

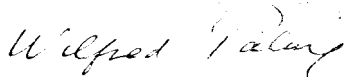
# TELE COMMUNICATIONS JOURNAL

THE POST OFFICE TELECOMMUNICATIONS JOURNAL IS PUBLISHED BY THE POST OFFICE OF THE UNITED KINGDOM TO PROMOTE AND EXTEND KNOWLEDGE OF THE OPERATION AND ADMINISTRATION OF TELECOMMUNICATIONS.

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## *A message from the Postmaster General*

It is with much pleasure that I greet the first appearance of the Post Office Telecommunications Journal, and I wish the new venture all possible success. I have every confidence that, with the co-operation of all concerned in the organization and administration of the Post Office telecommunications services, the Journal will make a real contribution to the discussion of current practice and of new ideas, without which the best enterprise may fail to achieve full development. I know some of the difficulties which have been encountered, and I congratulate all on the success with which they are being surmounted.



## *From the Assistant Postmaster General*

I offer a warm welcome to the Post Office Telecommunications Journal. I am sure it will be read with profit by all who have the efficiency of our telecommunications services at heart. From what I know of the problems which lie ahead in the telecommunications field, there will be no lack of material for the columns of the Journal; nor is there likely to be any dearth of writers with constructive views able to express them with clarity and force. I see a successful future for the venture. It goes ahead with my best wishes.



## *From the Director General*

There is undoubtedly a need for a Journal of this type and I wish it every success. In the early days of telephony the National Telephone Company had its own Journal which dealt with the numerous problems thrown up during that pioneering phase. Their Journal was succeeded in 1914 by the Telephone and Telegraph Journal, a change which marked a new phase in telecommunications in this country when the public telephone system had been brought completely under the direction of the Post Office. That Journal, in its turn, covered the period of development in Post Office telecommunications up to 1933, when it ceased publication. Since then there has been no Post Office Journal dealing with non-engineering problems arising from the rapid expansion and modernization of the telecommunications services, and it will be the important task of the new Journal to provide a centre of information and discussion on modern practices and developments made possible by the ever-onward march of science.

The present paper shortage makes it important that each copy of the Journal should serve as wide a circle as possible and I have no hesitation in commending it to its readers.





EDITORIAL BOARD. From left to right: G. H. TAYLOR, C.B.E., Deputy Regional Director, London Telecommunications Region; F. J. TICKNER, Assistant Secretary, Telecommunications Department; C. J. MILES, M.B.E., Assistant Secretary, Personnel Department; J. H. RICHARDSON (Editor), Contoller, Public Relations Department; B. L. BARNETT, C.B., M.C. (Chairman), Director of Inland Telecommunications; MISS P. I. K. STANLEY, Public Relations Department (vice F. R. ALLCROFT, Assistant Editor); H. TOWNSHEND, C.B., Director of Overseas Telecommunications; A. J. GILL, Engineer in Chief; J. F. MURRAY, O.B.E., Deputy Regional Director, South Western Region.

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COMMENT

A COLLEAGUE OF OURS IN THE STORES Department, prompted by the official announcement of the intention to publish the *Post Office Telecommunications Journal*, came a few days ago to the Public Relations Department to offer a set of volumes of the old *National Telephone Journal*. We accepted this offer with much pleasure, and, we hope, with suitable grace. This gift will help us to keep in mind some traditionally valuable ideas. *The National Telephone Journal* gave place in 1914 to the *Telegraph and Telephone Journal*.

MANY OF OUR READERS WILL SEE IN THE *Post Office Telecommunications Journal* a longed-for re-appearance of the old *Telegraph and Telephone Journal*. In some respects, the features of the old Journal will be apparent. There will be, as

it were, family likenesses, but naturally the new-comer will have traits attributable to the admixture of new strains. Its manners will be in the modern mode; none the less taking for all that, we hope. To attempt to revivify the dead bones of the old Journal and clothe them in the old style would invite derision. The structure of the Post Office has changed too fundamentally for success to lie in looking backward. The new Journal will have the forward look, and have a character and individuality of its own—especially character.

MAKING OUR BOW TO THE WORLD WE NOW TAKE our place alongside our elders in Post Office journalism. We offer our respectful tribute to our blood brother *The Post Office Engineering Journal*. In our own field we aim to be complementary, not competitive, and as successful.

We wave a hand to that lusty youngster *The Post Office Magazine*, and throw back a regretful thought for the demise of the *Sales Bulletin* which had a short life—not without a certain gaiety. It was one of war's casualties. We extend a friendly greeting to *Traffic*, a journal started at the beginning of the year with commendable initiative by the Traffic Officers' organization.

SOME EXPLANATION OF OUR OBJECTIVES IS DUE TO our readers. First, to give some degree of permanence to the valuable papers delivered before local groups on telecommunications subjects. Then, to provide a forum for the discussion of the administrative, executive and non-engineering technical problems associated with the telecommunications services. To interest the wide readership for which we hope, the Journal must find space for a variety of subjects. The chief difficulty at the outset will be that of selection. Our colleagues can do much to give the Journal a fair wind now that it has been launched. On our part we pledge our best effort.

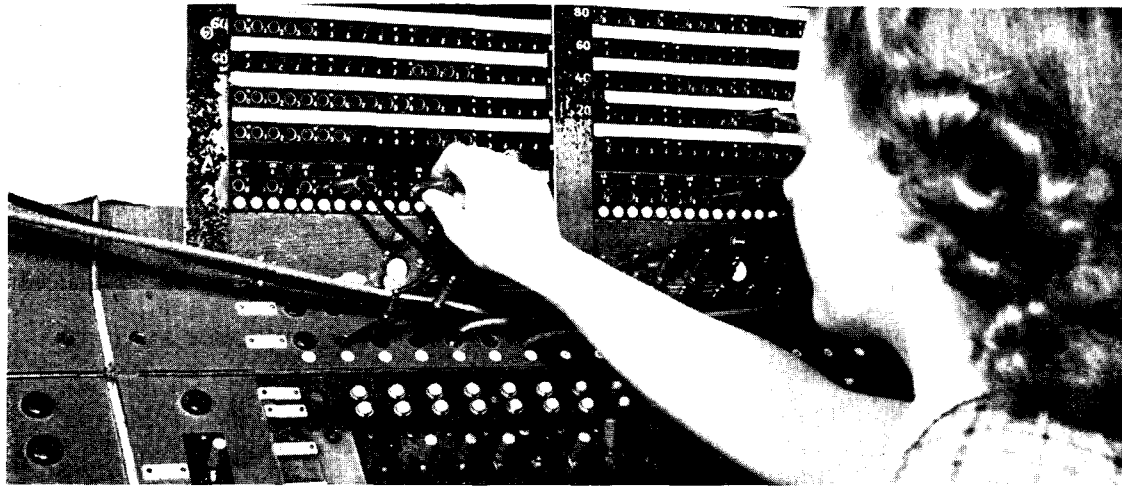
A GLANCE AT THE PROGRESS REPORTS FOR THE Inland Telecommunications Services presents an almost kaleidoscopic sequence of questions occupying the official mind at the moment. The columns of the Journal will reflect many of these topics. The manpower difficulties obviously give the Administration more than enough to contend with. One notes for instance that the Post Office has rejected requests from the Air Ministry and War Office that it should take over the operations of Private Branch Exchanges serving subordinate formations. So long as a manpower "ceiling" is in being the Post Office could not undertake commitments reducing the staff required to man the public telephone and telegraph services. However, we can accept the implied compliment to the efficiency of Post Office operators.

ON THE SUPPLY SIDE, THE EXPORT TRADE MAKES enormous demands. Our readers know full well the drastic changes in telephone policy which have been necessitated by the consequent restriction of supplies of materials for the home services. So that our readers may be able to see the position in true perspective, we briefly recapitulate the main facts. Six out of every 10 telephones and 75 out of every 100 loop miles of local telephone cable made in this country are

exported. 75 out of every 100 teleprinters go abroad. Under national planning the number of men employed on new buildings, extensions of buildings and duct laying for the Post Office has been reduced from 6,000 to 4,000. The effect on the exchange equipment programme has been drastic. In 1938 the expenditure on exchange equipment was £4,000,000; for 1948 it is of the order of £5,000,000, or £2,800,000 in values of 1938, a drop of 30 per cent.

IN THE TURMOIL OF PEACE, WAR'S TOLL OF THE British telecommunications system, in physical damage alone, is often forgotten. London did not get the immunity from devastating bombing enjoyed by Paris or New York. Large exchanges which had taken years to design and build were lost in a flash. In one terrible night in 1940 the centre of the telegraph system in this country went down in flames. The public nevertheless got its telegraph service next day with minor loss or delay. Let us remember that during the war the Post Office, though denuded of staff, kept its public services going and built for the Services a country-wide telecommunications network larger than the pre-war system. Yet, notwithstanding the drain on resources these achievements denote, something approaching a miracle has happened. Over 1,500,000 telephones, equivalent to 50 per cent. of Britain's pre-war total, have been fitted since the war. Practically all overseas telegraph and telephone services were restored by the middle of 1946. An Anglo-Dutch cable of improved type was laid in November 1947 by a new Post Office cable ship and is now in service. An Anglo-Belgian cable has also been laid and will be in service in the next few months. Momentous changes in telegraph practice, described in the article "Telegraph Switching" in this number, are being carried through. Several large telegraph centres, including the Central Telegraph Office, have been re-designed and re-built, the aim being to give a telegraph service of quality second to none.

IT IS TRUE THAT WHILST IN FACE OF SHORTAGES OF manpower and material the immediate needs and problems have had to be tackled by expeditious of the "make-do-and-mend" variety, there is nowhere any indication that long term aims have been lost sight of. The story of the last few years is one of courage, resource and achievement; let there be no mistake about that.



## TELEGRAPH SWITCHING by F. J. TICKNER

UNTIL COMPARATIVELY RECENTLY telegraph working has mainly been by means of point-to-point circuits; circuits working direct between two offices. There are obvious advantages, particularly on less heavy circuits, in developing facilities to work from a single teleprinter to several different offices, as the demands of the traffic require. The best example of this is concentrator working.

Until 1933 the Telegraph Service had its own separate main line cable system in which the bulk of the point-to-point physical line circuits, repeated where necessary, were provided. At this time there were 11 Zone Centres, about 35 Area Centres and 275 Group Centres and Minor Offices with telegraph circuits. As the majority of the latter had only outlets to their home Area Centre, most telegrams incurred more than one transmission.

