

Post Office Telecommunications Journal

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Telephone Service Today

THE IMPROVED PERSONAL CALL SERVICE, INTRODUCED throughout the United Kingdom on May 1, is one example of the efforts made by the Post Office during the past few years to improve the telephone service as well as to extend it. The new system abolishes the previous limits on the number of attempts made to set up a personal call for the one fee and also makes provision in suitable cases for the called number to ring through to the originating exchange, without charge, as soon as the required person is available. This improvement should minimise delay on personal calls not completed at the first attempt and give a better service than before the war.

In other directions also, progress continues. Seven out of ten subscribers are now on automatic exchanges, compared with only five before the war. The service given to the public in terms of time to answer, percentage of calls effective and so on, is better than in 1938 and technical improvements being introduced should ensure that this trend continues. For example, prototype equipment incorporating a call-queueing feature is associated with the Directory Enquiry suite in the new Southampton Telephone exchange opened by the Postmaster General on April 3. This will ensure that Directory Enquiry calls will be answered in sequence and long delays eliminated. Similar equipment will be installed in other exchanges as opportunity offers.

Our main problem, however, continues to be the extension of service to new subscribers. We are working hard to reduce the waiting list and keep up with the exceptionally heavy demand, but with over three million lines connected since the war—compared with only two million in the nine years before the war—and a reduction of 200,000 in the waiting list in the past five years, good progress has been achieved in spite of shortages of capital, materials and labour.

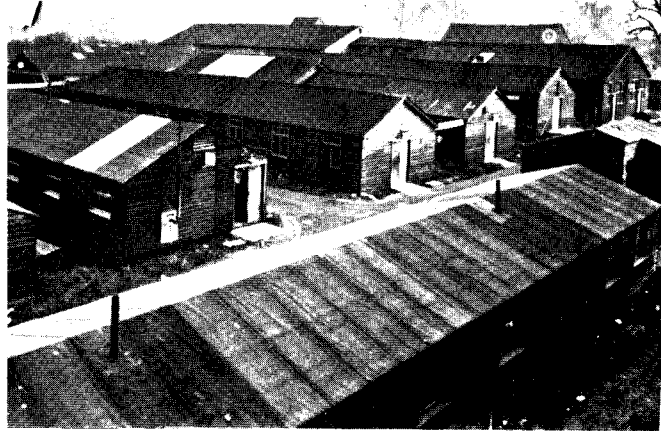


Fig. 1
Dollis Hill in 1922

ON THE SUMMIT OF DOLLIS HILL, ABOUT eight miles to the north west of Headquarters Building, and on a clear day commanding a fine view across London to the Surrey hills beyond, stand the modern brick-faced buildings of the Post Office Engineering Research Station. A total staff of close on a thousand is housed in its laboratories and offices. This thriving community at Dollis Hill is of comparatively recent growth, and it is interesting to trace the beginnings of research in the Post Office.

The earliest experimental work in connection with telegraphy and telephony in the Post Office is recorded to have taken place in 1878, but it was not until 1904 that one or two members of the Engineering Department were relieved of their executive duties to enable them to pursue investigations of a purely experimental nature. A room was allocated in the Central Telegraph Office, and some good work was done in those early days with very limited resources.

In 1909 the Research Section was given official recognition as a separate entity, and in 1912, when the Post Office took over the National Telephone Company, the Section was augmented by amalgamation with the Company's Investigation Department. Although additional laboratories in King Edward Street, London, E.C.1, had been provided to supplement the Central Telegraph Office accommodation it soon became evident that rehousing of the scattered groups of the Research Section was desirable.

The outbreak of war in 1914 delayed the proposals, and eventually it was decided to embark on a more ambitious research programme

The Post Office Research Station

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Engineer-in-Chief's
Office

and to build a permanent research station on a new site of eight acres which had been acquired at Dollis Hill. The sprawl of London did not then extend beyond Cricklewood, and Dollis Hill was a pleasant green hill surrounded by fields and farmland, leading down on the north side to the blue waters of the canal reservoir known as the Welsh Harp. This site was chosen mainly for the relative absence of noise and vibration from rail and road traffic—an important consideration in those days of dependence on sensitive mirror-type galvanometers for electrical measurements and of freedom from electrical interference from railways and tramways. This remoteness is perhaps not always appreciated by the unwary visitor who alights at Dollis Hill Bakerloo station, only to find himself faced with an uphill walk of a mile and a quarter!

The main group of research workers was installed on the site in 1921 in ex-army wooden huts (shown in Fig. 1), which were some years later replaced by permanent buildings of brick. In 1933 the main block of the present buildings shown in Fig. 2 was formally opened by the Prime Minister (the Right Hon. J. Ramsay MacDonald), and the transfer from the temporary huts to the permanent buildings was practically complete. Since the war a new block housing drawing office and well-equipped machine shops has been built, and the eight-acre site, with its 20-odd separate buildings, two 160-foot radio masts, car parks and natural pond, is fully used. During the war the adjoining farm site of 2½ acres was also acquired, and temporary buildings have now been erected on it.

In addition to the Research Branch, the Dollis Hill site also houses the Radio Experimental and Development Branch (WE). The two branches have separate laboratories, stores and workshops, but the whole staff of the station shares certain common facilities, notably the technical library and the refreshment club.

With the rapid expansion of London the rural serenity of Dollis Hill did not long survive. In the nineteen-thirties the new suburb of Neasden sprang up, and the fields leading down to the Welsh Harp gave place to rows of semi-detached houses. Part of the southern slope of the hill has been preserved as a public park, but the hedges, ditches and pot-holes of the old Dollis Hill Lane have gone for ever. Nevertheless, much of the original community spirit still persists, and this is reflected in the strength of the social and cultural organizations which pursue their activities outside official hours: the sailing club (which possesses two 15-foot "Wildcat" sailing dinghies on the Welsh Harp), the orchestra, and the drama group, to mention but a few.

Functions

The Post Office provides services for which normally it obtains the necessary plant and equipment from manufacturing companies. The development work which precedes the introduction of new types of equipment may therefore be done by the Post Office or by a manufacturing company; often the final product is the result of co-operation between the Post Office and a manufacturer. The Research Branch may be called upon to deal with problems arising at any stage of such work; it may, and often does, initiate development work and carry it through to the production of prototype models. It acts generally as adviser on telecommunication matters for which experimental or theoretical investigation (beyond the facilities available in other branches) is needed, and it keeps in close touch with new developments and ideas, both at home and abroad, which may have a useful application in this field.

Much of the work of the Research Branch arises from direct requests made by the other Post Office Headquarters branches, which are of course more directly concerned with the main-



Fig. 2
The main research building today

tenance and development of engineering plant; the request may arise from difficulties experienced with existing equipment, or in anticipation of new requirements.

Each new investigation is allotted a Research Case number which serves as a means of controlling and co-ordinating the work. All expenditure on labour, stores and materials is recorded under the case number, and finally the work is concluded and the case closed by the writing of a Research Report. If the subject matter is of sufficiently wide interest, as many as 200 copies of the report may be printed, and copies may be sent not only to branches of the Post Office Engineering Department but also to British Government research establishments and other organizations. Some reports may be published more widely by means of contributions by the officers concerned to technical journals, notably the *Journal of the Institution of Electrical Engineers* and the *Post Office Electrical Engineers' Journal*.

In addition, many investigations are originated by the Research Branch, such as the development of a new form of measuring technique or equipment, or research work of a more fundamental nature, aiming at extending the field of knowledge without specific reference to a particular requirement.

Organization

The Research Branch is staffed partly by engineers, on grades which are common throughout the Engineering Department (thus permitting the interchange of staff between the Research Branch and other sections of the Engineering Department), and partly by scientists on grades

which are common throughout the scientific Civil Service. The total staff in the Research Branch is about 770, of whom some 150 are qualified engineers or scientists.

The Branch has seven main divisions, each under the control of a Staff Engineer or a Senior Principal Scientific Officer. The scope of four of these divisions is mainly engineering, and covers electro-acoustics, long lines transmission, telegraphy, telephone switching and postal mechanization. The other three divisions are staffed by scientists, and cover basic electronics and thermionics, physics, chemistry, metallurgy and mathematical research.

The basic unit within the division is the "Research Group", consisting of a group-leader—generally a Senior Executive Engineer or a Principal Scientific Officer—with a small staff of perhaps three or four qualified engineers or scientists and a few technicians or assistants. Altogether there are about forty such groups in the Branch.

Common services

In addition to the research groups, other sections provide common services for the whole Branch. Of these the largest is the mechanical design and workshop section, occupying a large



Fig. 3
Mechanical designers at work on a prototype



Fig. 4
Taking a high-speed cine film of a mail-handling device

new block at the rear of the site. The major part of this block, completed only in 1953, consists of modern woodworking and machine shops. These have the north wall almost entirely of glass, giving a striking impression of light, space and cleanliness. At the top of the building are a fine new drawing office and offices for the engineering design staff (Fig. 3). Some of the machine tools are of the highest precision, and are handled by skilled craftsmen. Many examples could be quoted of experimental and prototype apparatus of a very high standard that has been produced here, such as the speaking clock mechanism for the "TIM" service, and the prototype picture telegraph equipment (for the transmission of pictures over radio circuits) designed and constructed at Dollis Hill for Cable and Wireless.

The photographic group is well equipped to undertake all varieties of photographic work, including such specialized work as high speed cinematography on 16-millimetre film, at film speeds up to 3,000 frames per second, and the processing of photographic sound recordings. The high-speed camera has proved of special value in examining fast moving mechanical devices such as mail-handling machinery (Fig. 4); for example, much has been learnt about the reasons for jamming and failure to stack of stamp cancelling machines that could never have been discovered



Fig. 5
Part of the reading room in the main library

by visual examination of the machine in operation.

The patents group is responsible for patenting new inventions by Post Office staff, which are likely to be of value to the Post Office. In addition, new patents are scrutinized, and selected patent specifications circulated to officers whose work is related to the subjects covered.

The Engineering Department's Technical Library is maintained at Dollis Hill. A very comprehensive collection of technical periodicals and textbooks of interest in telecommunications is held here for reference and loan (Fig. 5).

Typical investigations

It is not possible in such a short account as this to attempt to do more than mention briefly a few of the more interesting of the current investigations, with the aim of indicating the nature of the part played by the Research Branch rather than of cataloguing its varied and extensive programme of research. For example, the Long Lines Transmission division is concerned with a variety of problems concerned with carrier telephony, in which a number of circuits are carried over the same pair of conductors but are distinguished by being allocated different frequency bands—in much the same way that radio broadcasting stations operate on different frequency bands. As the total frequency range to be

transmitted over the cable is made wider, so the problem of design of amplifiers becomes more difficult (Fig. 6); not only do these have to effect an overall gain which exactly compensates for the losses in the cable at all frequencies within the range, but they must be free from non-linear distortion (which would produce cross-talk between channels). The design of filters (used for separating the different speech circuits carried over the same conductors) and electrical connecting networks is becoming more complex, and progress depends on continued development of the theoretical work on which all advances in telephone transmission are based.

The need for providing line links for the transmission of television signals has created more difficult problems than those of multi-channel carrier telephony. A single television channel can be operated over the same type of coaxial cable system as could 960 carrier telephone channels, but requires a substantially higher degree of line compensation.

These and other allied problems are being studied by research teams at Dollis Hill. An example of the special test equipment which has been made there is a cross-talk measuring set capable of accurate measurement of signals differing by 190 decibels: that is, having an electrical power ratio of one to 10^{19} , or ten million million.

