telecommunications business. He succeeded Mr H. W. Barnes who has retired from the Post Office.

Mr David Richards, Economics and Industrial Adviser to the Pay Board, has been appointed Head of the Research Division in the Post Office Employment Policy Department. With the help of a small support team, he will organise research in depth to help Post Office managers concerned with the pay and conditions of staff.

#### **Crossbar** award

Technical Officer Mr I. P. Lightfoot has been awarded a 1972/73 Associate Section Papers Award by the Institution of Post Office Electrical Engineers for his paper on "The 5005 crossbar exchange". Mr Lightfoot, of the IPOEE Exeter Centre, has been awarded a £25 prize and an Institution Certificate.

#### **Channel tower**

Work has started on the site for a new Post Office radio tower at Tolsford Hill, near Folkestone, which will greatly enlarge Britain's busiest single international telephone link – a 30-mile microwave radio "hop" across the English Channel to France.

As the first step in a two-stage programme to increase the route's callcarrying capacity the existing radio mast on Tolsford Hill has been strengthened to take more aerials. The second stage will be the setting up of the new tower, and when this is ready for service in 1975 the old mast will be taken down.

The route from the Tolsford Hill microwave station to its French counterpart at Fiennes handles calls to and from France and carries many inter-



A model of the new radio relay tower planned at Tolsford Hill.

national calls across France to other countries, principally Italy, Switzerland, Spain, Greece and Yugoslavia.

The new tower will be 64 m (210 ft) high, with six galleries, triangular in plan, spaced at 6 m (20 ft) intervals. The top gallery is surmounted by a 22 m (70 ft) tubular steel tower. The galleries

### CONTROLLING THE FUTURE

The Post Office has chosen the GEC Mark II BL digital processor as the control element for future exchanges it is to develop in close collaboration with the industry. This digital processor will be a computer-like device which controls the working of the exchanges and communication links built around it.

When the decision was announced the Post Office issued the following statement:

The Post Office and its principal suppliers have recognised that the chances of system cost-effectiveness were greatest if a single, basic design of control processor were to be used in the UK system. This provides maximum flexibility for new facilities and services, most effective use of technical resources, and maximum opportunity for efficient interworking with plant that already exists. In the processes of evaluation and choice, the Post Office discussed at length with the firms involved their designs, the criteria and the facts to be used in judgment. Considerable weight was given to the very high reliability demanded by the real-time, continuous-operation nature of telecommunications. Models of possible exchange environments were also developed and agreed with individual firms as bases for cost-effectiveness evaluation.

As a result of this 18-month exercise, the Post Office has selected the GEC Mark II BL as a foundation for its "processor utility" and is placing an initial development contract with GEC to secure Post Office participation in on-going design.

This decision is an important first step in the system development programme to be undertaken by the Post Office with its suppliers. The Post Office and GEC have agreed that full manufacturing details and know-how will be made available to the other suppliers of exchange equipment for use on Post Office work and that, if required, GEC will be prepared to grant them royaltyfree licences for export. are supported on five circular, reinforced concrete columns, arranged as a regular pentagon; the vertical members of the steel tower also form a pentagon.

#### **Police network**

The authors of the article on a new network for the Metropolitan Police (Telecommunications Journal, Autumn 1973) wish to amplify a statement which could imply that the network is not compatible with current Post Office policy. When they stated that an extension-to-extension call within the network could involve six links, this figure included the extension links and only up to four inter-switched circuits.

#### **Research prizes**

Dr David Newman and Mr Simon Ritchie have won a 1973 Scientific Premium of the Gordon Radley Fund (Christopher Columbus Award). The Fund's awards are made annually for outstanding research by staff of the Post Office Research Department.

Dr Newman is head of the research group evaluating solid-state materials for possible use as light sources in optical communication systems, and Mr Ritchie is the member of the group particularly concerned with assessing the reliability of these devices.

Their joint award was gained for a paper on "Experimental tests of proposed mechanisms for gradual degradation of gallium arsenide double-heterostructure injection lasers."

A second Scientific Premium has been awarded to Mrs Mary Halliwell for a paper on "The optimum choice of reflexion to reveal disclocations in gallium arsenide by x-ray reflexion topography." Mr John Grierson was highly com-

mended in this section. Two Craftsmanship Premiums have been awarded. The first – for the engineering design of mechanised postal equipment for optical character recog-

nition and verification – was shared by Mr Dennis Bannon, Mr Edward Bishop, Mr Peter Dowling, Mr Peter North and Mr Roy Wyatt.

The second Craftsmanship Premium was shared by Mr Derek Friend, a design draughtsman, and Mr Fred Ware, a technical officer.

The awards were presented by Mr Reginald Halsey, former Post Office Director of Research. The ceremony was held for the first time at the new Martlesham research station.





Dr D. Newman

Mr S. Ritchie

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