Between 1927 and 1931 the main circuits were converted from multiplex baudot to teleprinter working. Early in 1933 it was decided to provide the main telegraph network on multi-channel voice frequency equipment and to adapt the telegraph cables to provide trunk circuits for Telephone Demand working. This programme was largely completed by the end of 1934.

The voice frequency systems provided go and return channels and dispensed with duplex balance, so that it was decided to adopt similar principles on local lines as the scheme developed.

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The degree of standardisation of lines and equipment had reached the stage where it was possible to reduce the number of transmissions by developing switching methods. Accordingly in 1935 the Director-General set up the Telegraph Retransmissions Committee to consider the practicability of reducing the number of transmissions by through-dialling between teleprinter offices. The Committee issued its main report in December, 1937.

The two most important factors in the mechanisation of the telegraph service in this country are the relatively short distances involved, and the great diversity of the traffic. Telegrams from any one office have a wide variety of destinations. This makes any scheme attractive which gives the sending clerk a wide choice of offices to which to work direct.

### *Retransmissions Committee's Proposals*

THE RETRANSMISSIONS COMMITTEE ADVOCATED direct communication between any two of about 800 teleprinter offices in the inland network. They proposed that each operating position should have a teleprinter, a dial set, control key and supervisory lamps. To send a message the telegraphist would move the control key to the sending position, giving a red supervisory lamp

signal. She would dial the code appropriate for the distant office, obtained from a visible index file. The code would have from one to seven digits, as a rule three or four. This would route the call through automatic equipment at one or more intermediate offices and, if the circuits were free, the code of the distant office would be automatically received as a signal to commence sending. At the end of the message the operator would depress the WRU (Who are you?) key to verify that the circuit had been held throughout transmission, and clear the circuit with her control key. An incoming call would automatically pick up a free teleprinter, giving a green supervisory lamp signal to show that the position was engaged. When calls were offered to an office with all its circuits engaged the call would be held on a "waiting" contact and pick up a circuit immedi-

ately one became free. If, however, all circuits were still engaged at the end of 30 seconds, the call would be connected to the last Area Centre in the chain of connections from which the message would be retransmitted.

The automatic equipment was to be located at 24 centres; at tandem centres in London, Birmingham, Leeds, Bristol and Glasgow; at full switching centres at Bangor, Belfast, Edinburgh, Exeter, Grimsby, Hull, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham and Southampton; and at limited switching centres at Aberdeen, Bournemouth, Brighton, Cardiff, Dundee, Leicester, Sheffield and Swansea. The switching centres and interconnecting lines were so arranged that with normal routing no calls would exceed the transmission limits of two voice-frequency channels and two physical extensions; or three voice-frequency channels and two physical extensions having negligible signal distortion; and the number of circuits provided between any two switching centres would be such that only one call in 500 even at times of pressure would fail to secure immediate connection. It was estimated that an overall increase of 700 teleprinters would be required on the number then in use. Each machine would need an answer-back unit and a paper feed alarm.

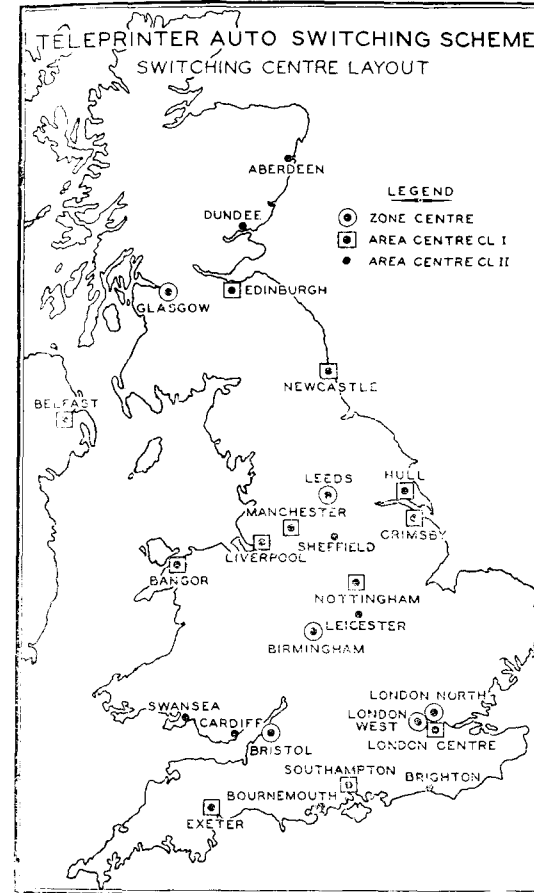
The apparatus space required was comparatively small. At Birmingham, the largest provincial centre, a room thirty feet square would be adequate. At Leeds, less than 50 feet of 10 ft. 6 in. racking was needed.

### *Trial with Dummy Traffic*

TO VERIFY ITS CONCLUSIONS, THE COMMITTEE SET up model switching plant, equivalent to 22 teleprinter positions, distributed over four London and eight provincial offices. So successful were tests with dummy traffic, that the system was used for live traffic in the afternoons for eight weeks. Nearly 10,000 messages were successfully transmitted. The overall sending time was estimated at 62 seconds; incoming at 49.

Independent duplex circuits were to be retained between large offices where the direct traffic warranted them.

The Committee estimated that their proposals would result in an annual net saving of at least £175,000 and possibly of more than £250,000, and advocated a full scale experiment in the Birmingham zone at a capital cost of about £110,000. The war intervened and the matter was left in abeyance.



**War-time Reconstruction: the first stage**

IN THE EARLY PART OF 1941 FOUR IMPORTANT offices, London, Birmingham, Liverpool and Bristol, were put out of action and others were damaged by enemy attack. Reconstruction was hindered by further bombing, by a heavy increase in traffic, and through the fact that the Post Office had now built up and was maintaining a defence private wire system 3½ times the size of the civil network.

It was assumed that automatic switching would come in the early years after the war, and reconstruction was planned with this in view. Instead of the large offices being rebuilt, 39 Area Centres were opened in July, 1941. The Zone Centres were left to serve their immediate vicinity, and the rest of the country was served by groups of three Area Offices which thus came to be known as the "Triangle Offices." Each triangle had main outlets equivalent to a Zone Centre, but because of accommodation and other restrictions they were divided between the three offices which were linked to one another by direct circuits. This increased retransmissions, for two-thirds of the traffic from each office had first to go to another office in the triangle.

Simultaneously a number of new teleprinter offices and new phonogram appointed offices were set up, primarily for defence reasons, but with an eye to the increased number which would be required under automatic switching. In London about half the traffic was taken from the Central Telegraph Office and divided between four new offices in the suburbs—the Ring Centres. This reorganisation increased the average number of transmissions per telegram from 2.1 to 2.8. Before the war about 1,000,000 telegrams were dealt with weekly, or 2,100,000 transmissions; for most of the war a representative figure would be about 1,500,000 telegrams weekly or 4,200,000 transmissions at the higher rate. All this increased the average transit time from 30 minutes to about 90 minutes.

**The second stage: Manual Switching**

THE POST OFFICE DEVELOPED, FOR THE DEFENCE services, a manual switching system, using voice frequency channels, with switchboards very much on telephone lines. Each switchboard has circuits to a number of telegraph offices with teleprinters for communication with the switchboard operator and the operator at the receiving position.

In 1944 the Post Office decided to introduce this type of working into the civil network to reduce the extra retransmissions caused by the "triangle" scheme. The first switchboard was installed at Birmingham, and Leicester, Nottingham and Derby, three triangle offices, with Coventry, Peterborough and Rugby, were given access to it for most of their traffic. 23 other offices were given limited access for their traffic to the offices primarily concerned.

This was the first instalment of a general scheme with switchboards at Manchester, Leeds, Bristol, Glasgow and London, all of which have now been completed. They can cater for about 150 offices. This marks the end of the improvised war-time scheme and should reduce the average transmission time to something approaching the pre-war figure of 30 minutes. Practically every telegram is transmitted through one switchboard only. At first, two switchboard operations were required for a number of messages.

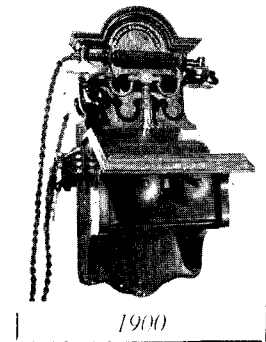
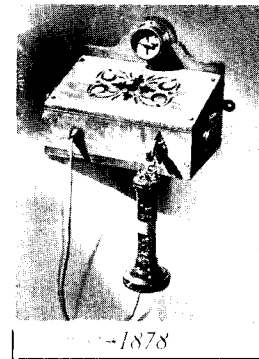
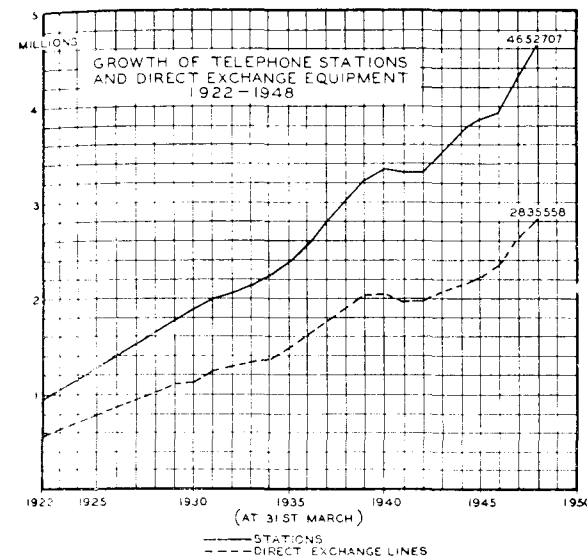
**The third stage: Automatic Switching**

ALL THIS IS TENDING IN THE DIRECTION OF automatic switching. With the exception of Manchester, the manual switchboards are located at the Tandem Centres in the automatic scheme. In April, 1945, a Committee was set up to see how far the original proposals of the Retransmissions Committee needed modification in the light of subsequent events. This Committee has completed its work; the modifications necessary are surprisingly few, thanks to the foresight of those who planned the war-time reorganisation of the service. A start will be made with automatic switching by opening the Birmingham and London

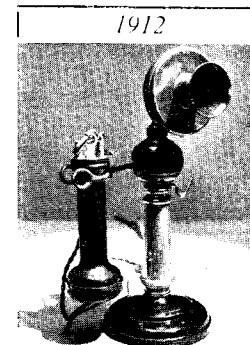
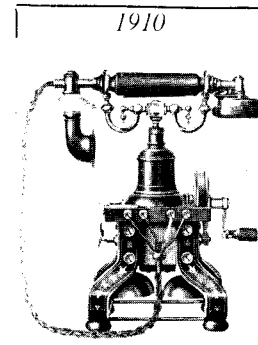
North Tandem Centres during 1949 and the whole scheme should be completed by about 1953. Concurrently a new and improved teleprinter, the No. 47, designed by Messrs. Creeds, will be introduced. Thus, within the next five or six years it should be possible to develop a telegraph service giving

direct communication between the office of origin and any one of about 800 delivery offices (the number has not been finally fixed); this will make it possible for a telegram to be sent out on delivery within about 12 minutes of its being handed in, a far better standard of service than has ever been known in this country.