Submerged repeaters have become "front page

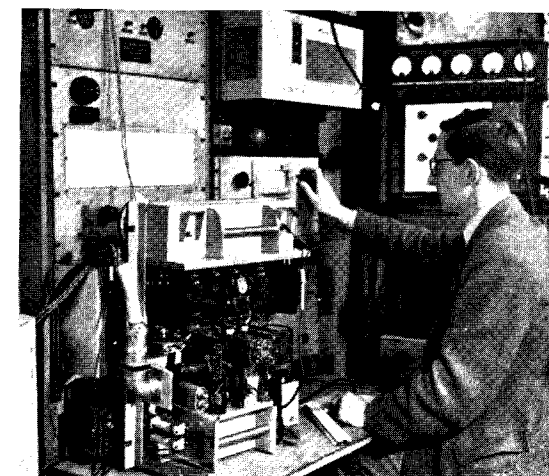


Fig. 6
Testing an experimental wide-band transmitting amplifier

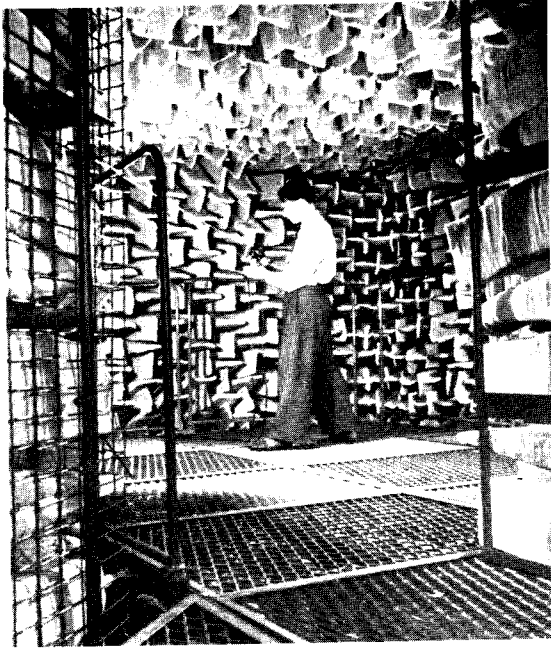


Fig. 7

An acoustically "dead" room, lined with 3,000 wedge-shaped bags of glass wool

news" recently in connection with the transatlantic cable project. As a signal passes along a cable its strength falls and the higher the frequency, the more rapid the loss. The level can be restored by amplification but there always exists a background of electrical interference or "noise" which is amplified at the same time, and it is therefore possible to permit only a limited reduction in signal strength before amplification. It is thus necessary in a long cable to amplify the signals at intervals along its length; for an under-sea cable, this entails amplifiers enclosed in watertight containers laid on the bed of the sea, the electrical power for the valves being supplied over the cable from the land station.

The first submerged repeater ever to be installed for service in a working cable was designed at Dollis Hill and laid in a telephone cable crossing the Irish Sea in 1943. Others have been laid since, and experience has been gained on schemes including several repeaters in one cable. A standardized shallow water repeater has now been designed so that up to ten such repeaters can be included in a single cable to provide 60 bothway circuits over distances up to 200 nautical miles.

This system was first introduced by inserting four repeaters in an Anglo-Dutch cable in 1950.

It is essential that all the components in a submerged repeater, including valves, shall operate reliably for many years without attention. A special study is being made by the Thermionics Division at Dollis Hill of the factors affecting the life of thermionic valves; much new and valuable information has been obtained, and valves with a long expectation of life are now being produced in the laboratories.

Electro-acoustics and local transmission

The acoustic laboratories are equipped with specially treated rooms (Fig. 7) in which precise acoustical measurements can be made without disturbance from internal sound reflections or from external noise. This section of the Branch was responsible for the design of the Medresco hearing aid, which is issued under the National Health Scheme.

Closely associated are other groups which study designs of telephone instruments and which have responsibility for determining the "telephone transmission ratings" to be applied to such items. This involves a variety of kinds of subjective tests using live talkers and listeners. For example, in "articulation" testing, a talker reads a series of single syllables at a carefully controlled speaking level into the telephone under test (Fig. 8). Four



Fig. 8

Assessing the "articulation" efficiency of a telephone by transmitting a list of syllables over the circuit

listeners in sound-proof rooms write what they think they hear, and the lists are subsequently checked. These tests are statistically controlled, and from the results deductions can be made which might show, for instance, the additional length of line over which an improved design of telephone could be used while still giving the specified minimum grade of transmission.

The Research Branch is well represented on international committees such as the C.C.I.F.; the "A.R.A.E.N." equipment (a reference telephone system for making subjective transmission tests) in use at the C.C.I.F. laboratories in Geneva was designed and supplied by Dollis Hill.

It is worthy of note that at the 1953 International Electro-Acoustics Congress at Delft in Holland three members of the staff of this division read papers on acoustics subjects.

Properties of materials

New materials are constantly being examined by the materials groups at Dollis Hill to see how they can best be applied. Metals and alloys of many kinds are studied: new lead alloys for cable sheathing, copper and other alloys for contact springs, iron alloys for magnetic parts and so on. Materials which have failed unexpectedly in service may be referred to these groups for investigation of the causes. The study of lead metallurgy has been rather a speciality, because of the wide use of lead for telephone cable sheaths, and the laboratory was able to give valuable assistance on the lead pipes used in the last stages

of the war to convey petrol under the English Channel in the "Pluto" scheme.

Spectrographic analysis is an extremely useful adjunct to chemical methods for the measurement of minute proportions of impurities in small samples. Pioneer work has been contributed by Dollis Hill towards putting spectrographic analysis on a quantitative basis, and many standard specifications are based largely on work done there. A current problem is the production of high-purity germanium single crystals for use in crystal diodes and triodes (which may one day replace some types of thermionic valve in certain applications). Metal for this purpose must contain less than one part in ten million of impurities.

Other fields of research

Many of the problems encountered in telegraphy are similar in outline to those of telephony, but the techniques are different in many ways. For example, improved methods and apparatus have been developed for accurately measuring the deviations from normal of the durations of short telegraph pulses. Basic work has contributed towards the successful introduction of Teleprinter Automatic Switching.

The development work done at Dollis Hill on trunk signalling systems forms the basis of the present trunk mechanization scheme. Studies now being made of the application of electronic techniques to telephone switching may well prove to be the foundation of the switching system of the somewhat distant future.

Inland Telecommunications Statistics

In the three months ended December 31, 1953, there were 107,000 new demands for telephone service and 100,000 new subscribers' exchange connections were installed. The number of shared service connections at December 31 was 702,000 compared with 663,000 at September 30.

The number of telephones in service at the end of the period was 6,121,000, a net increase during the quarter of 69,000 (including an increase of some 480 public call offices). The number of outstanding applications was 369,000 representing a decline in the quarter of 15,000.

69,851,000 inland trunk calls were made of

which 17,049,000 (24 per cent.) were at the cheap rate. In the corresponding quarter of the previous year the figures were 65,397,000 and 15,800,000 (24 per cent.).

The number of inland telegrams (excluding Railway and Press) amounted to 7,935,000 including 1,458,000 (18 per cent.) greetings telegrams. In the same quarter of 1952 the figures were 8,388,000 and 1,485,000 (18 per cent.).

At the end of December, 1953, there were employed 47,146 telephonists, 8,861 telegraphists and 55,167 engineering workmen. The corresponding figures at December, 1952, were 47,607, 9,495 and 54,470.

A New Directory Enquiry Service for London

H. F. Edwards,
London Telecommunications Region

WHEN LONDON'S DIRECTORY ENQUIRY Bureau in the Terminus Telephone Exchange celebrated its twenty-first birthday in August, 1953, everyone knew that it would be its last in its present form. A new system was being evolved which would revolutionize the service even more radically than the opening of the Bureau in 1932, when an heroic effort had been made to keep all London subscribers' telephone numbers in a single loose-leaf record, both in alphabetical order of subscribers' names and in address order, which could be maintained up-to-date.

There were several hundred loose-leaf books, increasing, in the last years of the life of the bureau, to nearly 2,000, while the number of telephonists having access to them rose to ninety. It took as many as thirty telephonist clerks and twenty typists to maintain this record and another forty telephonists were needed to distribute enquiries to telephonists seated in that part of the "library" where the right book was to be found. Readers wishing to know more about the old system will find a description of it in Post Office Green Paper No. 20 entitled "Directory Enquiries" which was issued in 1935.

Before five years had elapsed the inflexibility of this centralized organization was being realized and ideas were forming for its replacement by eight bureaux, one for each London Telephone Area, but the strong community of interest between subscribers in different areas would have made it necessary for each bureau, if equipped only with up-to-date information about its own area, to refer many enquiries to other bureaux.

These plans went into cold storage in 1939 and the central Bureau had to rub along as best it could until the end of the war; but when there was a spate of new and removing telephone subscribers in 1945 such a flood of enquiries was received that it was more than could be handled. The bureau

was the largest the building would accommodate and stop-gap relief measures of various kinds had to be introduced, but these lengthened the time taken to answer an enquiry and added appreciably to the cost of the service, which rose to about £300,000 a year.

It was not until 1952 that the first of what was intended to be a series of properly organized relief bureaux was opened, at Palmers Green Telephone Exchange. This handled enquiries from North London subscribers and was equipped with up-to-date information available to every operator in duplicated loose-leaf form, showing the names and telephone numbers of all subscribers whose postal address finished up with "London, N." (regardless of the figure which followed the "N"). Enquiries about subscribers in other districts were to be referred to other district bureaux.

By this time other, more ambitious, ideas for re-organizing the service, which had been under consideration, had been found to be practicable and the district bureau scheme was developed no further.

Decentralization

The weakness of the old scheme lay in the possession of only one copy of the up-to-date record, which made it difficult to avoid centralization. The district bureau scheme decentralized, and gave a limited number of copies of the record for the home district, thus avoiding the need to employ telephonists in distributing enquiries, but it was inefficient in handling enquiries about other districts. What was needed was an up-to-date record of all London subscribers in a handy form available to all enquiry operators. Only reproduction by printing could supply this.

Early in the history of London's telephone service, it was realized that many people who were uncertain of the Christian names or initials



Searching for a telephone number in the London Postal Area street-order telephone directory

of the subscribers whom they wished to telephone were having difficulty in finding the right entry in the telephone directory and as the number of names in the directory increased it became more difficult to find a particular name. Even thirty years ago there were many pages of "Smiths" and there were hundreds of less common names such as "Warren" which covered more than one page each. An alternative form of search was very desirable and it was found that, if all the entries were re-arranged in address order, it was easy to find a "Warren", whose initials were unknown, under "278 High Road, N.3", whereas a search for that entry in the published directory would take a long time. This re-arranged list of subscribers was assembled in loose-leaf books in 1932, in the same way as the list in alphabetical order of subscribers' names.

In 1954 the published London directory is being divided and new directories (London Postal Area and Outer London) are being introduced.* Because each of the new Outer London directories contains relatively few names, the common name problem is much simplified. (Outer London, Surrey, is the largest and this has only 700 pages, about the same number as Manchester.) It was accordingly decided to cease maintaining a street-order directory for Outer London. Arrangements

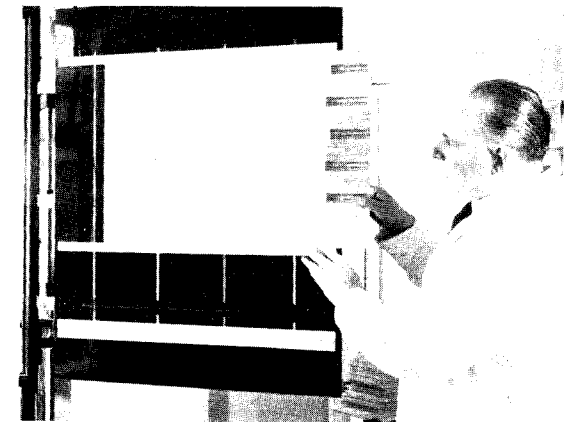
*See "London from A to Z"; Journal, November, 1953

are, however, now being made to print the street list for the London Postal Area so that each telephonist can have her own copy, and to re-issue it at monthly intervals so that it is never much out-of-date. The new directory enquiry arrangements for London which embodied the use of this printed street directory came into operation in January, 1954.

The street directory for the London Postal Area was designed to be reproduced in the largest format which could be consulted without difficulty and which the working positions at the enquiry bureaux would accommodate, in order to reduce the number of pages and the binding problem to a minimum. This resulted in a printed area about 12 inches high by 9½ inches wide; 1,400 pages of this size were needed. Had the standard directory-size page been used, 2,000 pages would have been needed. Because the directory is used only by Post Office staff abbreviations have been used extensively.

In practice, the street directory is divided into 20 sections and a fresh print of one of these sections is received every day, on five days a week. The old section is then thrown away.

At the five enquiry bureaux now operating in London, a single binder fixed on each desk is used to hold all 1,400 pages, the normal position being with the pages opened in the middle. In this position the telephonist can most readily turn the pages back for streets beginning with the letters J back to A, or turn them on for the letters K to Z. When she has to refer to another directory,



A "Flexoprint" panel of the street directory being placed sideways on the photographer's easel

she turns the street directory to its middle position where there is a protective inset and places the other directory on it. As she refers to the street directory more frequently than to any other, she saves a good deal of effort by keeping it in front of her rather than filing it in a book rack in the usual manner.