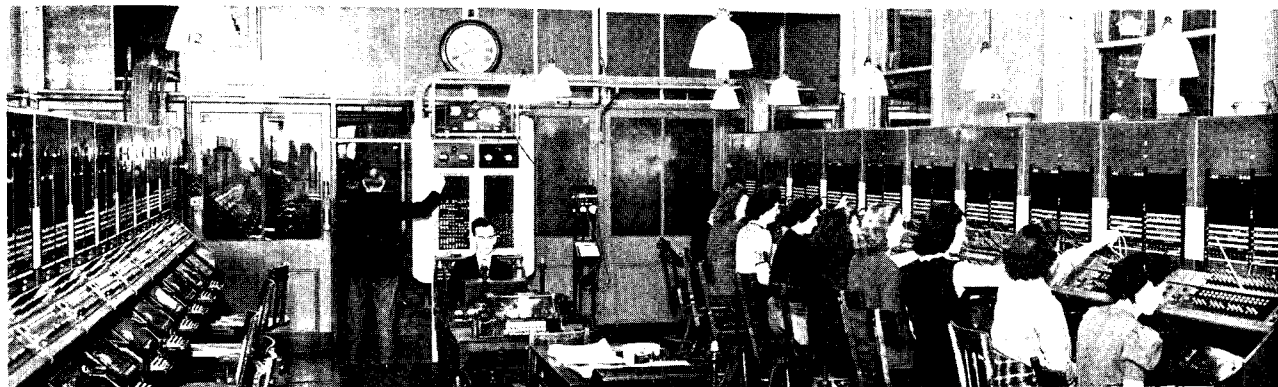
**TELEPHONE GROWTH SINCE 1922**



★ HOW THE STYLES  
★ HAVE CHANGED ★  
★ THROUGH THE YEARS ★



MANCHESTER TELEPRINTER MANUAL SWITCHBOARD POSITIONS



# ★ THE TRAFFIC OF THE MIND ★

By J. M. Newton, Personnel Department, Training and Welfare Branch.

"... First, there is polyploidy: a triploid (3x) arises by non-reduction in pollen or embryo-sac formation or a tetraploid (4x) arises by failure of a mitosis . . ."

THIS SENTENCE IS A COMMUNICATION. To some people it will be a speedy and intelligible one. Probably for most readers of this Journal its message will seem very effectively scrambled. It illustrates an assertion of Mr. Charles Morgan in a recent essay entitled "The Death of Words," (published in "English," vol. vii No. 38): "Words are ceasing to carry the vol of the mind. A reason for this is the centrifugal movement of modern knowledge into remote and distinct compartments, each with its own cipher." The launching of this Journal suggests a few general thoughts on the problem of conveying ideas about telecommunications, a compartment of knowledge whose cipher can be as obscure as any.

There is of course no special problem in communication limited to experts who know intimately each other's vocabulary. Difficulty starts as soon as the discussion is conducted "for all whom it may concern," whether on an official file or in a journal. The writer must then, consciously or unconsciously, make guesses about the knowledge of people he may not know. He will wish to save time and trouble (for the knowledgeable reader as well as himself) by using technical terms without explanation and by making generous assumptions about the reader's ability to follow a summarised technical argument. Yet he will often find that he loses more time by second and third attempts to complete the circuit of understanding than he would have taken by a more thorough first attempt. Only by trial and error will the right balance be found. Some specialist terms will be unavoidable for there are no synonyms in the general vocabulary for the ideas they express. But the motto must always be understanding before speed.

Let us consider the problem for contributors to this Journal. In a journal which, like this, has a varied public the ideal is to find language simple enough for all readers. Yet in practice life is too full for most people to read all through even the most interesting "literature" that comes their way; and whether they will taste or ignore any particular morsel will depend both on its substance and on

the way it is served up. The would-be contributor must therefore decide to whom, primarily, he is offering his tit-bit and must choose his language accordingly.

These days the world is not divided simply between the technicians and scientists - those who understand and all the rest who do not. As Mr. Morgan implies, specialisation of science is such that the language of one research worker may seem double-Dutch to another on the same station. Yet the specialities remain inter-dependent in ways both obvious and unseen. Therefore the ambitious writer, even if frankly seeking only technical comment on his ideas, will do well to consider, before he commits himself to paper, how narrowly specialist his customary vocabulary is. An obscure piece of workshop or office jargon may shut out his meaning well enough to destroy the interest of another technical reader whose help might have thrown unexpected light on the problem.

But it is perhaps most necessary to emphasise that the really important ideas, before they can become fully effective, must be expressed in a form intelligible not only to all the interested technicians but also to the non-technical mind. Though physical science may profoundly modify economics and politics and the other humane studies, it is equally dependent upon them; and in the last resort machines are made for men. This is true of telecommunications as of other applications of physical science; and although no Post Office official needs to be reminded that he is a servant of the public, it is sometimes forgotten that this is not only a constitutional theory but one example of a working fact. Shared Service will only succeed if people tolerate it. Equally, the cordless switchboard could fail if telephonists disliked it strongly enough. These truths are no doubt firmly enough in the minds of most technical people in telecommunications. Their relevance here is that no discussion of any important development can get far without extending to matters which call for the experience, the advice and ultimately the decision of non-technical people.

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# THE CORDLESS SWITCHBOARD

A BRIEF OUTLINE

by H. C. Andrews, Telephone Manager, Portsmouth.

THE CORDLESS SWITCHBOARD, IN ONE FORM or another, is not new; but it is probably true that its use as an instrument for large systems has reached prominence only during recent years. In essence, a cordless switchboard system is relatively simple, but it has not so far been used for exchanges as large as would be required in this country; and the most difficult single design problem which had to be resolved was how to serve efficiently exchanges of up to 100 controlling positions.

It is part of the system to present calls in the chronological order of their arrival; for this purpose they are made to wait in a queue, and are taken from the queue, in turn, by the operators.

Although other means of presenting the call to an operator are being used it is perhaps correct to say that the 200-outlet motor driven unselector - a description of which is available elsewhere - has made the cordless switchboard more practicable so far as the requirements of this country are concerned.

## The Calling System

A schematic diagram of the system is shown in figure 1. A call to the manual board is routed from the auto exchange, via an appropriate grading, to one of a group of 200-outlet Demand Distribution Switches. The first 20 contacts of this switch are the queue contacts, and the remain-

ing 180 contacts (if they are all used) are led out to the manual board connecting circuits the equivalent of cord circuits on a cord type switchboard. The calls are stored on the queue contacts, the longest waiting call being on contact No. 20 and the last arrival, assuming 20 calls are waiting, on contact No. 1. To accept a call an operator moves the key of a free connecting circuit to the "speak" position and momentarily depresses a common "connect answer" key on her position (see figure 5). This action marks the distribution switch bank contacts appropriate to the connecting circuit selected, causes the wipers standing on contact No. 20 to hunt until the marked contact is found, and transfers the call from the queue to the connecting circuit. Queue contact No. 20 becomes free and the wipers standing on queue contacts on other switches in the group then move up one contact, leaving contact No. 1 free to accept a fresh call.

## Limiting Conditions

The number of positions (called the field) which can be served by one distribution is limited by the size of the distribution switch, the length of the queue, and the number of connecting circuits required per position. The most critical factor is the number of connecting circuits; for, once they are provided, it would be a major operation to increase them, since there would have to be a corresponding reduction in the size of the field. Since reliable data were not available, it was necessary to assess the number of connecting circuits theoretically, using the laws of probability, supported by such information as could be obtained by studying the incidence of traffic on the present cord type boards. The theory indicated that with seven connecting circuits not more than one call in 300 would need to wait for a free circuit.

The fundamental unit served by one queuing system will comprise 25 positions, each with seven connecting circuits, and a queue of 20, leaving five spare contacts on the distribution switch.

**The problem of serving exchanges of more than 25 positions**

It is undesirable to serve an exchange of over

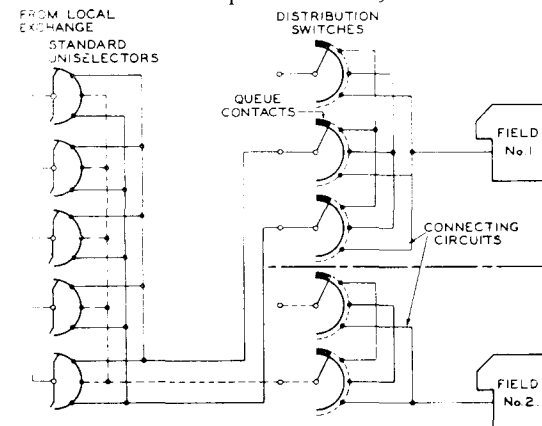
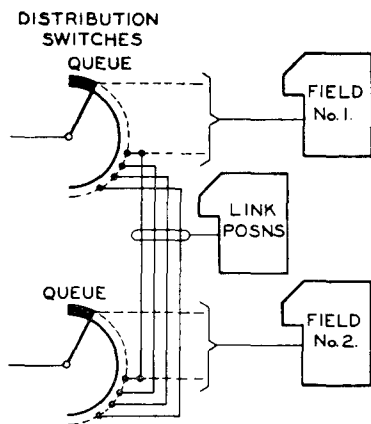


FIG. 1 THE CORDLESS SWITCHBOARD DISTRIBUTION SYSTEM.