As the directory is completely re-issued every month, new telephone numbers are contained in it within a month or less of their connection and there is no need for supplementary up-to-date information. Ceased numbers are deleted with similar promptitude and there is thus very little danger of giving out-of-date information. For the rare enquiry for someone whose telephone was connected only a few days earlier, a daily issued supplement to the published directory can be referred to. The published directory and its supplements are there for reference also when the caller does not know the address in sufficient detail for a street search; for example, "J. S. Warren, of High Road, N.3, number in road unknown".

The Directory Supplements

In spite of the merits of the street directory it cannot serve all purposes. Not everyone knows the precise postal address of the person he wants. How many London shoppers know the street numbers of the principal departmental stores in

Oxford Street which they regularly visit?

To find an entry quickly in the street directory it is necessary to know the street number, unless it is a street with few telephones, and there are 14 columns of entries for Oxford Street. It does not help in the search to know that the subscriber in Oxford Street for whom you are looking has his office opposite Bond Street. A record in alphabetical order of names is therefore needed and the most satisfactory way of adapting the old loose-leaf alphabetical record to printed reproduction, both for the London Postal Area and for the Outer London areas, was found to be by the use of the published directory supplemented by printed pages of new entries, also in alphabetical order. It should be remarked here that the term "new entry" is intended to include both new and changed entries; for example, even if the entry for "Smith, J." is altered to "Smith, John" the latter is a "new entry".

The most convenient form of supplement to operators would be one containing every entry not shown in the published directory, brought up-to-date every day or two, but the amount of work involved in reprinting several hundred pages every day or two would be prohibitive. On the other hand a work of reference consisting of a number of sections, each including only the additions made in a period of a few days, would be inconvenient to search because many sections



A general view of the Chiswick Directory Enquiry switch-room

would have to be examined to find a particular name.

A compromise has been reached in which the entire supplement to every London directory is reprinted monthly (a different portion each day to spread out the load) and a "supplementary" supplement is printed daily containing new entries arising since the monthly supplement was last issued.

Each of these supplements is cumulative: for example, the July monthly supplement may contain all entries, since the last directory issue went to press, and up to, say, July 10, while the daily supplement dated July 29 will contain all new entries for the period July 11 to 29. In both the order of entries is alphabetical, not chronological.

There are monthly and daily supplements for each of the four parts of the London Postal Area directory and for each of the five Outer London directories and, because the street directory is limited to the London Postal Area, the supplements are the only works of reference about new entries available for the Outer London areas. Because of the rate of growth of the service and the number of changes, the size of the daily supplements to the London Postal Area parts grows from one page at the beginning of the month to about ten pages at the end. At this stage the entries are assimilated into a re-issued monthly supplement which had started life with

about 30 pages when the corresponding directory part was published, and which is replaced by a new one about ten pages thicker on each subsequent month. As soon as each daily supplement is assimilated at the end of the month a fresh one is started.

By the time a re-issue of the directory is due the monthly supplement will have reached about 150 pages, but as soon as the new directory is published a new and much smaller monthly supplement will be received to accompany it; this will contain only those entries which arrived too late to get into the press copy for the directory and it will be only about 30 pages thick. The cycle is then repeated.

In operation, the monthly and daily supplements are held by steel rods, with their appropriate published directory, in an "Easibind" binder. As each new daily supplement is received the old one is discarded. Similarly with each new monthly supplement.

Search for a name in the daily supplement is very quick indeed, even if the name is Smith, and search in the monthly supplement is considerably quicker than in the published directory. It is this rapidity of search which has justified the expense of printing daily supplements. The number of enquiries for new lines is very small but there are so many enquiries for the names of people said to be subscribers, but who are not,

2 Collins R W	LIV 2517																							
4 Padley J H	LIV 5857																							
BRADLEY RD SE19 Norwood		<table border="1"> <tr><td>2 Collins R W</td><td>LIV 2517</td></tr> <tr><td>4 Padley J H</td><td>LIV 5857</td></tr> <tr><td>5 Dalton Mrs Grace</td><td>LIV 2362</td></tr> <tr><td>5 Dalton C T</td><td>LIV 2362</td></tr> <tr><td>6 Stanley H</td><td>LIV 2086</td></tr> <tr><td>7 Isale A C</td><td>LIV 1544</td></tr> <tr><td>8 Peatson A J</td><td>LIV 6209</td></tr> <tr><td>11 Booker R G</td><td>LIV 2814</td></tr> <tr><td>13 Davies R</td><td>LIV 6012</td></tr> <tr><td>14 Garner E M F</td><td>LIV 5252</td></tr> <tr><td>18 Geal F N Plmbr</td><td>LIV 4335</td></tr> </table>	2 Collins R W	LIV 2517	4 Padley J H	LIV 5857	5 Dalton Mrs Grace	LIV 2362	5 Dalton C T	LIV 2362	6 Stanley H	LIV 2086	7 Isale A C	LIV 1544	8 Peatson A J	LIV 6209	11 Booker R G	LIV 2814	13 Davies R	LIV 6012	14 Garner E M F	LIV 5252	18 Geal F N Plmbr	LIV 4335
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that reference generally has to be made to up-to-date information before the operator can say with confidence that she cannot trace the number. Up-to-date information could be quite easily limited to a central point and the cost of reproduction saved, but the cost of the operating time involved while the first enquiry operator referred to the central point and the central operator searched would far outweigh the reproduction cost.

How it is Done

In many American cities frequently reprinted telephone directories are produced by normal printing processes. Her Majesty's Stationery Office were considering following a similar procedure to meet London telephone needs when attention was drawn to a new filing system adapted to photographic reproduction. This is a Remington Rand product known as "Flexoprint" which has recently been adopted by the Havana, Cuba, telephone authority for the production of their directories. The basic principle is the same as that of other forms of visible edge card index. It consists of a separate card for each directory entry which slides up and down on a vertical runway and overlaps the greater part of the card above it. Only a narrow portion at the top of each card (except the bottom one) is visible, and the entry can be typed on this. When the cards are assembled on the runways and three runways are clipped on to panels the appearance is that of a directory page, with very little wasted space, but on a rather larger scale.

The unique quality of "Flexoprint" lies in the accuracy with which the cards are cut and the neatness of the assembly which lends itself to photography without marked shadow lines appearing on the photograph between each card and its neighbour.

Photographs are taken on negative material of the size at which it is desired to reproduce the copy. By contact exposure from each negative a photo-lithographic plate is made, and copies are made from the plate by offset printing, the process already used for producing Post Office Headquarters Circulars, References, and so on. By a suitable programme of timing of all these processes it is possible to despatch a number of printed copies within 24 hours of setting up the cards on the panels.

Those who are familiar with directory enquiry records in the provinces will observe the similarity in principle of the new London records and may envy the ease of reference which printing on

standard directory-size pages permits, compared with the form that information about new subscribers takes elsewhere; for example, manuscript entries on blank pages bound into the special issues of the directory; loose-leaf entries, one per page, in binders; strips assembled on panels on rotary drums, rather like postcard holders in seaside shops.

One respect in which there is a difference in principle is the treatment in London of ceased and amended directory entries. In provincial centres it is the practice to cross through deleted entries in all working copies of the directory and in the larger centres where more than a hundred deletions weekly have to be made in a dozen or more directories it creates a good deal of work. The amount of clerical work varies in proportion to the product of the number of subscribers and the number of directories needed to deal with the volume of enquiries. As the volume of enquiries also is governed by the number of subscribers, the amount of work will be seen to vary in proportion with the *square* of the number of subscribers.

Deletions

Additional work arises when a directory wears out and all the old deletions have to be carried in to a fresh copy. In London there are 2,000 deletions every week and over 100 complete directories in use, so that it would be quite impracticable to make deletions in the directories.

The omission of this deletion information is less serious in practice than might appear to be at first sight. During the period of stop-gap relief measures about 50 telephonists were constantly answering enquiries from the unamended directories and although they must have given many ceased or changed numbers, there was very little complaint. Often an enquirer, when given a changed number, would say "No! that is their old number, before they moved" and the operator would then enquire of the central bureau for up-to-date information (nowadays she will search in the supplements).

The programme of production of the street directory is simple. There are 1,400 (large) panels to be maintained and 70 are brought right up-to-date each day and sent for reproduction. For the supplements the number of (smaller) panels for each section changes as the days and months go by and cards have to be transferred from daily

to monthly panels to give the make-up of the supplements which has already been described.

The Post Office Supplies Department Reproduction Unit photographs and prints both the street directory and the supplements, and despatches them to enquiry bureaux on the day the cards are assembled on the panels, or on the following day. The cards are generally typed before a new telephone is connected and they can, therefore, be assembled on the daily supplement panels immediately on advice of connection being received.

The New Service

The plan for handling enquiries from London subscribers will be to have ultimately a bureau employing 30 to 50 operators in each telephone area, using cordless call-queueing equipment. At present, however, there are only five bureaux: Terminus (the old bureau much modified), Bloomsbury, Palmers Green, Chiswick and Greenwich. Although Terminus has been adapted to give automatic connection of callers to any free telephonist, ordinary lamp signalling switchboards of various types have been used elsewhere. Fortunately the electrical requirements of a directory enquiry operator's position are very simple.

Another change has been made at the same time as that described. Formerly, London subscribers were supposed to dial "DIR" to enquire about London numbers only, "TOL" to enquire about numbers outside London but within the London toll area, and "TRU" for anything else. Frequently those wanting a number in the toll area dialled "DIR" and the bureau was unable to help them except by switching them to a toll directory enquiry office.

With the re-design of references needed by London directory enquiry operators, it was found possible to accommodate all the directories required to give information about the toll area, as well as about the London Telecommunications Region, so that "DIR" now covers up to the toll boundary. When the new call-queueing equipment arrives it will be possible to accommodate all directories and thus give a comprehensive directory enquiry service, covering the whole country, in conformity with national practice.

Tribute should be paid to the pioneer work on directory services done by Mr. G. A. Bennet, formerly of the Inland Telecommunication Department, Organization and Methods Branch, and to the organizing and liaison work of Mr. G. W. Robson of the Central Organization and Methods Branch, who has smoothed the way through many difficulties and aided the London Telecommunications Region in bringing the new scheme into operation.

Directory enquiries from subscribers anywhere in the London directory area are routed to the five bureaux mentioned, but those from subscribers outside the directory area are handled at the local exchange information desks which are similarly provided with the references used at the bureaux. The only differences are in the binding of the street directory which, being less frequently used, is divided into four conveniently sized volumes which can be filed in book racks; and the use of local directories and other information of a parochial character.

At the time of writing (early March) it is too early to give firm facts about the improved quality of service to the subscribers or of savings of staff, but there is already an appreciable reduction in the time spent in finding the required number.

Last of the District Managers



Our picture shows a well-known and popular personality, C. R. Fright, M.B.E., Telephone Manager, Reading, who retired at the end of December.

He began his Post Office career at Headquarters in 1910, remaining there until the outbreak of World War I when he joined the West Kent (Queen's Own) Yeomanry, serving in Gallipoli, Egypt, Palestine and France. At the end of the war he resumed duty in the Headquarters Traffic Inspectorate where he remained until 1934 when he was appointed District Manager, Colchester. In the following year he transferred to Reading and became Telephone Manager in 1940 under the Regional Reorganisation Scheme.

During his stewardship the number of telephones in the Reading Area has trebled. In addition to his duties as Telephone Manager he was Liaison Officer to the Regional Commissioner, Civil Defence, throughout World War II. In recognition of his services he was made a Member of the Order of the British Empire in the 1947 Birthday Honours.

Service to Subscribers in the United States

R. W. Palmer, M.I.E.E.,
Engineer-in-Chief's Office

THOUGH THE TITLE OF THIS ARTICLE MAY appear to be a generalization, the operative word is "Service". This survey arises as a by-product of the visit to the United States of America in 1953 by six Post Office engineers representing management and staff, to study maintenance of automatic telephone exchanges under the auspices of the British Productivity Council. Their report has recently been published*. The realistic outlook on service to the customer could not be dissociated from the efficiency of maintenance, and this article includes many details taken from that report, plus some additional service information that may be of general interest.