25 positions by two or more separate and independently staffed units. In Melbourne two fields are combined by providing link positions common to both fields and arranged as shown in figure 2. The staff on the two fields must be kept as numerically equal as possible, and the link positions are arranged to assist whichever field has the larger queue or the longest waiting call. One disadvantage is that the link positions reduce the size of the field, especially when more than two fields are required; and another is that it would be difficult to maintain equal staffing over a number of fields.

A scheme which would, in effect, distribute the traffic to the fields in proportion to the capacity of the staff to accept it, has been devised, using the time to answer as a controlling factor. Figure 3 shows a simple schematic for an exchange com-

FIG. 2. MELBOURNE LINK SYSTEM



prising four 25 position fields, A,B,C&D. The total traffic would normally be distributed equally to the fields, and the calls entering the queues would be timed by one second time pulses. If field A (or any other field) were short staffed (although the total staff is adequate) the waiting time of the calls in queue A would increase. It could be arranged that when the waiting time in the queue reached a predetermined amount (15 seconds has been chosen) the queue would automatically close and all traffic would be distributed evenly to the other three fields B,C&D. If the traffic continued to rise, queues B and C might similarly close, leaving field D open. Field D would then accept all the traffic and unless any other queue had reopened in the meantime, the longest waiting call in queue D would soon have to wait 15 seconds. At this stage all the queues

would re-open and the time control would automatically shift from 15 to 30 seconds. With rising traffic the cycle of events would be repeated, the time control being raised 15 seconds for each cycle until a limit of 120 seconds is reached: busy tone would then be given to callers until one or more of the queues reopened. With falling traffic the cycle of operations would be reversed, the queues opening as the time of the longest waiting call dropped below the particular time control stage, and until the first stage of 15 seconds time control is reached. The time control would not be provided for exchanges with only one field, nor would it be applied in a multi-field exchange when only one field is staffed: in such cases busy tone would be applied when the physical limit of the queue is reached.

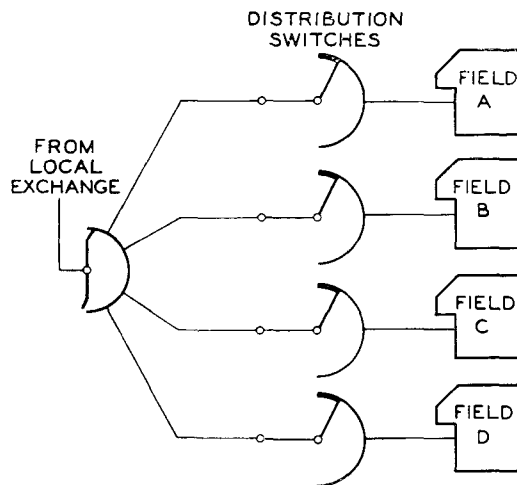


FIG. 3. DISTRIBUTION TO FOUR FIELDS.

It is proposed to provide a suitable display on each field to indicate to supervisors which time control stage is in operation and whether the traffic is rising or falling. A lamp will be provided on each position to show when calls are waiting in the queue; and a second lamp will indicate to the supervisors that an operator has preset her position to receive the next call on her headset when no calls are in the queue.

**Switchboard design**

The shape of switchboards in the past has been governed by the answering and outgoing multiples and the cord circuits; but, since these items are not used on the cordless board, it was decided to design it to meet, as far as possible, the physical comfort of the operators.

Figure 4 shows a model cordless switchboard which has been agreed as a prototype on which to base a standard design. The most noticeable differences are that the supervisorys have been placed on a sloping panel; the common keys have been placed on the left hand side to leave the right hand as free as possible for writing and key-sending; and the writing space has been increased to provide more adequate wrist support during the preparation of tickets. The various items have been so placed that the chronological sequence of events in setting up a call is followed with the greatest ease of movement; and the switchboard has been kept as flat as possible to create a desk atmosphere and to avoid the almost claustrophobic condition which arises with the present multiple type switchboard. The keyshelf is of normal table height from the floor, and light tubular steel chairs, with a shelf to accommodate handbags, will be used.

**Switchboard facilities**

Figure 5 shows the model keyshelf and panel. Each connecting circuit comprises an ordinary "Speak Monitor" key, a clock No. 44 and five supervisorys. Two of the supervisorys are circuit engaged lamps which serve to indicate that a particular connecting circuit is engaged. The "ordinary" circuit engaged lamp will glow when a call from an ordinary subscriber is received; the "coin box" circuit engaged lamp will indicate when a call originates from a coin box. When a call is received from a coin box line the time check lamp will operate to meet the coin box operating procedure. For suspended and reverted coin box calls the operator will depress momentarily the "Revert CB" push button key; this action will cause the "coin box" circuit engaged lamp to glow and the coin box time check procedure to operate. The "Release Answer/Release Call" key is operated with the appropriate speak key to release either one or the other side of the connection, and is also used for releasing the connecting circuit after the completion of a call.

The Delay Display panel consists of a frame into which small translucent labels, bearing

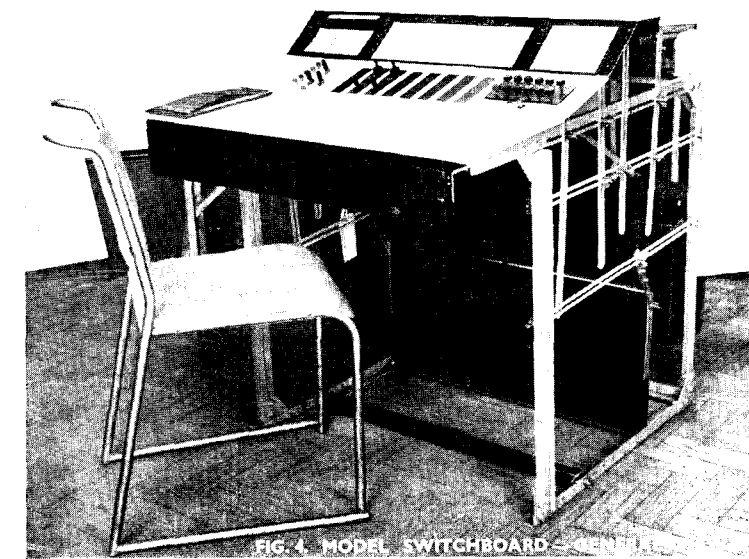
the numerical code of the route in delay, may be inserted; and a three-colour delay indicator will illuminate the labels from behind.

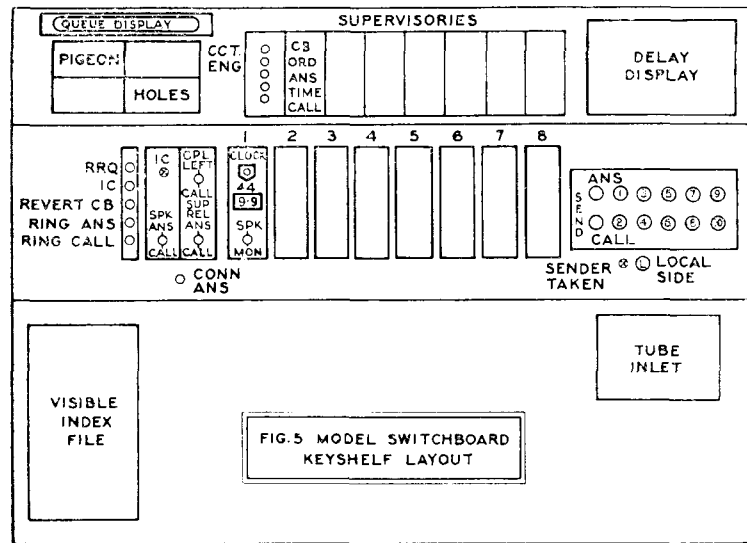
Keysender access is normally to trunk selectors, but if it is necessary to complete a local call the operation of the "Local" key (marked "L" in figure 5) will divert access to the local selectors.

**The merits of the cordless switchboards**

It should be made clear that a cordless switchboard can only be used efficiently with a mechanised trunk service, and any comparison between the cordless switchboard and the cord type switchboard should be done under the conditions of mechanisation for both types.

The reasons for the increased efficiency achieved with the cordless switchboard in other countries are a little obscure, and at one time it was thought to be due to the psychological advantages gained by the more attractive working conditions; but it is more probable that the greatest gain is due to reductions in fatigue. It now seems clear that the main fatigues on a cord switchboard are: physical, due to the use of cords and multiples; visual, due to lamp signals; and mental, due to an operator working across the field of vision of another. Contributory fatigues are due to noise and to an operator's consciousness of her inability to handle the load in times of heavy pressure. With the cordless switchboard most of these fatigues are eliminated.





will be the cubic capacity required for the staff employed. Partly because of this factor it has been decided to provide positions 33-ins. wide. Also the suites will be placed back to back with a gangway between. Supervisors' instrument jacks will be placed both at the back and at the front; though it is not intended that supervisors should supervise entirely from the back of the boards, the facility may prove to be useful at times. There is very little wiring in the switchboards and additional positions can be installed in the switchroom without seriously interfering with ordinary work, or in small suites in other rooms without loss of operating efficiency.

Fears have been expressed that operating will be more monotonous than for a cord type board. Monotony is, however, a product of repetitive processes, and there is no more repetition with a cordless switchboard than with a cord switchboard. Experience abroad shows that the cordless switchboard removes the drudgery without lessening the interest; and fears of monotony need not be entertained.

The switchroom layout is not restricted, and the long rows of switchboards, which often block out natural lighting, can be replaced by short suites of open type switchboards, arranged across the width of the room, and permitting better ventilating, heating, lighting and cleaning facilities. The exact layout will depend upon the shape and size of the room; and it is likely that the factor limiting the number of positions in a switchroom

On the debit side there is perhaps some loss of flexibility and the system is not so well adapted to delay working on a large scale. Extensions, particularly when new fields have to be provided or re-arranged, may prove to be more difficult, and the periods for which equipment forecasts are made may have to be modified. Generally, the advantages outweigh the disadvantages, and it is considered that the advent of the cordless switchboard will be an advance towards a better and more efficient telephone service.

**Conclusion**

This article is a very brief outline of the system. It will take some time yet to complete final details and circuit designs, but we are well on the way.!

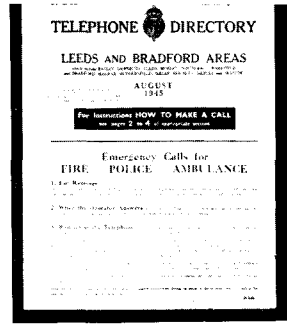
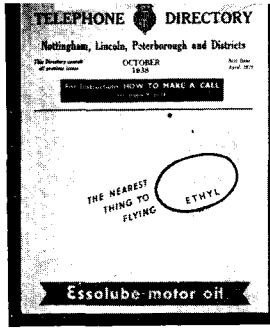
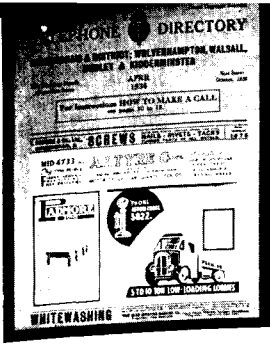
**THE TRAFFIC OF THE MIND** (continued from page 8)

There comes a stage when there is no escape from the task of explaining the essentials of a new idea so that it can be grasped by people without technical knowledge. But the wise innovator will not wait until that ultimate stage. He will recognise not only that human considerations determine the final fate of a piece of research but also that, if given the chance, they may help to direct it along fruitful lines. He will therefore try to bring every man into his confidence as early as possible and he will remember that it is words which must carry the traffic of his mind.

**TO SPEECH**  
(Hymn from the Rigveda)

*On the world's summit I bring forth the father:  
my home is in waters, in the ocean.  
Thence I extend o'er all existing creatures, and  
touch even yonder heaven with my forehead.*

*I breathe a strong breath like the wind and the  
tempest, the while I hold together all existence.  
Beyond this wide earth and beyond the heavens I  
have become so mighty in my grandeur.*



# Linseed Oil and the Telephone Directory

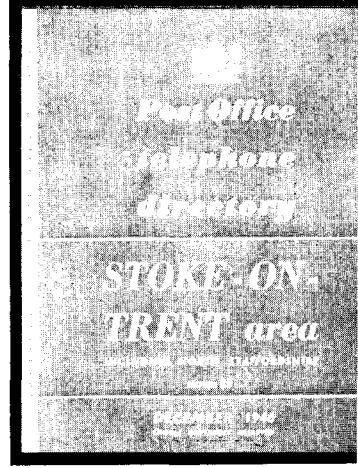
TELEPHONE SUBSCRIBERS APPEAR ALMOST WILFULLY TO REFRAIN from consulting the telephone directory. Their apparent indifference to it costs the Post Office tens of thousands of pounds every year. London "Directory Enquiry" receives far too many queries which subscribers could answer themselves by a glance into the directory. Calls are delayed and lines and operators' time are unfruitfully occupied by non-essential operations. Black blobs have appeared periodically on the cover exhorting subscribers to read the preface and the "How to Make a Call" instructions. These typographically frenzied appeals were supposed to make their way amidst a variety of strident and overcrowded advertising matter. Some slight improvement was achieved by substituting official for commercial advertisements on the front and back covers. Concurrently with this change the heading of the London telephone directory was given greater prominence. This was a stop-gap measure until a complete revision of the cover could be undertaken. These changes however made no great difference: the overcrowding remained. Subscribers still maintained their cold disdain.



CLEARLY THERE IS NO SINGLE OR QUICK SOLUTION TO THIS PROBLEM OF making the subscriber more directory-conscious. But both good taste and expediency seemed to indicate a new approach to the question of its appearance. Could it be made less confused, less repellent? Obviously, the first step was a drastic simplification of detail. Could it be made continually attractive by the use of a changing sequence of bright colours? The real change, from the point of view of printing, was that the ink should produce the colours and not the paper. This scheme, promising in its beginning, was not to be realised. Linseed oil—an important ingredient of printing ink—is an import; so that on a job of such huge dimensions, it must be used frugally. The Post Office has therefore had to postpone until a better day its schemes of rich background colourings with white lettering in favour of dark printing of the lettering in colour on a pale tinted paper background. The richness of the desired effect has been largely lost, though the simple architectural style has been maintained. The designer of the new covers is Mr. L. Beaumont, F.S.I.A., who worked with the Public Relations Department throughout the numerous editions. From the illustrations readers will be able to see at a glance the changes in style over the years.



Below: The ideal aimed at. White lettering, blue, maroon or brown



# ENGINEERING DEVELOPMENTS (1)

by **A. J. Gill**  
**Engineer-in-Chief**

*Mr. Gill's interesting article touches on the associated problems of developments in the telephone receiver, land and submarine cables, and radio links. A further article, with equally interesting features, will appear in our February issue.*

ANY ATTEMPT TO FORECAST FUTURE ENGINEERING developments is liable to err through the impossibility of taking account of new discoveries or inventions. It is of course true that many discoveries and inventions arise directly from research and these can to some extent be anticipated. But many more arise fortuitously often as a result of research or experiment undertaken with a totally different object in view. It is these that upset all our calculations. In fact, at times the scientist is impeded by his own knowledge. It has been amusingly, but truthfully, stated that in 1900 scientists knew it was impossible to signal across the Atlantic by wireless and therefore none attempted to do so. Marconi on the other hand was so ignorant that he didn't realise it was impossible and went and did it. In endeavouring therefore to give some picture of what is likely to happen in the future it is necessary to point out that due allowance must be made for the unexpected. This should not deter us from looking ahead. Short term predictions are not likely to be upset because it always takes time to introduce new inventions, however important, into effective operation, since normally full utilisation would involve replacement of a large amount of existing plant still capable of giving useful service. Also, a period of development is generally required before a new discovery or invention can be brought to the stage where it can be incorporated in equipment manufactured under factory conditions. The three electrode thermionic valve is a typical example—it was patented in 1907 but a reliable mass produced article was not available until about 1916.

### *Sunk Capital—Cables*

In deciding how best to employ our limited resources for research into the development of new methods and devices, there is naturally a tendency to concentrate on those items likely to yield greatest financial benefits. In telephony a very large part of the invested capital is in the ground in the form of cables. By far the largest

part consists of local cables connecting subscribers to exchanges. It is rarely practicable to obtain full usage of these because it is impossible to foresee exactly where the demand for service will arise. Any means for increasing appreciably the utilisation of such cables will yield good dividends. Recently the Engineering Department has introduced new methods of local distribution, including facilities in street cabinets, to enable circuit changes to be made easily. This should ultimately effect considerable economies in the provision of local cables with corresponding savings in cost.

All local and junction cables consist of copper wires separated from one another by dry paper wrappings and the whole enclosed in a lead sheath or pipe. As long as the lead sheath remains intact the cable is satisfactory; but the slightest puncture in the sheath permits the ingress of water or air (which contains water vapour). The moisture is rapidly absorbed by the paper wrappings which then cease to behave as insulators and the cable fails. The lead sheath is very susceptible to mechanical damage and to electrolytic and chemical corrosion. Large sums are spent annually by the Post Office in cable replacements and repairs due to these defects. Experiments with the use of a new plastic material to replace lead or paper or both are in progress.

Cable costs could also be reduced by improving the efficiency of the subscribers instruments. This would enable us to tolerate greater losses in the cable and permit the use of smaller wires.

### *The Carbon Microphone*

The carbon microphone, in world-wide use for ordinary telephony, is somewhat crude in its operation. It has been the subject of much research since its introduction very early in the history of telephony and progressive improvement has been made. The microphone is still, however, responsible for much of the distortion in telephone speech and must probably remain so while this type is used. Radio broadcasting and high-

quality sound reproduction may have made the public more aware of the better quality that can be obtained with other types. The electrical output of the carbon microphone is, however, much greater than that of any other type and it could not be replaced by one of these without the introduction of an amplifier at the subscribers' premises. Hitherto this would have increased the cost and complexity of the apparatus individual to each subscriber and would have been an obstacle to providing an extended service of adequate quality at a low cost. Recent developments however suggest that it may be practicable in the future to provide such amplifiers. Considerable improvement has recently been made in the telephone receivers used by the Post Office and current research indicates that some further improvement is possible.

The research work at present being done at the Post Office Research Station at Dollis Hill on the improvement of subscribers' instruments is to enable us to set up new specifications for improved performance, which will be made known to manufacturers as a guide to new designs. Much work is also being done to obtain a more accurate knowledge of the performance of the complete telephone instrument under working conditions. As mentioned above the results of this work can make possible great savings in capital expenditure as they enable considerable economies to be made in the size of cables connecting subscribers to their local exchanges.

### *Coaxial Cable Developments*

Developments during the period between the two world wars resulted first in the application of valve repeaters to the trunk lines. These developments produced enormous savings in the amount of copper required and thus enabled much larger numbers of lines to be accommodated in cables. This was soon followed by the adoption of wired wireless or carrier systems in which one pair of wires was made to carry a group of 12 separate and simultaneous telephone conversations. Later it was found possible to transmit still larger numbers of channels over coaxial lines. Each pair of conductors in these lines takes the form of a tube enclosing a central wire. In both the 12-channel wire systems and the coaxial tube system, the speech information is impressed on radio-frequency carrier waves. Because of the rapid weakening of these very high frequencies with distance, both systems depend on amplification by valve repeaters at intervals of a few miles along

the route. Generally, the speech channels for the two directions of transmission are provided by separate tubes, or pairs of wires.

It seems likely that coaxial cables will satisfy our requirements for large groups of circuits on main trunk routes for many years. A coaxial tube, 0.375 inch in diameter with repeaters every six miles, can provide 660 telephone channels. The latest type of cable with one inch diameter tubes, at present being laid for conveying television programmes between London and Birmingham, should be capable, if used for telephony, of providing 5,000 telephone channels in one direction on each tube. The applications of this cable for telephony have not yet been explored.

### *Wave Guides and Radio Links*

Looking further ahead, it is possible that on routes where very great numbers of circuits are required, coaxial cables may be ultimately replaced, or supplemented, by wave-guides. The wave-guide is a hollow tube down which radio-frequency waves are propagated but, in order to make this possible, these must have a frequency of several thousand megacycles per second, i.e. the waves must be very short, of the order of an inch or less and approaching heat waves. Such frequencies have already been used, for instance, in very short-wave radar and radio telephone sets, where wave-guides have served to connect signal generating equipment with the aerial.