Standard of Service

From previous articles which have appeared in the *Journal*†, readers will be familiar with the general organization of the United States telephone system, in which at least 80 per cent. of the subscribers are served by the Bell System companies whose sphere of operation is arranged on a geographical plan not very different from the British Post Office Regions. One difference, however, is that the 22 separate Bell Companies are more independent than Post Office Regions in the matter of service standards, and the 5,000 telephone companies outside the Bell system are

even more free to make their own decisions, subject only to the oversight by the Federal Communications Commission and the separate State Commissions who protect the interests of the public. Half of the automatic exchanges in the U.S.A. are step-by-step type, like the British system (Fig. 1).

Provision of Service

The provision of telephone service is negotiated in the first place by the Commercial Department of the telephone company concerned, the local contact with the public being through a staff of highly-trained girls called Service Representatives. These are to be found in the public offices, which are a model of dignified efficiency. The name of each representative is prominently displayed on her desk, the opening gesture of a service that is to be essentially personal, whether by telephone or by visit. Any one customer always deals with that one Service Representative, who has the obligation to look after the interests of her particular batch of customers. She has immediate access to the records of those customers in respect of their installations and their accounts.

*Published by the British Productivity Council, London. 5s. 6d.
†"The Telephone System of the United States", by H. J. McIntyre, *Telecommunications Journal*, February April and August, October, 1953.

PRODUCTIVITY TEAM REPORT

Maintenance of Automatic

Telephone Exchanges

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At every interview a "contact memo" is prepared to record the subjects discussed and the customer's reaction. This includes a record of any new service or facility that has had to be refused because of lack of plant or for any other reason.

When a new order is accepted, and is passed into the machinery of the Plant Department, the multi-sheet Advice Note is often produced in the Installation Control by direct teleprinter from the Commercial Department. The order usually includes an appointment date and time at which the order is to be executed. This completion time is often the same day as the order, or is at most very shortly after, and careful statistics are kept to bring to light failure to keep appointments.

A very high standard of service in this respect is maintained, but it appears that much of the success in rapid installation work arises from the practice of temporary installations that count for statistical purposes as "completions". The obligation that has been met is the provision of basic telephone service, even if it merely consists of a telephone on the floor just inside the front door. The addition of permanent house-wiring or

extension instruments may follow later, but the customer prefers this to the postponement of the essential service facility until all details can be incorporated. This is a realistic attitude and is not adopted merely to distort the statistical records. What the customer wants is more important than what the company think he ought to have.

Fault Reports

General complaints by subscribers about the quality of telephone service may be received by the Service Representatives, whose job it is to pass them to the right quarter and follow them up until the customer is satisfied. On the contact memorandum already referred to, the customer's criticisms are noted and classified under 30 headings - is it alleged overcharging, is it annoyance at a number change, is it dissatisfaction over plant faults? Individual faults, however, are normally reported by the subscriber by dialling a 3-digit number to a Repair Clerk.

The Fault Repair Service in the U.S.A. is very similar to the "filtered ENG service" in the United Kingdom, but with several important differences. The first is that the Repair Clerk



Fig. 1
The Productivity Team at a Bell System step-by-step exchange (Springfield, Mass.)



Fig. 2
Female Repair Clerks at a subscribers' fault card turret in an independent telephone company's exchange (Fort Wayne, Ind.)

who receives the complaint is neither a telephonist nor an engineer. She is a specialist in handling complaining customers in a personal and helpful manner. She has immediate access to the subscribers' fault cards from which she can find the name of the customer, his installation, his previous complaints and the steps previously taken by the company to satisfy him. The Repair Clerk is usually seated at a flat-topped desk with key-ended circuits and with an elastic cord that enables her to reach the fault card cabinet while still speaking to the caller.

At one independent company visited the clerks were seated round a turret of fault cards as seen in Fig. 2, and they were expected to address all callers by name after reference to the cards.

In front of the clerks there are often two wall clocks, one being ahead of normal time by an amount equal to the current delay period in attending to subscribers' apparatus faults. These clocks are not always used for the making of appointments, but they do accentuate time-consciousness in the handling of complaints.

Skill in satisfying the customer is of prime importance. If he can be persuaded, in effect, that the failure is his own fault (for example, inadequate P.B.X. lines, not waiting for dial tone or wrong dialling procedure) then no plant "fault" is recorded. The object is to gain his confidence and his co-operation. If there is, in

fact, a genuine plant fault, the case must be handled in so personal a manner that he will remember the efficiency of the repair service rather than the annoyance of the fault.

The handling of the complaint is as important as the clearance of the fault, so Repair Clerks and Service Representatives are subject to "service observations" by the administration. Did the employee leave a good impression of service? Did she carry out the bare minimum of her duties, or did she provide "overtones of service"? The answers to such questions are recorded but are never used against any one individual. They lead to a general report to the supervisor of the group, implying that the failure of an individual is the failure of the supervisor whose job it is to find the black sheep and to guide and train the group as a team.

The subscribers' fault cards in U.S.A. deserve special mention in several respects (Fig. 3). They are slightly smaller than the cards in the U.K. and are normally filed in trays with the short side uppermost. Not only does this make a 50 per cent. saving in floor space, but it reduces the distance to be travelled by the Repair Clerks to reach any card. The seriousness or urgency of each entry is indicated by ticks in the spaces marked as follows:—

O indicates "out of service", deserving much more urgent attention than a complaint of

- occasional lost calls, noisy lines, and the like.
- A or B is a supplementary classification meaning a fault "carried over" from the previous day. No account is taken of "carry over" of faults other than those in the "out of service" category. Class A are those reported before 5 p.m. on the previous day. Class B are those reported later than 5 p.m.
- M refers to repeat complaints (whether of minor fault or of loss of service) and therefore justify special attention in the cause of good customer relations.
- I indicates faults of any kind within one month of a new installation, and again requires special attention.

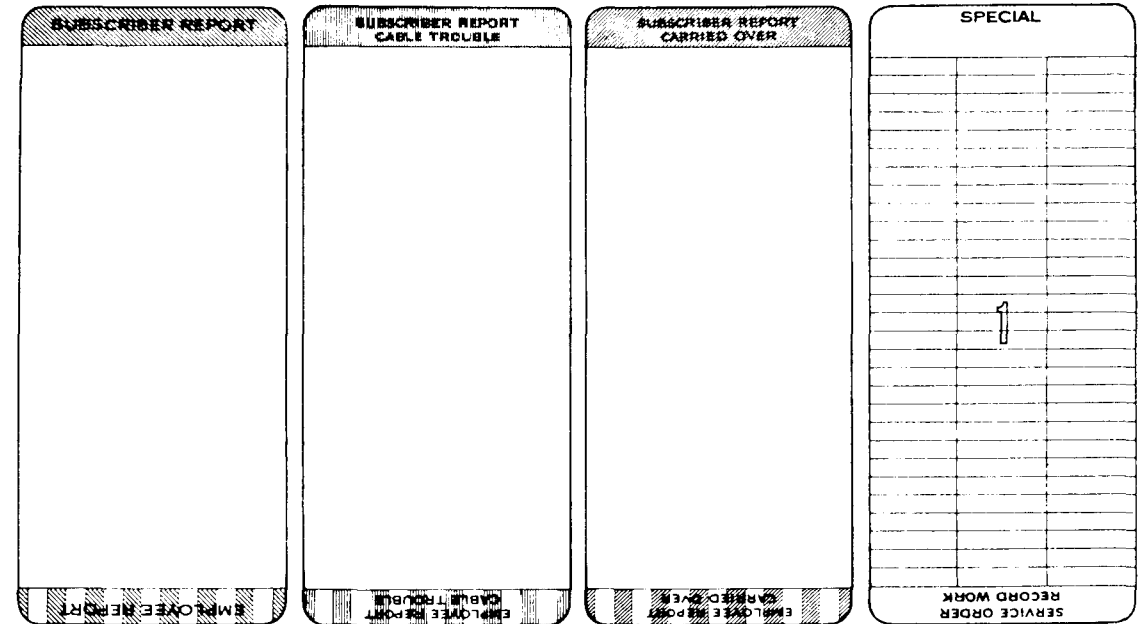
Any complaint not classified by one of the above symbols is in the non-urgent category, because it is obviously less serious to the customer. Some of the faults directly affecting a subscriber's service may have already been reported by operators or engineers before he complains and the matter may be in hand. To cover this, the absence of a fault card from the file is indicated by dummy index cards (Fig. 4) that show one of

eight reasons why the card has been removed. All these cards have a specially prepared surface so that pencil notes can be added. Thus, when a complaint is received, the Repair Clerk can tell if the fault is already known, and can add to the prestige of the company by telling the subscriber immediately that the repair is in hand. Employees' reports of faults affecting a particular subscriber's service are always reported through the Repair Clerks and are entered on the fault cards.

When a fault card entry has been made, the Repair Clerk passes the card to the fault control engineers, who are usually in the same room. If attention by line or subscribers' apparatus staff is required, the engineers convey instructions to the lineman by telephone. If exchange staff are involved, the complaint is passed over to the exchange foreman, again by telephone; exchange fault dockets are prepared by the foreman, and the clearance of the fault is reported back by telephone to the fault control. The docket system is for local engineering control, and the subscribers' fault cards are for control of public relations.

It is inappropriate in this article to go into

Fig. 3
Bell System subscribers' fault cards



Key to colours: Red ■■■, Yellow ■■■, Green ■■■

The U.S. telephone companies are of the opinion that however nice it would be to have a simple and really accurate measure of service, a state of perfection is quite impossible, and the expense of taking service observations must be justified by its contribution to efficiency, directly or indirectly. The figures are used merely to indicate improvement or degradation at particular exchanges, since uniformity between one place and another is not expected, nor is it considered economically desirable. To get the greatest concentration of traffic and consequently the largest sample, the observations are taken at the first selectors instead of at selected subscribers' lines.

Faults that are observed are usually reported at once to the repair staff though the connection may not necessarily be held for tracing; at least the engineers are immediately made aware of the trouble and may be able to deduce the location of the fault by the pattern of such reports. These comments refer principally to dialled calls (auto to auto) but it is often considered that more observations are required on calls handled at a manual switchboard. This arises because "time to answer" has a special significance to the customer in relation to his satisfaction with the telephone service; it is something that he will notice and shout about, whether his complaint is reasonable or not. To deal with this service aspect on an economical basis, a new automatic answering-time recorder is being introduced, providing a large number of results without the costly human observation of the less important details of the calls.

Publicity

This story of service would not be complete without the mention of the part played by publicity in the U.S.A. Blatant advertising cannot take the place of quality of the product or of service, but dignified and informative publicity can make a good service better by getting the co-operation of the public. The American telephone companies put out their direct advertising by press, radio and television, building up the public confidence that the company is competent and progressive and is striving to give better and better service (Fig. 5). But there are many other and better forms of publicity through the employees, every one of whom is a representative of the company in the eyes of the customers. The special training of Service Representatives and the Repair Clerks to leave a good impression with the subscribers has already been described.

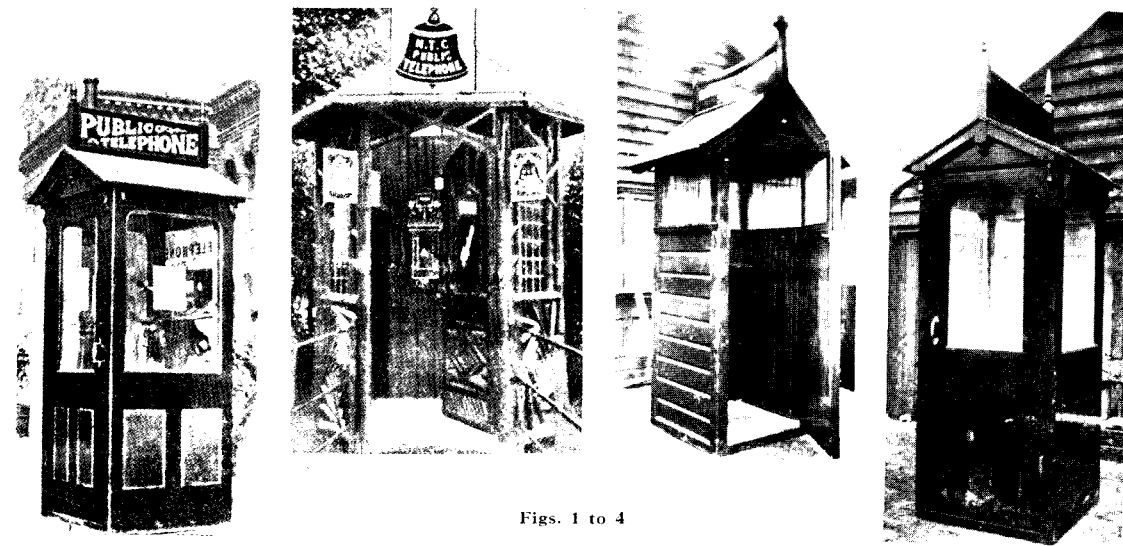
The employees are also expected to echo the general publicity and to amplify it in the course of satisfying the customers in their everyday contacts.