With the present trend of prices, however, a large part of the cost of a new cable route is that of excavating the trench and laying the cable ducts, so that attention is increasingly being given to the possibility of omitting the cable altogether, and of using a narrow beam of radio waves transmitted in free space between highly directive sending and receiving aerials. These have to be almost in sight of one another so that a practical system consists of a number of "hops" from 10 to 40 miles in length, depending on the geographical features of the country traversed. This country has already more services of this kind in use than anywhere else in the world, but they have been used in all cases as an alternative to submarine cables between mainland and islands, or between islands, and usually only one or two links have been employed in tandem.

The next step will be to use this system as an alternative to the land trunk cable. A start in this direction has been the placing of a contract with the General Electric Company for a chain of radio links between London and Birmingham. This



## THE ATLANTIC CITY CONVENTION IN RETROSPECT

Mr. L. V. Lewis is a member of the Telegraph Branch, Overseas Telecommunications Department, Headquarters.

### I THE CONFERENCES

ON 2ND OCTOBER, 1947, THERE WERE SIGNED at Atlantic City, New Jersey, an International Telecommunication Convention and International Radio Regulations to replace the Madrid Convention of 1932 and the Radiocommunication Regulations of 1938. The signature brought to a close a Radio Conference and a Plenipotentiary Conference which had opened on 15th May and 2nd July respectively. Our hosts, whose industry and organizing genius have done great things, had hoped that the Radio Conference would finish in six weeks, leaving the field free for the Plenipotentiary Conference which might revise the Convention in four weeks. Some other countries, perhaps more war-weary and less euphoric than our hosts, doubted whether the time was ripe to revise the Convention. But in the event a workmanlike job was done by unrelenting effort in the hot and humid summer of the New Jersey holiday resort.

The Convention of Atlantic City is the legitimate successor of the Madrid Convention which in turn replaced separate Telegraph and Radiotelegraph Conventions of which the first was the Paris Telegraph Convention of 1865.

The new Convention does not enter formally into force until 1st January, 1949, but it was decided to make certain important provisions effective as from 1948. There has therefore been some practical test of it and these jottings attempt a preliminary evaluation of some of the new features.

### II MEMBERSHIP AND VOTING

The effectiveness of international telecommunication depends upon close co-operation among the maximum number of countries. It would be perfectly practicable to travel round the world by

by L. V. LEWIS

various means of transport, changing at frontiers or ports and paying for each lap separately in the national currency. An international telegraph service on these lines would not be worthy of the name; a telephone service would be impossible. Radio has no cognizance of political frontiers since an emission for internal purposes may cause interference in another country. Since good international telecommunication depends upon a world-wide organization in which all must accept standards and obligations, the Telecommunication Union has tended to be an association of countries for practical ends without a very clear test for membership. Decisions have, for the most part, been reached on merits rather than by voting, in the knowledge that a country may reserve on a provision which is not acceptable to it and on which it has been outvoted. This idea was aptly expressed at the Vienna Congress of the Universal Postal Union of 1891 when it was declared that "les voix se pèsent plutôt qu'elles ne se comptent." Voting is, however, necessary at telecommunication conferences. In effect, any territory which could obtain access to a diplomatic channel could be party to the Madrid Convention, but each Conference drew up its own voting list: this gave rise to long discussions of a quasi-political character and certain territories and groups of territories, not generally recognized as sovereign states, were accustomed to vote. An attempt was made at Atlantic City to settle this question by confining membership of the Union to Members of the United Nations and other generally recognized sovereign states, and by granting Associate Membership to other territories which applied for it. Each Member would have a single vote. Associate Members would take part without vote. This

plan was adopted by the Conference with the important exception that certain non-self-governing territories or groups of territories which had exercised a vote at previous Conferences were given the status of Member, and secondly that Associate Membership was made conditional upon approval by a majority of Members.

It is too early to see how far the new Convention will solve the problem of membership and voting. Serious difficulty can hardly arise at world conferences of the Union but unfortunately the Conference did not accept a proposal that the Rules of Procedure should apply also to regional conferences. The recent European Broadcasting Conference of Copenhagen, where the whole question of representation and voting was discussed afresh, is not a fair criterion, chiefly because it was held in the difficult transition period between the Madrid and Atlantic City régimes. The test will come at the Telegraph and Telephone Conference at Paris in 1949 when it may be possible to judge whether the next Conference empowered to revise the Convention will be urged to amend the Atlantic City provisions on membership and voting.

Rumination on the Convention since it was signed gives little cause to doubt the wisdom of these provisions apart from the retention of votes by some non-sovereign states and the lack of precise directions to regional conferences. As a result of the former decision, the British colonial "ensemble" retains the vote which it exercised in the past. This gives rise to some anomaly, since territories or groups of territories of the ensemble which are granted Associate Membership will lose participation in the general colonial vote. But they will have the advantage of sending their own delegations to conferences and of corresponding direct with the General Secretariat of the Union instead of through the United Kingdom Post Office.

Recent experience suggests that we have not heard the last of voting by two-thirds majority. This was discussed at Atlantic City and it was decided that the rule of simple majority should prevail. There is something to be said for the Soviet view that decisions should be reached by unanimous agreement, although this is probably a survival of the tribal theory of government by acclamation. But in practice it is ultra-conservative since it makes it possible for a minority to exercise a sort of veto.

**III RELATIONS WITH THE UNITED NATIONS**  
Under Clause 57 of the Charter, specialised

agencies\* are required to negotiate agreements with the United Nations. The agencies fall into two broad classes. Some, like the International Telecommunication Union and the Universal Postal Union, regulate and co-ordinate specialised international activities, while others actually provide services. For the former class, and particularly for long-established agencies which have a record of excellent practical achievement, a large measure of autonomy is desirable. Such measure was provided by the agreement which was negotiated at Lake Success while the Atlantic City Conferences were in session, and there is reason to believe that the agreement will be to the advantage of both parties. Meanwhile machinery for liaison with the United Nations and with other specialised Agencies remains to be perfected.

The general effect of the Agreement is to quicken the political consciousness of the Union, but the long term result may be to make it freer to pursue its technical work, untrammelled by political questions.

The Agreement left the Union free to make its own membership rules on the understanding that the Resolution of the General Assembly of 12th December, 1946, on relations with Franco Spain was observed. So far the position of Spain has not given rise to practical difficulty.

### IV THE ADMINISTRATIVE COUNCIL

Formerly the Bureau of the Union at Berne, now the General Secretariat at Geneva, was the only body of full time officials serving the Union as a whole.

Before Atlantic City, some suggested that, apart from the secretarial activities of the Bureau, the Union was dormant between Conferences and that the remedy lay in creation of a Board of permanent officials with general executive powers complemented by subsidiary Boards with similar powers in specialised fields. The Atlantic City Conferences agreed that there was some case for strengthening the structure of the Union and that as a Specialised Agency of United Nations, the supervision of the Secretariat, although performed with consistent excellence by the Swiss Confederation since the inception of the Union, should pass to an organ of the Union. A middle course between the status quo and the establishment of a full-time Board was taken by election of an Administrative Council of eighteen Member

\* Specialised agencies are "established by inter-governmental agreement" and have "wide international responsibilities . . . in social, cultural, educational, health, and related fields."

countries, each of which would appoint an official, highly qualified in telecommunication, to serve on it. The Council would normally meet once a year and would function provisionally before the formal entry into force of the Convention. It was expected that the Council would have much to do in the transition period between the Madrid and Atlantic City régimes, and it has already met twice at Geneva this year. It is not too soon to assert that the periodical meeting of a body of officials of international repute, responsible to their Governments which, in turn, are responsible for promoting the interests of the Union as a whole, will fully justify the hopes of Atlantic City. The absence of the representative of the Soviet Union from the first session of 1948 seemed an unfavourable portent. Misgiving was, however, allayed at the September session where a Soviet representative was present and collaborative. The failure of the International Telegraph Consultative Committee to implement the recommendation of the Council to elect a Director of its Plenary Assembly in May last was unfortunate, but, as suggested below the fault lay with the Committee rather than with the Council and there is no reason to believe that this incident augurs unfavourably for the future of the Council.

#### V THE INTERNATIONAL FREQUENCY REGISTRATION BOARD (I.F.R.B.)

If the suggestion that the Union was dormant between Conferences was unfounded, it was true that the procedure for appropriation and recording of frequencies needed elaboration. The I.F.R.B. was set up at Atlantic City to meet this need, but before it can begin its duties the preliminary task of the Provisional Frequency Board (P.F.B.) of revising the International List of Frequencies must be completed. The P.F.B. has encountered difficulty because a minority have questioned the wisdom of the technical directives of the Radio Conference and have declined to furnish data in respect of their countries. This question is outside the scope of the present article but it must be noted that the Administrative Council, at its meeting in September, was unanimous in paying tribute to the industry and conscientiousness of the P.F.B. and that a majority in the Council believed that the Board had good prospect of success in following the Atlantic City directives although its task would take longer than first expected. It is too early to express an opinion on the future of the I.F.R.B. It is very properly conscious of its special position as a body of men renouncing

national obligations in the interest of the common weal in a highly important technical field. There are bound to be difficulties and the experiment is one which deserves the sympathy and support of all men of good will.

#### VI THE CONSULTATIVE COMMITTEES

Three International Consultative Committees deal respectively with telegraphy (the C.C.I.T.), telephony (the C.C.I.F.) and radio (the C.C.I.R.). The C.C.I.F. was unique in that it had its own full-time Secretary General, assisted by a small specialised secretariat with headquarters at Paris. The C.C.I.T. and C.C.I.R. had no full-time officials specifically allocated to them and depended upon the common secretarial services of the Bureau of the Union. Experience showed that the C.C.I.F. enjoyed an advantage in having a full time Secretary General, and it was decided at Atlantic City to organise the C.C.I.T. and the C.C.I.R. on the C.C.I.F. model. In particular it was decided that the Plenary Assembly of each Committee should elect a Director and that all three should have their headquarters at the new seat of the Union at Geneva. The C.C.I.R. should also elect a Vice-Director for broadcasting.

The new régime has not opened very auspiciously for the C.C.I.T. The Administrative Council recommended that the Plenary Assembly of the C.C.I.T. at Brussels in May should elect a Director to take office from 1st of January, 1949. All Members of the Union become, under the new Convention, members by right of all C.C.I.'s although they need not, unless they choose, take part in the work. At Brussels it was questioned whether the countries represented, amounting to about a third of the membership of the Union, would be justified in holding the election and it was decided to refer back to the Administrative Council. At its meeting in September the Council recommended a procedure which should prove satisfactory and enable a Director to be elected.