In the execution of their work, great care is taken to explain the value of every job, the reasons and the policy behind it. This is done by bulletins and posters, but more particularly by "on the job" training or by conferences for supervising staff.

Finally there is the publicity associated with the presentation of statistics. Results are displayed attractively and copiously, but the accent is on continuous progress rather than any arbitrary achievement. At appropriate intervals, new local targets or "expectancy figures" are set up. These are reasonable aims, representing something just a little better than before, irrespective of whether the previous performance was better or worse than average. If the aim is achieved, it is a matter for congratulation and appropriate publicity. If the aim is not realized, the failure is not so bad that the staff give up the struggle in despair. This appreciation of psychology keeps morale at the highest level and keeps the staff "on their toes".

The Meaning of Service

These aspects of the American telephone business reveal how the companies think of service as something personal rather than numerical or even standard. In this respect their outlook is the same as that throughout American business where the personal satisfaction of the customer is the paramount consideration. To get an idea of how the telephone subscriber judges the administration it may be useful to work out how you judge "service" at a retail shop. The shop you select as giving the best service is not necessarily the cheapest or the one with the largest range of goods. It is the one that welcomes you as an individual, that tries to avoid forcing on you what the shop assistant thinks you ought to have, whether you want it or not; it is the shop that may sometimes make mistakes in the goods or in giving change but repairs the error with such grace and sincere apology that your complaints are turned into appreciation. These things may not be revealed by statistics, but they do determine the answer to the question—"are you satisfied with the service or not?" There is a great deal behind the Bell System slogan—"Service—that's what we Sell".



Figs. 1 to 4

"You may telephone from here"

The story of the public call office

*George Orchin,
Public Relations Department*

IT IS PERHAPS A LITTLE SURPRISING NOWADAYS to see signs bearing the inscription in white letters on blue ground "You may telephone from here" affixed to the walls of old buildings in various parts of the country. They are reminiscent of the early days when most public call offices were installed in the local general store or chemist's shop, perhaps as an added pull to custom. Such call offices, however, are now few and far between, for the public demands a 24-hour service which can be provided only at places accessible at all hours of the day: mainly, therefore, on the public highway. Sir Giles Gilbert Scott, R.A., architect of Liverpool Cathedral, was the designer of the present standard No. 6 kiosk which, with its distinctive appearance and colour, its simple inscription "TELEPHONE" written in glass opals around the top, and its black and chrome internal furnishings, provides a service to the community as important as and perhaps in some

cases, more important than, water, gas and electricity services.

The first kiosks appeared on the streets of our towns and villages in the early 1900's. Fig. 1 shows a kiosk installed on the public highway at Nottingham and Fig. 2 one of a rustic arbour design in some public gardens at Folkestone, both in 1908.

Other types were coming into use by 1912, when the Post Office took over the National Telephone Company. A contractor in the south of England tendered for kiosks at an approximate cost of £12 free on rail and painted to specification. The maker's catalogue read as follows:

"This is the latest pattern of telephone cabinet for outside use with or without automatic penny in the slot lock. The door is fitted with a patent unique door spring for closing. We strongly recommend an automatic coin box inside the cabinet in preference to the automatic door lock, it having been found by long experience that these are very costly to maintain".

This kiosk, shown in Fig. 3, was known as the "Norwich" type and was installed in east coast districts. Two other types, the "Wilson A" and the "Birmingham" (Figs. 4 and 5) were also brought into use. In addition there were some special rustic designs for rural districts, and galvanised iron kiosks for dock areas.

The colour of the kiosks varied from place to place. A kiosk at Southport was painted buff and dark brown outside and dark brown (lower half) and white top and ceiling inside. The "Birmingham" type was finished in oak varnish. Even in 1912 scribblers caused trouble, for white paint was replaced by varnish. About this time the Postmaster General approved the provision of scribbling pads, with advertisements, in call offices to prevent defacement of the kiosk walls, although this facility was short-lived.

Soon after the National Telephone Company was taken over it was apparent that there was a need to improve the design of kiosks and to standardise the colour at red. Drawings were made in 1913 for two types of more ornamental design which it was stipulated should combine aesthetic quality with economy of design and should be produced at no increase in cost over the existing types. It is doubtful whether the proposed new designs ever reached the building or even prototype stage, for in 1914 the "Birmingham" type was still being ordered.

With the outbreak of war the question of providing kiosks lapsed into obscurity and it was not until 1921 that the problem was again tackled seriously. In that year the first standard design was introduced and was designated Kiosk No. 1. It was a prefabricated concrete structure with metal glazing bars (Fig. 6). About 150 were first ordered, at a cost of £35 each, but there was such a demand that 500 had been ordered by March, 1923. By February, 1925, the demand was for 52 a month and the cost had fallen to £13. To reduce freight charges, contracts were then being placed in various parts of the country.

For more reasons than one London had lagged behind other parts of the country in providing kiosks on the highway. The National Telephone Company had installed kiosks on some London streets, but they proved to be unremunerative and were withdrawn. It was only after protracted negotiations with the various local authorities from 1923 onwards that provision in London was stepped up. There were some 99 of these authorities to negotiate with; further, because of the



Fig. 5

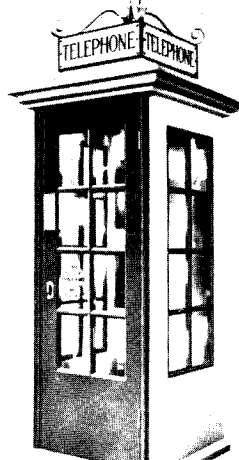


Fig. 6

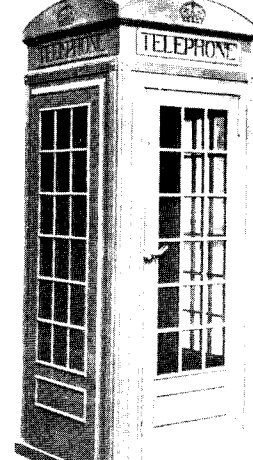


Fig. 11



Fig. 12

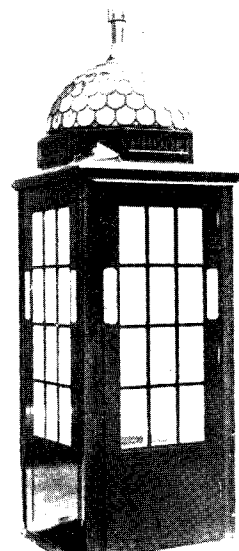


Fig. 7

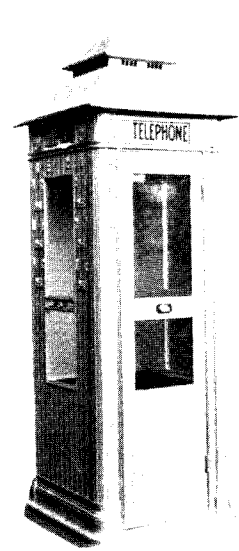


Fig. 8



Fig. 13

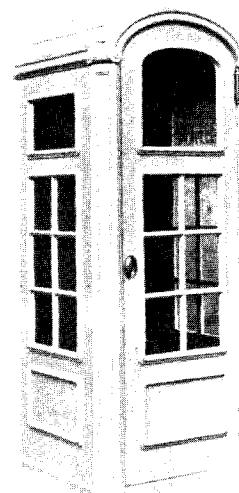


Fig. 9



Fig. 10

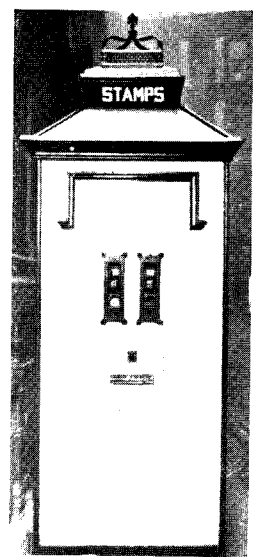


Fig. 14

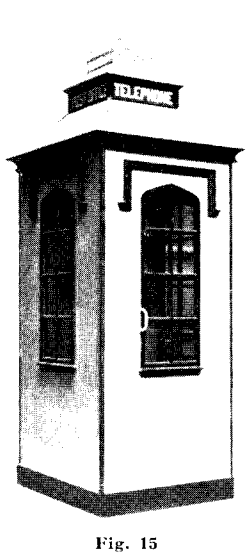


Fig. 15

extraordinary congestion of pedestrian and vehicular traffic, both the police and the Ministry of Transport had to be consulted.

With the formation of the London and Home Counties Traffic Advisory Committee, on which the police and the Ministry of Transport were represented, procedure was smoothed out to some extent. By 1926 180 kiosks had been erected on the public highway, on sites controlled by the City Corporation, County councils, County Borough councils, Urban District councils, Rural District councils, Parish councils and the Port of London Authority; 115 were installed on private sites. By the end of 1929 the number of completed kiosks in the London area of all types had increased to 1,581.

In 1924 production of a new design of cast-iron kiosk was considered and the Fine Arts Commission recommended that a premium of £50 be offered for each of three designs to be submitted by architects of recognised standing, whom the Commission would select. Designs were prepared by Sir John Burnet, A.R.A. (Fig. 7), Sir Robert Lorimer, A.R.A. (Fig. 8), the Birmingham Civic Society (Fig. 9), the Metropolitan Boroughs Joint Standing Committee (Fig. 10) and Sir Giles Gilbert Scott, R.A. (Fig. 11). Models were placed on view on vacant land behind the National Gallery and selection was made by the Fine Arts Commission. The design by Sir Giles Gilbert Scott was chosen and, with slight modification to the door, was adopted by the Post Office. It was designated Kiosk No. 2.

In 1927 Sir Giles Gilbert Scott was asked to design a more ornamental kiosk than the No. 1 and his design was accepted. This kiosk was of prefabricated concrete and designated No. 3 Kiosk (Fig. 12). Although, in 1929, the Post Office did not consider it desirable to discontinue entirely the manufacture of No. 1 kiosks, they intended to regard No. 3 as the normal kiosk for sites of special architectural importance and the No. 1 as the kiosk for places where all aesthetic considerations were subordinated to economy, as in a rural area where the local authorities found it difficult to guarantee a minimum annual revenue.

During this period of development there were many difficulties to contend with; local authorities were very jealous of their amenities and, while appreciating the need for public kiosks, they did not readily accept standard designs or colour. In Eastbourne, for example, the Corporation insisted on having two kiosks along the sea-front thatched

to match the rustic public shelters. A local builder tendered to provide the thatched roof at a cost of £14 and the estimate was accepted. The two thatched kiosks (Fig. 13) remained from 1925 till 1936, when they were withdrawn and replaced by No. 6 kiosks.

It is interesting to recall a letter to the *Eastbourne Chronicle* dated March 19, 1936:

"Some years ago the Corporation persuaded the Post Office to put a miniature thatched top on the telephone kiosk which stood at the corner of the Redoubt Bowling Green. The result was rather quaint for the box was a cross between a Chinese Pagoda and a mushroom. Now I see the thatched roof has gone and in its place is one of those horrible looking red 'phone boxes which clashes with all the green hedges and grass. . . . I hope the Borough Surveyor hasn't given up the fight for making things of utility things of beauty as well".

The No. 4 kiosk was first proposed in 1923 and the prototype (Figs. 14 and 15) was erected at Bath in 1926. It contained facilities for buying stamps and posting letters, in addition to the telephone.

The standard No. 4 kiosk (Fig. 16) was designed by the Post Office Engineering Department on the basis of the No. 2 kiosk and was approved about 1927. It was painted vermilion outside and flame colour inside. The original cost figure was £50. 6s. 9d. and an order for 50 was placed at this time. It was argued that these kiosks would save opening town sub-offices and they were erected only at special places where it was expected they would be highly remunerative and only where there was a genuine public need. These kiosks were considerably larger than the other types and consequent difficulty was experienced in getting suitable sites. Other objections came to light with the kiosk in service; for example, the noise of the stamp machines disturbed callers, and there was difficulty in keeping rolls of stamps sufficiently protected from the weather.