The C.C.I.T. was also unfortunate with its first major tariff study, a scheme for a world maximum rate on the broad lines of the U.S.-Commonwealth Agreement signed at Bermuda in 1945. But the failure must be attributed to deterioration in the world monetary situation since studies began in 1946 and to other factors; it does not point to any unsuitability of the C.C.I.T. for studying tariff problems.

It remains to be seen how far the C.C.I.T., and more particularly of the C.C.I.F., which have been predominantly European in the past, will

change their character because they become, under the new régime, what are in effect "Committees of the Whole House." The C.C.I.R. has always enjoyed the participation of members of extra-European countries, and the 1948 meeting at Stockholm, at which a Director and Vice-Director were elected, was generally satisfactory. There are indications that the C.C.I.T. and the C.C.I.F. will tend to do much work formerly done by Administrative Conferences, so restricting the main tasks of the latter to consolidation of the C.C.I. recommendations in the Regulations.

#### VII LANGUAGES

Under the Madrid Convention debates were in English and French but all documents were in French. Atlantic City decided that there should be five "official" languages—Chinese, English, French, Russian and Spanish—for formal Acts, etc., with three "working" languages, English, French and Spanish for debates and conference documents. So far, thanks to an admirable spirit of collaboration on the part of the Spanish speaking countries, practical experience has been largely limited to two languages for Conference documents. Thanks also to the similar spirit displayed by the United States of America, fears that differences of American usage and spelling would cause difficulty with documents in English have proved groundless, the United States having willingly acquiesced in most Old World standards. But the preparation of parallel texts in English and French alone has proved difficult. There has been ample experience to show that preparation of documents in more than one language retards work and, to put it no higher, entails sacrifice of conciseness and idiom to uniformity. Further, the cost of the linguistic service necessary to implement the Atlantic City decision is a source of grave concern; it exceeds the cost of all the other expansions. But it is not easy to measure, in terms of cash, the value of the new arrangements in so far as they enable eminent technicians and scientists—some of whom are not very familiar with French to take an active part in the work. It will hardly be denied, however, that the language decisions derived from political as well as from utilitarian considerations. There is another consequence which should not be overlooked. In the past the French texts were regarded as almost liturgical, and were not disturbed unless absolutely necessary. Points of interpretation were put in minutes of meetings and there was seldom doubt as to the precise

meaning of a text. But it was decided not to print minutes of Atlantic City committees because of the labour and expense of publication in three languages. Hence the paradox that whereas there was formerly full committee documentation in one language, now there is none in three languages! The result may be that the texts of one Conference will be argued over again at the next, and that there will be a tendency for each Conference to disregard what has gone before and start afresh. Few can fail to be concerned at this prospect although all may not share the dismay of delegates of the old school.

The simultaneous interpretation system enables three or more languages to be spoken without the delays inherent in the "consecutive" system, but delegates must master a special technique for speaking before the system can be fully effective.

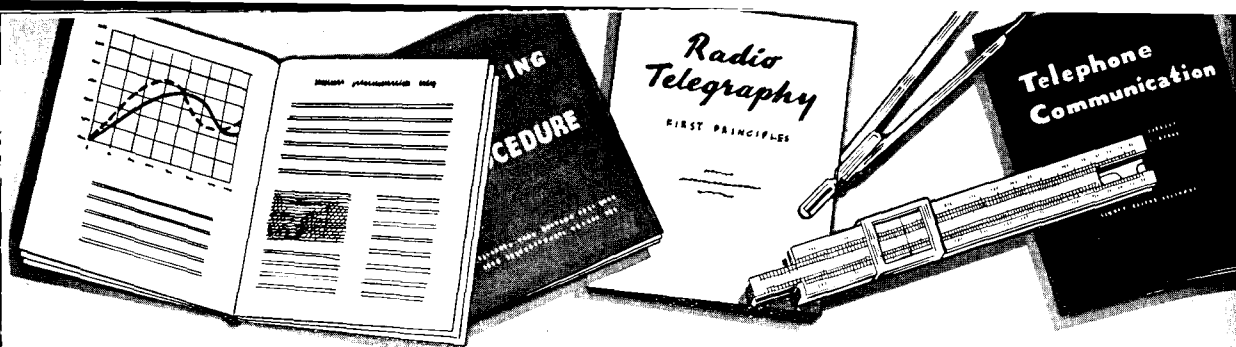
#### VIII REGULATIONS

The Convention is completed by Telegraph, Telephone and Radio Regulations. Parties to Madrid were not obliged to accept more than one only of these sets of Regulations and for good reasons the United States and Canada, in particular, did not sign the Telegraph or Telephone Regulations. In the opinion of the majority this was a source of weakness in the Union. It was also responsible for a tendency to regard the Union as essentially a radio organisation and to impute to the Union as a whole certain shortcomings which in fact derived mainly from the inadequacy of the frequency registration machinery.

One of the reforms introduced by Atlantic City was a provision that all parties should accept all sets of Regulations. Certain countries made reservations on this but there is evidence of a serious attempt to implement the decision in a spirit of mutual understanding. A special committee will meet in January 1949 to consider how the Telegraph and Telephone Regulations might be modified to meet the difficulties of countries which have not hitherto signed them.

#### IX MONETARY UNIT

The Conference retained the "gold franc" as the monetary unit for the tariff and international accounts. This is a highly controversial matter with philosophical implications which are hardly suitable for discussion in conference or in official papers. The present Journal will fill a need if it can provide space at some time for speculation on such implications of this and other official problems.



## BOOK REVIEW

**H**EAVILY DOCUMENTED (A FEATURE JOYCE'S classic lacks), less stodgy than Hemmeon's, Mr. Robinson's book\* shows what can be done with available material, because he seems to have used only published sources.

The word "Posts" meant originally relays of horses established at various points for the use of couriers, and from the creation of the "Master of the Posts"—probably in 1516, some sort of post service was established. Tuke refers in 1535 to the fact that "there are always ordinary posts between London and Dover." In 1533 we find Tuke defending himself against charges of slow posts and saying that he has suggested that a sender should write "on the back of his paquettes the hour and the day of the depeche . . . but it is seldom observed."

By the end of the XVI century there were regular post roads and our author includes a map of them. Cecil received a complaint in 1569 that the posts between London and York "never come nor go under three days."

With the appointment of Witherings as Postmaster-General for Foreign Parts (in 1633) a new era began. At this time the Postmasters suffered from arrears of pay generally for six or seven years. During the Civil Wars the Post Office was "bandied about" and the history of this period is a record of quarrels between appointees of the King, the Lords and the Commons, culminating in the "farming" of the Posts to John Manley (1653). After the Restoration the foundations of a better service were laid, and we have an elaborate survey of the roads by John Ogilby, specimens of which are reproduced.

The first penny post (Dockwra) and the later reforms of Ralph Allen are adequately treated.

From the introduction of the mail coach by Palmer (1784) to the advent of Francis Freeling, the internal organisation was bad, and the picture given is not exaggerated. The changes following

upon public agitation included the establishment of uniform penny postage, and the work of the reformers, chief of whom was Robert Wallace, was carried to fruition by Rowland Hill, who was given and will retain the proud title of "the founder of penny postage." I know of no better history of this reform than Mr. Robinson's. The introduction of uniform postage and the adhesive stamp outside the British Isles is very appropriately entitled "The flattery of imitation."

It was in the 1880's that another figure in postal reform emerged. Henniker Heaton devoted himself to the idea of an Imperial Penny Post, but it was not until 1911 that it was realised.

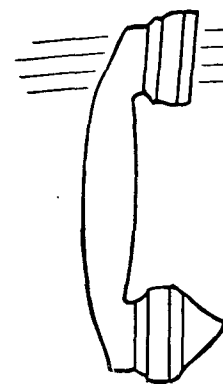
In the latter years of the XIX century the Post Office expanded in many ways. The Savings Bank, improved Money Order Service, postal orders and the parcel post were introduced, and in 1869 the Post Office acquired the exclusive right to operate the telegraph service. In 1896 it took over the trunk lines of the telephone service. In 1912 the Post Office bought out the National Telephone Company and became, with the exception of Hull and the Channel Islands, the owners of the telephone system.

The closing chapter describes the "idea of using the Post Office frankly as a taxing machine," a policy which culminated in the Bridgeman Committee (1932) and the introduction of their recommendations. But it gives, also, the progress made in the improvement of old and the introduction of new services. Ship and shore radio, the Post Office Underground Railway and Air Posts are cases in point.

The book is well illustrated and there is a good bibliography. The index could be improved but this is a minor blemish.

T. L. DRURY, *Post Office Librarian.*

\* *THE BRITISH POST OFFICE: A HISTORY*, by HOWARD ROBINSON, Princetown University Press, 57/50.



## NOTES AND NEWS

*International Conferences - Exhausted Telephone Exchanges - Industrial Output - Equipment Programme - Morse Telegraphy - Cardinal Sins in Business - Treasury Film on the use of the Telephone - Scrap - etc., etc.*

**International Conferences.** Telecommunications has had its full share this year of international conferences. The first, the International Telegraph Consultative Committee, took place in Brussels from May 2 to 29. The United Kingdom delegation was headed by Mr. H. Townshend with four representatives of the Overseas Telecommunications Department, five representatives of the Engineering Department and two representatives of Cable and Wireless Limited. Good progress was made on the technical side; although on the administrative side progress was less encouraging, arrangements were made for working out a statistical basis for a European network based on through switching.

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The second conference, the International Telephone Consultative Committee, took place in Stockholm from June 7 to 22. Mr. D. C. H. Abbot led the party with four representatives of the Overseas Telecommunications Department and six of the Engineering Department. It was decided not to introduce a cheap night rate for the present but a reduction in line charges was recommended which may pave the way for a reduction of rates in the European system. It was also arranged to start trials of "operator-dialling" between several European centres, including London.

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The third conference, the International Radio Consultative Committee, also took place in Stockholm from July 12 to 31. The United Kingdom delegation was headed by Captain C. F. Booth of the Engineering Department. Besides re-starting

its normal technical work so long interrupted by the war, the meeting had to put into effect an important re-organization of the Committee approved by the International Telecommunication Union last year, by appointing two new permanent international officials, a Director and a Vice-Director, the latter to specialize in the technical problems of broadcasting. A distinguished Dutch scientist, Professor van der Pol, was elected Director and Mr. L. W. Hayes of the B.B.C. who is very well known in international telecommunication circles, was elected to the Vice-Directorship.

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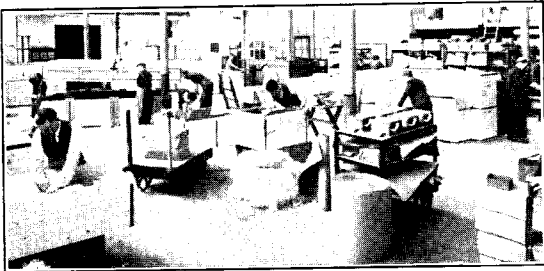
The fourth conference began at Copenhagen on June 25. Its task was to allot long and medium wavelengths to broadcasting stations in the European area, including the Mediterranean and North Africa, and to conclude a European Broadcasting Convention. After more than six weeks work, the Conference was transferred to Elsinore and ended on September 15. The United Kingdom delegation was led by Mr. H. Faulkner, Deputy Engineer-in-Chief, and included representatives of the Overseas Telecommunications Department and the Engineering Department, together with those of other Government Departments and the B.B.C. The present use of wavelengths rests on an agreement made in 1933 and the new plan was urgently required. The extent of the domestic broadcasting which each country can undertake depends, of course, on wavelengths; they are inadequate in number, and their international allocation presented both technical and diplomatic difficulties which needed time, skill and goodwill to unravel.

The Conference was notably successful. Mr. Faulkner also headed the United Kingdom delegation to the European Regional Maritime Radiocommunication Conference at Copenhagen and Elsinore which ran concurrently with the broadcast wavelength conference.

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**Exhausted Telephone Exchanges.** Throughout the country one Post Office telephone exchange in four is exhausted. There is no spare equipment. In many cases even if the Post Office had the equipment there is no space in which to instal it. The total number of outstanding telephone applications for direct lines at the end of August was approximately 462,000. At the beginning of the year, the number was 433,000. There is an intimate connection between the "waiting list," the restriction of supplies and the export drive. Telephone manufacturers have already increased their exports considerably. The average level of £400,000 per month during most of 1946 has now risen to over £900,000 per month. This rate of increase is roughly equal to the rate achieved nationally in the total of all exports.

The exports of telephone underground cable for which the average monthly value was £200,000 in 1946 increased to £690,000 in April, 1948.



Packing equipment for export at Ericsson's factory







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**Scrap.** During 1947 the Post Office sold scrap stores to the value of £1,128,000. This saving to the public resulted from careful salvage of every type of material no longer fit for service. Condemned telephone and telegraph cables, wires and instruments were broken down and the component metals separated for bulk disposal. More than 9,000 tons of scrap lead and 1,700 tons of scrap copper were recovered and sold. Discarded uniform clothing, boots and shoes and rags realised £16,900; waste paper fetched £29,600, and miscellaneous scrap brought in £120,000.

**Industrial Output.**—That the Government attaches supreme importance to the idea of co-operation in industry is demonstrated by the issue of an official factory news-sheet *Target*, a monthly bulletin on production publicity. Printed by rotary-gravure in four colours, the news-sheet in current conditions is a courageous venture. In our view, this is, in embryo, the coloured newspaper of the future. An open letter from the Chancellor of the Exchequer to Managing Directors stresses the point that *Target* does not tell them how the Government thinks collaboration should be done but how some firms are doing it.



It emphasizes the importance of firms working out their own ideas, using local resources and enthusiasts in the works to carry them out. Its columns provide a clearing house for a variety of schemes on joint production effort which have been successfully introduced. These features are supplemented by facts pictorially displayed bearing on the national export position. A good deal can be said in favour of letting such facts speak for themselves. One of Dunlop's efforts is reproduced below.

ONE OF THESE ITEMS SENT ABROAD	PROVIDES THE FOREIGN CURRENCY NECESSARY TO PURCHASE ONE OF THESE UNITS OF FOOD			
	EGGS	LOAVES	MEATS	BUTTER
 RHS COVER	46 doz	463	135 lbs	77 lbs
 RUBBER BOOTS	6 doz	63	18 lbs	10 lbs
 CYCLE COVER	13	11	3 1/2 lbs	2 lbs
 GOLF BALL	11	9	3 lbs	1 1/2 lbs
 HOT WATER BOTTLE	13	10	3 1/2 lbs	3 lbs
 1 FOOT CONVEYOR BELT	4 1/2 doz	45	13 lbs	7 1/2 lbs


**YOUR WORK BUYS FOOD—STEP IT UP!**

**Post Office Contribution to Output.**

## ACHIEVEMENT

A MILLION AND A HALF NEW TELEPHONES HAVE BEEN FITTED SINCE THE END OF THE WAR

TO KEEP UP THIS RATE OF CONNECTION THE POST OFFICE WOULD NEED MORE EXCHANGES MORE EQUIPMENT MORE CABLES AND MORE TELEPHONES — BUT SUPPLIES OF ALL THESE ARE NEEDED FOR THE EXPORT DRIVE



THAT IS WHY THE POST OFFICE MAY NOT BE ABLE TO SUPPLY YOUR NEW TELEPHONE FOR SOME TIME

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**1948-1949 Equipment Programme.** The value of orders authorised for automatic exchange equipment during September, £460,280, makes a total for the current programme of £1,778,030. Orders for transmission equipment authorised for issue to contractors during October amounted to £120,810, making a total during the year of £610,330. During September authority was also given for 20 main trunk cable schemes to the value of £265,605, making an accumulative total for the year of £1,890,792.

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**Morse Telegraphy.** By an agreement entered into in 1890 between the then Postmaster General and the Great Northern Railway Company (Ireland) the Post Office provided, free of charge, morse telegraphists at ten railway telegraph offices for the purpose of dealing with railway telegrams over a railway telegraph system provided and maintained by the Post Office. In 1890, the value of a telegraphist's services for ten hours a day on six days a week was assessed at £40 a year.

The onus of providing sufficient staff qualified in morse operating at each of the offices concerned has borne heavily on the Post Office for some time. The arrangement was expensive and wasteful of staffing as the traffic at a number of places was very small. Last year a modification of the agreement was negotiated with the Railway Company. As a

result the railway telegraph system ceased to exist in all but one of the telegraph offices in Northern Ireland; railway telegrams were telephoned to and from the local Post Offices, and this traffic was dealt with over the public telegraph system. The change took place on October 1, 1947, and the scheme has worked very well.

The Great Northern Railway system is situated partly in Northern Ireland and partly in Eire, and morse working was retained on the latter portion. It was necessary, as an exceptional arrangement, to retain the telegraph office at the Belfast Great Northern Railway station and to continue to operate two morse circuits between that office and stations in Eire; but negotiations are now in progress with the object of transferring the work to a teleprinter circuit. If these are successful, morse working will become a thing of the past in Northern Ireland.

The last public morse circuit discontinued was in Northern Ireland no longer ago than June of this year. The circuit was one connecting Malin Head Wireless Station with Belfast and it has now been converted to teleprinter working. This was the last working public morse circuit in the United Kingdom.

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**Cardinal Sins in Business.**—Ten ways in which a "boss" most frequently may antagonise people who work for him are indicated by an observant employee in an article written in an American publication, *Nation's Business*.

- (1) first comes the fault of being too miserly with praise.
- (2) the strong inclination of employers to reserve credit for themselves.
- (3) the failure to unbend.
- (4) lack of regard for employees' self-esteem.
- (5) playing company politics.
- (6) judging employees hastily.
- (7) resentment towards candour by subordinates.
- (8) permitting personal feeling to enter into appraisals of employees.
- (9) being jealous of employees' outside interests.
- (10) breaking the chain of responsibility.

No. 5 is defined as discussing the merits of one employee to another and No. 9 as the commonest and least rational. No. 7 is aimed at the "yes" man. One "boss" was so sensitive that his men soon learned that the only way to live with him was to "yes" him assiduously and they "yessed" the business to death. (*Magazine Digest*).

# Letters to the Editor

Dear Sir,

Welcome to the *Post Office Telecommunications Journal*, the need for which has been felt ever since the regretted demise of the old *Telegraph and Telephone Journal*. What are we going to make of the new journal? In my view its general scope should aim at something between the highly technical *I.P.O.E. Journal* and the somewhat discursive *Post Office Magazine*; in fact, the old *T. and T. Journal* would provide an admirable model for the new venture provided that its scope is wider and it becomes attractive, not only to Traffic staff, but to the rank and file Engineers, the Sales and Chief Clerks divisions and to members of the Telegraph staffs of Head Post Offices.

Occasionally, detailed and specialised articles of matters of particular interest should, undoubtedly, be welcomed, but the general mass of the contributions should be capable of being read with interest and without undue strain by any member of the Telecommunications staff. The aim should be to give a broader knowledge of the service which exists at present and somewhat fuller details of noteworthy experiments and new developments. Controversial questions on such matters as, for example, why are our telephone buildings usually found inadequate after only a few years' life in spite of being designed for a theoretical 20-year period, should be welcomed and the subject matter should not be subject to editorial treatment. The usual editorial disclaimer regarding responsibility

for any such article could be added.

I visualise composite articles on such mundane subjects as the treatment, from start to finish, of an application for a telephone. A representative from each of the Sales, Engineering, Chief Clerk and perhaps Traffic divisions could quite well cooperate in producing a readable article on this subject, which would certainly enlighten the average member of the Telecommunications staff. Another subject capable of similar treatment is the history of a fault report by a subscriber, including not only the reporting and actual clearance of the fault, but such associated matters as fault returns and statistics and treatment of recurring faults.

There seems to be a crying need for simple expositions of Engineering aspects of the work on the lines of the technical explanations given in the *Civil Service Motoring Association Magazine* on the working of a motor car. Exposition of principles and avoidance of circuit details and technical jargon are the prime essentials.

The allocation of a page for questions and answers on day-to-day matters on any subject in Telecommunications should prove popular. Good luck to the new venture.

Yours faithfully,

North Eastern Region.

R. F. BRADBURN

*(Letters on subjects of general interest would be welcomed. They should be as brief as possible).*

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