For these reasons and because of the high cost the Post Office decided, about 1935, not to install any more kiosks of this type, and when those in service were withdrawn or replaced they were to be scrapped.

The Post Office had marked Queen Victoria's Diamond Jubilee in 1896 by introducing a number of improvements in the country's communications and at the Silver Jubilee of King George V in 1935 further improvements were introduced, including developments in call office facilities. Sir Giles Gilbert Scott was commissioned to design a new kiosk retaining the best features of

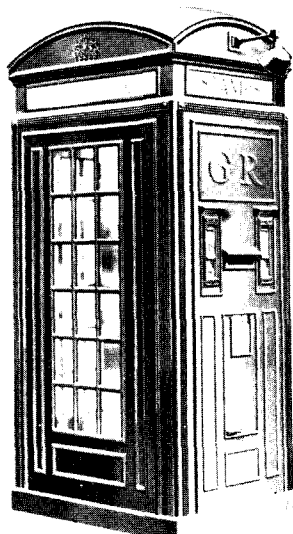


Fig. 16

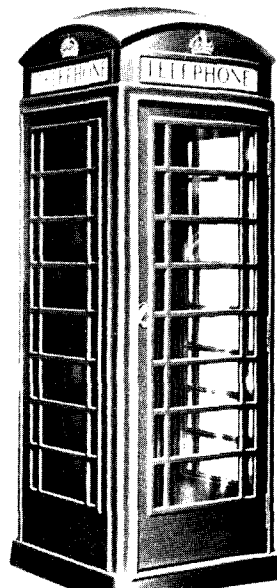


Fig. 17

the No. 2. His final design showed considerable improvement and received general approval of the Post Office and the Royal Fine Arts Commission. The Commission fully endorsed the use of Post Office red as the standard colour. This kiosk became known as the Jubilee kiosk (Fig. 17) and was adopted as a standard for all parts of the country. Simultaneously the Post Office re-designed the internal fittings in black and chrome (Fig. 18) and the unit is known as the Jubilee Assembly. The kiosk came into service in 1936.

Although this article is not intended to deal with the provision of kiosks, it is not perhaps out of place to mention that this notable year marked a step forward in the provision of call offices in rural areas. A scheme known as the "Jubilee Concession Scheme" was introduced whereby call offices were provided in every town and village on the mainland of Great Britain and Northern Ireland which had a Post Office. In the same year which, incidentally, was the tercentenary year of the Post Office, further development was encouraged, and the Post Office undertook to provide a call office wherever the local authority would contribute £4 annually for five years. The scheme was entitled the "Tercentenary Concession". Both schemes have now been replaced by the Rural Allocation Scheme under which call offices are provided in rural areas in co-operation with the Rural District Councils' Association.

With these further developments in rural areas it was not surprising that objections to the standard

colour increased and the Post Office had recourse once again to the Royal Fine Arts Commission and the Preservation councils in an effort to resolve the "colour" problem.

The Royal Fine Arts Commission was set up by Royal Warrant for the specific object of enquiring into and advising upon questions of public amenity or artistic importance referred to them by Government Departments or public bodies. As far back as 1924 the Post Office had asked the Commission's advice about the decorative treatment of kiosks. Their recommendation that Post Office red should be used as a standard had been adopted. In the ensuing years exceptions had, however, been permitted, especially in areas of particular natural beauty where, by special agreement with the County councils concerned, a few No. 3 kiosks were painted green to meet the councils' wishes.

Introduction of the No. 6 kiosk rendered No. 3 obsolete and it became increasingly difficult to

Fig. 18

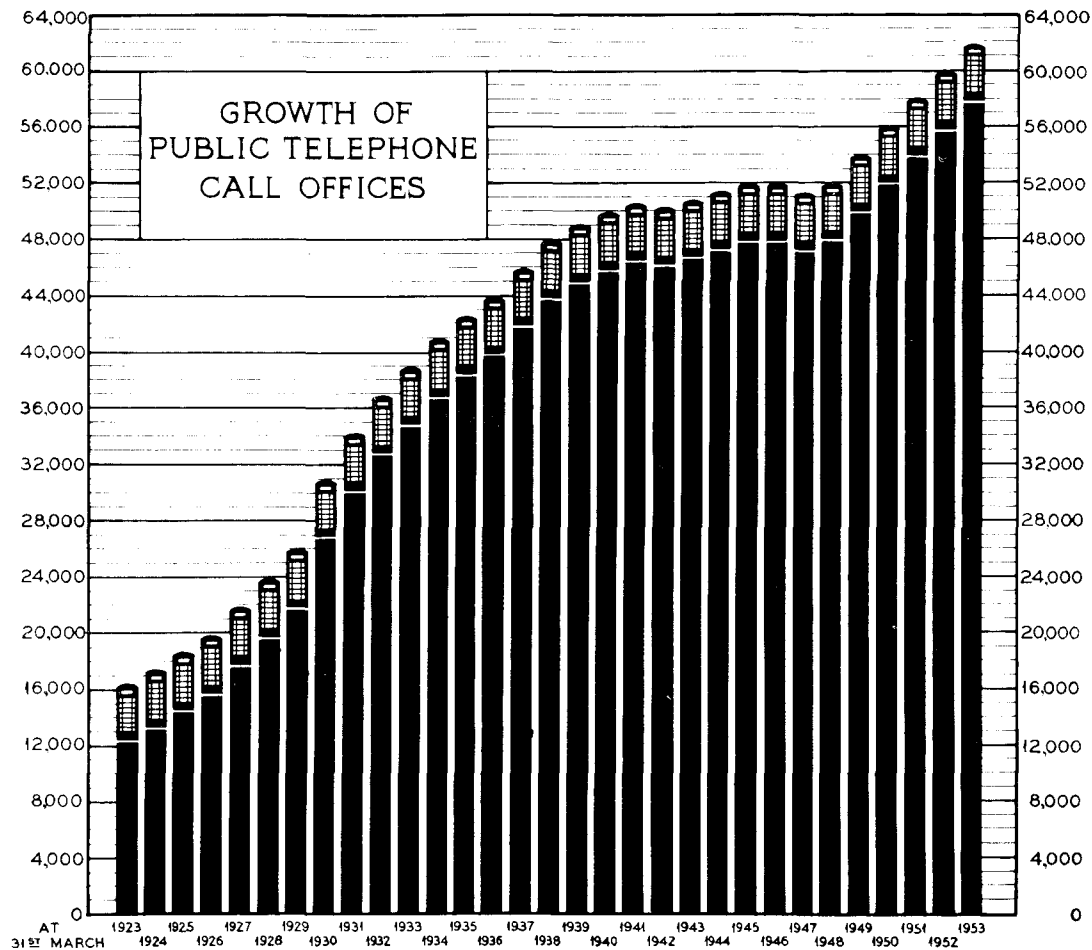


supply the obsolete type in the special areas; one of the difficulties with the pre-cast kiosk is that it is liable to damage in dismantling and re-erecting. Apart from the few exceptions noted, No. 6 kiosk was not provided in other than the standard colour. With the rapid increase of transport and the acceleration of movement throughout the countryside and the introduction of free emergency call facilities, it was considered essential to standardize design and colour to enable the public to recognize a kiosk so that assistance could be obtained quickly in an emergency, whether the fire, police, or ambulance service were required.

In 1939 the Royal Fine Arts Commission had endorsed their earlier recommendation. The war then intervened but in 1946 with the upsurge of interest in town and country planning and the expansion of call office facilities, post-war development brought the question again to the fore. The Council for the Preservation of Rural England raised the matter with the Royal Fine Arts Commission which, while adhering to their original recommendation, felt there were special cases in isolated rural areas and the wilder parts of the country where some variation from the standard Post Office red would be more in keeping with the surroundings and they suggested that in certain (unspecified) areas of special beauty, and with due safeguards, the Post Office should be permitted to paint kiosks dark grey or black, always retaining the approved red for the glazing bars.

In 1947 the Postmaster General, in reply to a question in the House of Lords, undertook to review the matter. Representatives of the Ministry of Town and Country Planning and the Royal Fine Arts Commission and the Council for the Preservation of Rural England took part in discussions and, to enable practical consideration of the different colours, six kiosks were erected in suitable surroundings for their inspection. The six kiosks were painted in Post Office Red, Deep Brunswick Green, Middle Brunswick Green, Black, Light Battleship Grey, and Dark Battleship Grey. With the exception of the red kiosk, the glazing bars of the doors and one other side of each of the five kiosks were painted in red and thus each kiosk could be viewed with or without this feature.

The conclusions were that Post Office Red should remain the standard colour for rural and urban areas, and that in certain places of very



exceptional natural beauty, where objection was raised to the standard Post Office Red, one alternative colour only should be permitted dark battleship grey with glazing bars picked out in red. These recommendations were accepted and a scheme was adopted which provided for co-operation between the Post Office, the local amenity societies and the planning authorities, which has proved very satisfactory in operation. Much more might be said about the development of call offices but it is enough to say here that since 1925 some 45,200 kiosks have been provided and the total of all types in service at December, 1953, was 63,665. The annual growth

is shown in the graph. Considering the intervention of the war and the restrictive years which followed this is no mean achievement. To provide a high quality service to the public, a well-designed, clean and attractive kiosk, neat and durable fittings, has been the constant policy of the Post Office and it has not failed in this respect. Much more remains to be done and saturation point seems a long way off but there is no doubt that our Jubilee Kiosk will stand the test of time and remain a hallmark of successful enterprise and development in the interest of our people.

We hope to include in a subsequent issue a further article dealing with the more technical aspect of call office facilities. EDITOR.

"Tailored" Telephone Facilities for Exhibitions

G. J. Millen, A.M.I.E.E.

Telephone Manager, West Telephone Area, London

TRADE EXHIBITIONS ARE IMPORTANT TO ANY manufacturing country, but especially so to Great Britain, which is so dependent on a thriving export trade. Year by year thousands of people from all over the world visit the famous exhibition centres in London — Olympia and Earl's Court — and the larger provincial centres to see the latest products of British industry. Home and overseas buyers are interested to see the goods Britain has for sale; manufacturers are eager to demonstrate and sell their goods; and large numbers of the British public go to see the most up-to-date inventions and designs which, later, they will be able to buy in the shops.

With the exception of a short break in the summer months, and another at Christmas, exhibitions follow each other regularly at Olympia and Earl's Court. The *Daily Mail* Ideal Homes Exhibition, the British Industries Fair, the National Radio and Television Exhibition, the Motor and Commercial Motor shows and numerous others, all present their special problems. At Christmas the exhibition halls stage the famous circuses, and even a circus needs telephone facilities.

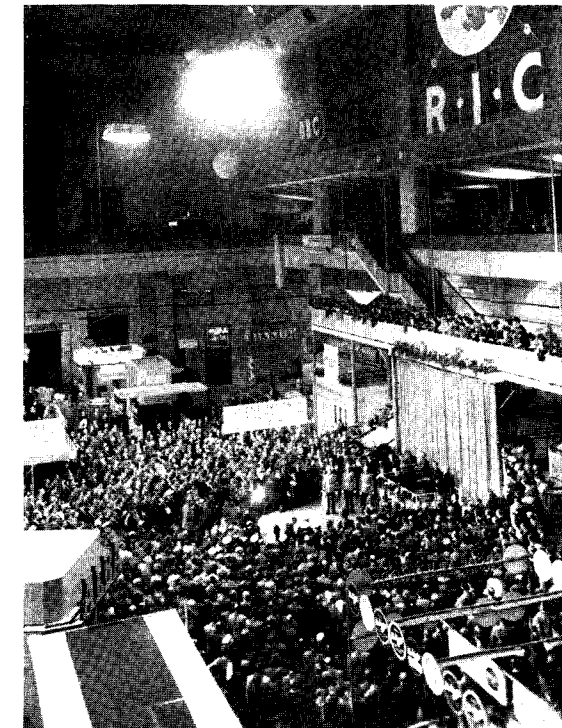
Efficient telecommunications play an important part in these exhibitions. Exhibitors need constant touch with their factories and buyers with the firms they represent. Overseas buyers need immediate facilities for telegraphing and telephoning to their offices in distant countries. In addition to telephones on the stands, call offices have to be installed for public use. An internal system of telephones is needed for controlling the exhibition.

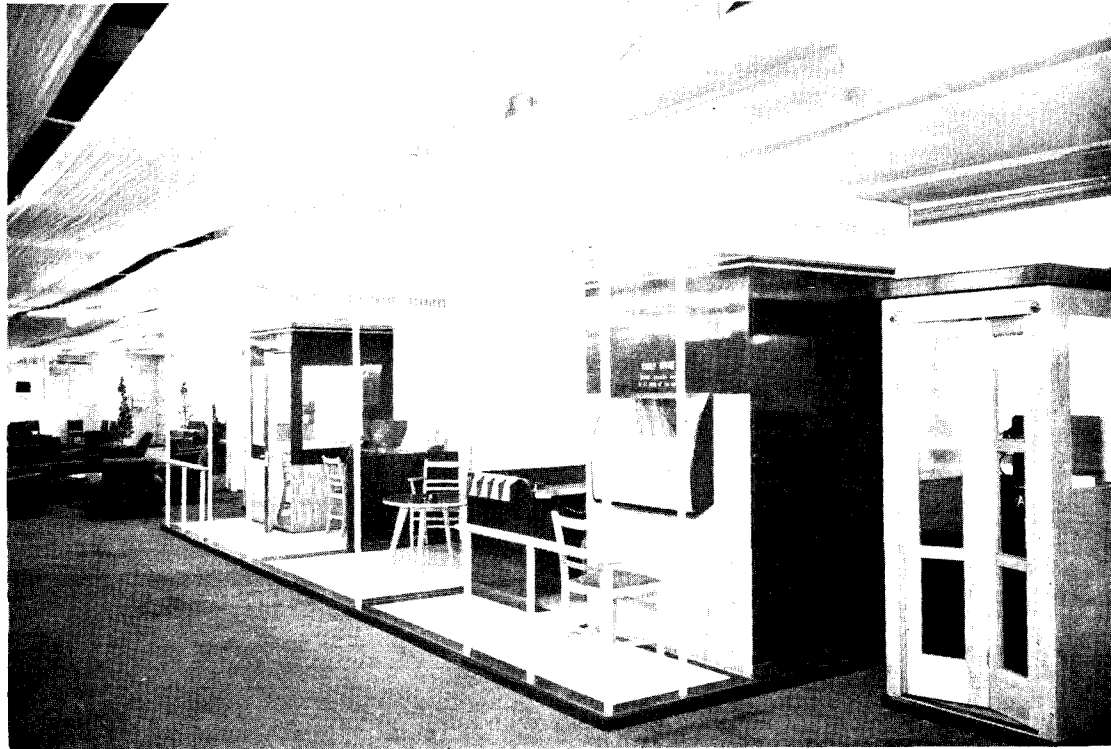
Olympia and Earl's Court are in the London Telecommunications Region, West Telephone Area, and the local telephone services have to carry a heavy extra load for each exhibition. Every exhibition calls for specially "tailored" telephone facilities suited to its "figure" and usually the staff have only a brief time to make the necessary

changes. A normal exhibition at either of these places probably involves fitting anything between 200 and 500 telephones; the British Industries Fair may involve installing as many as 1,800 telephones — 1,000 in Olympia and 800 in Earl's Court.

Exchange lines must, of course, be available for immediate connection, and a block of 1,850 equipments is reserved on Fulham Exchange for this purpose. These equipments are permanently

Twentieth National Radio and Television Exhibition, 1953
(By courtesy of the Radio Industry Council)





International Machine Tool Exhibition, Olympia: Post Office stand

cabled to the exhibition buildings by way of a break jack frame; a 1,200 pair cable serves Earl's Court and a 1,100 pair cable serves Olympia. Of the two centres, Olympia is the older and presents rather a different problem from the newer Earl's Court.

At Olympia there are three exhibition halls, the Grand Hall and the National Hall, each with one gallery and the Empire Hall with three galleries, a total floor area of about half a million square feet. A large exhibition will occupy all the available space, but smaller ones may take up only part of the building. Stands may be erected all over the ground floor and in the galleries.

The Post Office has a small room, in which there is a main distribution frame, where the cable from Fulham Exchange terminates, adjoining one of the main staircases in the Grand Hall. Distribution cables feed from this room to various distribution cases on walls and galleries but no further. The cabling to exhibitors' stands, the plan for which varies with each exhibition, is the

real problem. Here great use is made of steel suspension wires stretched between galleries, stanchions, pillars and so on. Along these wires one-pair cables are tied either singly or in bunches, leading through stand roofs as required.

This sounds relatively simple, but the time available to prepare an exhibition rarely exceeds a fortnight and is often no longer than a week. A stand telephone cannot be fitted until the stand is nearly completed and it can well be imagined that stands are in various stages of completion all over the halls right until the opening day. Much of the installation work has inevitably to be done in a rush during the few days before opening. The men who do the work, therefore, must not only know the halls intimately but must also be prepared to work closely with the stand contractors and to use their initiative to get telephones into the most inaccessible places.

Earl's Court is a relatively modern exhibition hall. There is only one main hall, with basement, ground floor and first- and second-floor galleries,

but, strangely enough, the available floor area is practically the same as at Olympia 500,000 square feet. The exchange cable feed terminates on a spacious main distribution frame in the basement, from which feeder cables take pairs of wires to terminal blocks all over the building. Many of these are hidden in small traps in the floors, others are on walls and stanchions, but more than 4,000 cable terminations are available to which the exchange lines can be connected.

At all sites, great vigilance has to be exercised while an exhibition is being set up to prevent stands being built on top of distribution point traps, thus sealing the vital cable pairs. Here again, co-operation with exhibitors and contractors is essential.

The Post Office installation engineer in these halls is also the maintenance engineer; indeed, without such an arrangement maintenance would be exceedingly difficult. As it is, temporary records have to be kept for each show, and the advantages of the "man who put it in" looking after it are obvious.

From the very nature of things, much of the traffic from exhibitions requires the assistance of an operator. Incoming callers often do not know the number of an exhibitor, and have to be told this by the exchange. Special monitorial services are instituted to enable callers to be given the numbers they seek. As many as four additional operators are used for this work at large exhibitions.

Again, originating traffic from the exhibitions is often long-distance and up to eight or more operators have to be drafted to the local exchange to handle the additional traffic. This has been taken into account in the design of Fulham Exchange, due allowance having had to be made to cater for the increased loads. At the large exhibitions, particularly the British Industries Fair and the Motor Show, a bureau with linguists in attendance is specially set up to assist foreign buyers.

There is a small Post Office open during all exhibitions at Olympia and Earl's Court. In addition, for some shows, special telephone facilities for both inland and overseas calls have to be installed in the Buyers' Club and at a few exhibitions the Post Office installs special stands from which visitors can telephone overseas, or send telegrams to places abroad. Staff to advise users, as well as operating staff, always attend on these stands.

All these facilities go to provide the high standard of service called for by exhibitors, buyers and the general public during the short term of an exhibition's active life; but perhaps the biggest problem is that of compressing actual provision of service into the short period between the time the various stands take shape and the actual opening.

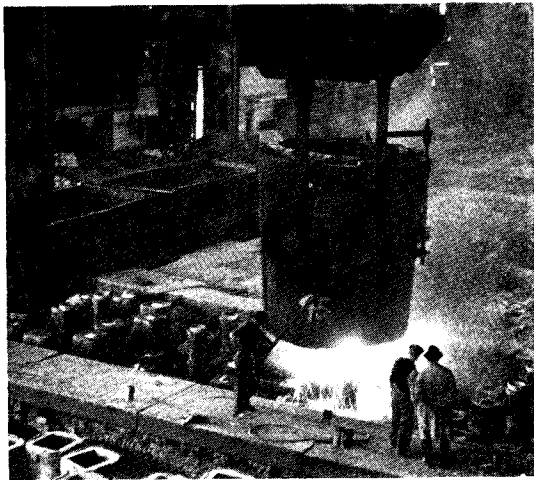
Book Review

The Great Iron Ship. By James Dugan. Hamish Hamilton Ltd. 224 pp. Illustrated 16s.

"Elephant Spinning a Cobweb" is the author's heading to the chapter on the *Great Eastern* laying the 1865 and 1866 transatlantic telegraph cables; it is an adaptation of a phrase about spinning "a thread of thought between two continents" used at the time by Sir William Howard Russell, *The Times* correspondent. *Great Eastern* was a paddle-steamer of 22,500 tons displacement the largest ship afloat until the *Lusitania* of 1906. Shortly, H.M.T.S. *Monarch*, the largest cable laying ship afloat today, will begin to lay a new "thread of thought" between Scotland and Canada; her displacement is a mere 8,000-odd tons.

James Dugan tells the great ship's story dramatically, from her conception by Isambard Kingdom Brunel, and the loss (one of many) of a "rivet basher" during the building, in 1854, to her break-up (after a spell as a show-boat) in 1888, and the discovery of the basher's skeleton inside her shell. The story of the cables is always worth re-telling and re-reading. Perhaps *Monarch* will carry the book in her library when laying the new telephone cable: good, and pertinent reading for her crew in off-duty hours.

New Converter. Cable & Wireless Ltd., have produced in their Radio House workshop a new instrument for converting the normal inland teleprinter 5-unit code into 7-unit for transmission overseas, and reconversion into 5-unit for inland distribution. The converter detects errors caused during radio transmission and obtains corrections from the necessary end. Units have been installed in the Post Office Cable & Wireless London Telegraph Station and shipped to Australia for field tests.



Casting 80 tons of molten steel into ingots
(By courtesy of Fox Magazine)

TWO NORTH EASTERN

"Made in Sheffield" is a legend known throughout the world for high quality steel products.

More than half the value of the steel produced in this country comes from Sheffield; steel for peace and steel for war, for high speed cutting tools and armour plate, for roller bearings and gun barrels. The first stainless steel, which revolutionized the cutlery trade, was produced here in 1912.

The discovery about 200 years ago of the method of making "Old Sheffield Plate" has led to the present extensive manufacture of artistic silver ware and electro-plate for which Sheffield is so well-known. There is probably hardly a household in the country without its Sheffield electro-plate, as well as Sheffield cutlery and garden tools.

The city with its 513,000 inhabitants is the fifth largest in England and the largest in the North Eastern Region.

Sheffield is the centre of a Telephone Area serving a wide variety of needs. It includes not only the coal mining and dense industrial districts of South Yorkshire, but also scattered and mountainous rural parts.

The Pennine Chain runs southward almost to Sheffield itself and below the city the Area extends into the Derbyshire countryside and includes Chesterfield, the Peak National Park and the Hope Valley. Further to the east it reaches Worksop in North Nottinghamshire and so comes down towards Sherwood Forest and the Dukeries, its boundary running with that of the Nottingham Telephone Area.

In the Sheffield Telephone Area there are over 90,000 stations of which 95 per cent are automatic, the highest proportion in any provincial Area. The annual revenue exceeds £1,500,000.

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Left to Right (seated): A. M. HUNT, A.M.I.E.E., Area Engineer; F. G. DEBKS, Chief Clerk; I. MATHESON, Telephone Manager; V. G. CRITCHLOW, A.M.I.E.E., Area Engineer; Mrs. D. H. LEAVER, Secretary. *(Standing)* C. A. ATKINSON, B.Sc., Chief Telecommunications Superintendent; A. L. TAMBLYN, Senior Sales Superintendent.



TELEPHONE AREAS

Wherever men deal in wool Bradford is a name of paramount consequence. Perhaps this very renown tends to obscure its other claims to notice. These are associated with circumstances as diverse as its unique geographical position midway between the east and west coasts in the heart of the industrial West Riding and its ecclesiastical importance as one of the newer bishoprics. Its cathedral, originally the parish church, dates back to the 14th century.

The city of Bradford is the headquarters of the Area but nearby are the important textile centres of Huddersfield and Halifax which are also well known for their engineering and chemical products, and Keighley which is world famous for textile machinery.

To those unacquainted with the Bradford Telephone Area not the least surprising feature is the wild unspoilt country within easy reach of the towns, country of romance such as the Brontë country, the Yorkshire Dales and Yorkshire Moors.

The Area covers 785 square miles of which more than half is rural; indeed the territory north of Skipton is very sparsely populated. Here are the headwaters of the rivers Aire, Wharfe and Ribble, long deep dales, steep and desolate fells, isolated and remote.

This part of the Area is now largely designated as a National Park. The scenery is austere and grand rather than dainty, although there are numerous charming waterfalls and little lakes or "tarns" with plenty of wild life.

The Area contains 61 exchanges of which 43 are automatic serving over 67,000 exchange connections with about 105,000 stations.

The total staff inclusive of operating force numbers 1,660. The annual revenue approaches £1,700,000

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Left to Right: A. SCARBOROUGH, Chief Telecommunications Superintendent; Miss M. M. GREEN, Secretary; A. BAXTER, Chief Clerk; B. R. BAILEY, Telephone Manager; R. E. RIMES, B.Sc., A.M.I.E.E., Area Engineer, External; W. G. GIBBS, Senior Sales Superintendent; E. HOPKINSON, B.Sc. (Eng.), A.M.I.E.E., Area Engineer, Internal.



SHEFFIELD

BRADFORD



Industrial scene in the West Riding
(By courtesy of the Halifax Courier)

The International Telecommunication Union

Hugh Townshend, C.B.

Assistant Secretary-General

The second and concluding instalment of Mr. Townshend's survey of the I.T.U. The first part appeared in the February-April, 1954, issue.

FROM THE NATURE OF THE WORK, IT FOLLOWS that many of the officials have to be recruited at a relatively advanced age from administrations or companies in which they have acquired the necessary experience in the course of duties more directly connected with the actual working of telecommunication services. Moreover, the telecommunication Convention prescribes that due regard is to be paid to the importance of recruiting staff on as wide a geographical basis as possible. Further, most of the staff of the Union need, for the efficient discharge of their duties, to have a fairly good knowledge of at least two languages. These conditions very considerably complicate the problems of recruitment.

In the third place, the staff of the Union has to be so organized that it can furnish the necessary secretariats—including translators and interpreters—for the functioning of the conferences and meetings which constitute its controlling bodies; this work, to which there is no analogy in a national telecommunication administration, presents administrative problems of its own, particularly owing to its spasmodic nature. Only nucleus conference staff can be employed permanently, for example, a cadre of translators and minute writers, who have other linguistic and secretarial work at headquarters in between conferences. This means the frequent recruitment of conference staff on short engagements.

The broad effect of this situation is to render the administrative work of the Union necessarily complex in relation to its size. Space does not, however, permit of the discussion in this article of purely administrative problems.

There is, moreover, a still more basic feature of the work of the I.T.U. to which nothing parallel is to be found in the field of national telecommunication administration. The Members of the Union are all sovereign governments (apart from a few which are territories responsible to a sovereign government). These governments have bound themselves to observe the International Telecommunication Convention and the International Telegraph, Telephone¹ and Radio Regulations (subject in some cases to important reservations); but in all other matters each country is free to conduct its telecommunication services in any way it chooses.² For technical reasons, it would be impossible in modern conditions to operate the international telecommunication services at all without a very high degree of standardization of operating methods and plant, and this has to be secured over a very large part of the field—everything not covered by the International Regulations by means of voluntary agreement.

Such agreement is in practice secured through the machinery of the three International Consultative Committees, which thus play a most vital part in the development of international telecommunication. Their organization is therefore worth describing.

As stated earlier in this article, each C.C.I. is governed by its Plenary Assembly. The essential

¹ The Telephone Regulations only apply in what is known as the "European régime"—that is, broadly, the countries of Europe and of the Mediterranean basin.

² Subject, of course, to any other treaty obligations which it may have undertaken, and to the customary obligations of international law; but in practice these apply in the main outside the highly specialized field of telecommunication services.

features of the Plenary Assembly are, first, that every Member country of the I.T.U. has a right to be represented at its meetings; secondly, that a "recognized private operating agency"—that is, a private company operating telecommunication services—has also the right to be separately represented as a member of the C.C.I., subject to the approval of the Government of the Member country which recognizes it;¹ thirdly, that the conclusions of the Plenary Assembly on any point before it are in the form not of binding rules or regulations but of "recommendations", which are circulated to all Members of the Union for adoption by those countries which see fit. In practice the representatives both of governments and of operating companies which attend a C.C.I. Plenary Assembly are experts in the field with which that particular C.C.I. deals; the meetings, therefore, constitute a kind of specialized conference, neither very large nor very expensive.

Study Groups

It is the Plenary Assembly, meeting normally every three years, which not only gives its fiat to recommendations on all the questions before it but also organizes the study of new questions for the next three years. The questions under study are dealt with by study groups consisting of expert representatives from Member countries, the work being co-ordinated by the permanent staff, that is, the Director with his specialized secretariat. Any country Member of the Union may, if it wishes, participate in the work of any study group, but in practice their membership is usually confined to a relatively small number of countries which are willing and able to lend the services of experts in the particular questions dealt with by the group.²

The field of studies varies very greatly covering highly technical matters needing to be dealt with by specialized scientists, other questions of technical standardization and the planning of international telecommunication networks which call for treatment by specialized engineers of wide experience, and matters of improving and standardizing operating practice and adjusting rates,

¹ International organizations "which co-ordinate their work with that of the I.T.U. and which have related activities" are admitted to participate in an advisory capacity.

² Besides administrations, recognized private operating agencies and interested international organizations, experts of (national) scientific or industrial organizations may be admitted to take part in the work of any study group; the latter do not, however, participate in Plenary Assemblies.

³ 100 per cent. in the case of the C.C.I.R. (radio), which by its terms of reference is wholly concerned with technical questions.

which also call for very specialized experience but are not technical at all in the narrow sense of the word. Nevertheless at least three-quarters of the work is strictly technical.³ The study groups work as far as possible by correspondence, but meet when necessary, the meetings being arranged by the Chairman in consultation with the Director. (There is provision freely used for joint studies of questions concerning more than one C.C.I.). The chairman and a vice-chairman of each study Group are selected personally by the Plenary Assembly.

It will be seen that the organization of the C.C.I.s has three basic advantages. First, it ensures a preliminary study of each question by a comparatively small number of highly qualified people, followed by discussion at a larger meeting—the Plenary Assembly. Secondly, it is extremely flexible, permitting experts drawn from a very wide field of national and international organizations, both private and governmental, to be brought together as and when required. Thirdly, it embodies to a very high degree the "voluntary principle", since no country is bound at all at any stage of the proceedings; as stated above, even when a formal recommendation is issued with the fiat of the Plenary Assembly no country is bound to follow it. As a rule, however, telecommunication administrations and companies do accept the C.C.I.'s recommendations and in this way the necessary degree of standardization is attained. It may be doubted whether, in a world of many independent sovereign countries, this result could be secured in any other way.

Report for Conference

It should be added that the C.C.I.s also play a part in the preparation of proposals for administrative conferences. One year before the quinquennial meeting of the conferences of the Union which revise the Telegraph, Telephone and Radio Regulations, representatives of the study groups of the C.C.I.s concerned, in concert with the General Secretariat, prepare a report embodying such extracts from the *recommendations* of their C.C.I. as seem suitable for incorporation by the Conference in the Regulations *binding* Member countries. This report is circulated to all the Member countries of the Union for their use in preparing proposals for the Conference; it is also available for use at the Conference itself.

The C.C.I. recommendations deemed, by the experts who took part in the studies leading up

to them, to be suitable for inclusion by an international conference in binding international regulations are naturally those recommendations that have been accepted and put into practice by a considerable number of countries. In this way the machinery of the C.C.Is brings into play the vital elements of discussion, persuasion and experiment in successively widening circles over a period of time before sovereign countries are asked to abandon idiosyncrasy and to commit themselves in the common interest to the adoption of internationally standardized methods and practices. It is tempting to ask whether there may not perhaps be scope for the international application of these proven principles in fields wider than that of telecommunication.

Radio Frequencies

A description of the I.T.U. in 1953 would be seriously incomplete if it did not include some account of the tasks and method of working of the I.F.R.B. It must be emphasized that the I.F.R.B. is still, to some extent, feeling its way to the full accomplishment of the task for which it was created, namely, facilitating and co-ordinating the voluntary international regulation of the use of radio frequencies. It must also be borne in mind that the constitution and attributions of the I.F.R.B., while they have been formally approved in plenipotentiary conference by the large majority of the governments Members of the Union, have been the subject of reservations by a number of Member governments.

The position can best be explained by means of a short account of the history of the I.F.R.B. The last normal Administrative Radio Conference of the Union, which met at Atlantic City in 1947, found the (post-war) frequency situation in chaos, and succeeded—but only after several months of intensive work—in drawing up a table known as the “Allocation Table of Atlantic City” which reallocated the whole of the available spectrum in bands assigned to the various *services* which need to use radio frequencies. The task was arduous and the issues controversial; and the Conference was unable itself to tackle the still more arduous and controversial task of assigning the individual frequencies in the various service bands to stations requiring them. It set up the I.F.R.B. with the idea that it would begin its normal work when this gigantic initial task of re-assigning the frequencies in use throughout the spectrum had been completed. This was to be done within a period of

about a year by special machinery set up for that purpose. The machinery devised was known as the “Provisional Frequency Board”—in effect a large special radio conference, meeting in 1948 in Geneva, with which the members of the newly created I.F.R.B. were associated in the capacity of international members. At the same time, other parts of the task were delegated to separate conferences, of which three were regional and two were concerned respectively with the bands allocated in the Atlantic City Table to the aeronautical services and to the high frequency broadcasting services. (The regional conferences dealt with bands of frequencies which, for technical reasons, do not give rise to *world-wide* interference.)

Some of these conferences succeeded in completing their tasks, others did not; moreover, in the end the meetings of the Provisional Frequency Board were suspended. This left a confused situation. The Administrative Council, in pursuance of its wide mandate, then took the matter up and with the approval of the majority of the Members of the Union, an Extraordinary Administrative Radio Conference, with terms of reference proposed by the Administrative Council and accepted by the Member governments, was convoked in Geneva in 1951. Although even this conference (known as the E.A.R.C.) was unable to prepare a complete frequency list covering the whole spectrum, it was able to secure the agreement of a large majority of the Members of the Union (although not without a number of reservations) to a detailed programme of work, on which the I.F.R.B. is now engaged. The Plenipotentiary Conference of Buenos Aires reviewed the situation and, by a majority decision, confirmed the recommendations of the E.A.R.C.

Completion by Stages

It is impossible, within the limits of space available, to do more than refer the reader interested in examining the present situation in detail, to the published report of the E.A.R.C. and the relative resolutions of the Buenos Aires Conference. Very briefly, however, the plan is to bring the Atlantic City Allocation Table into effect and to complete the Frequency List by stages over a period of several years—subject to an annual review of the position by the Administrative Council, which will initiate a recommendation to the Members of the Union to hold an Administrative Radio Conference to complete the edifice when it judges that

the time is ripe. Meanwhile, the I.F.R.B. is proceeding to examine, from the technical angle, demands relating to the utilization of frequencies and to effect their registration, over a wide portion of the spectrum. It handles the enormous volume of detailed data involved in this task with the aid of office mechanization, using a punched-card system.

It is worth while observing that the “voluntary principle”, so conspicuous in the organization of the C.C.Is and inherent in the statute of the I.F.R.B., also manifests itself in the Union’s *financial practice*.¹ Indeed this practice may be said to be based on a compromise between the voluntary principle and the opposing principle of centralised authority. In order to secure as far as possible the practical advantages of the latter, the Union has only one budget, which is prepared by the Secretary-General (in consultation with his colleagues at the head of the technical permanent organs—the C.C.Is and the I.F.R.B.) and approved by the Administrative Council. But in order to retain the advantages of the voluntary principle, the Union’s budget and accounts are divided into three different parts, the ordinary budget, the extraordinary budget and the printed-matter budget. The ordinary budget includes the cost of the main permanent structure of the Union—it covers an expenditure of the order of 6 million Swiss francs (say, £500,000) a year, mostly on staff, but also, of course, including expenditure on premises and office expenses; and it is paid for by *all* the countries which belong to the Union.

Extraordinary Budgets

The extraordinary budget is really a series of separate budgets, one for each conference; its total amount in any year naturally depends on the number and size of the conferences held in that year (it has varied in recent years from 10 to 2 million Swiss francs—say, from £850,000 to £170,000), but the essential point is that the expenses included in it are paid for *only* by those countries which attend the conferences in question. (In the case of the C.C.Is the expenses of the study groups are lumped in with those of the Plenary Assembly).

In this way no country need pay any share in the expenses of a conference or in the cost of running

¹ *Though the cost of the I.T.U. is so small, its allocation between the Member countries has given rise to much discussion. The principles of financing it which have been adopted are not therefore without some practical importance.*

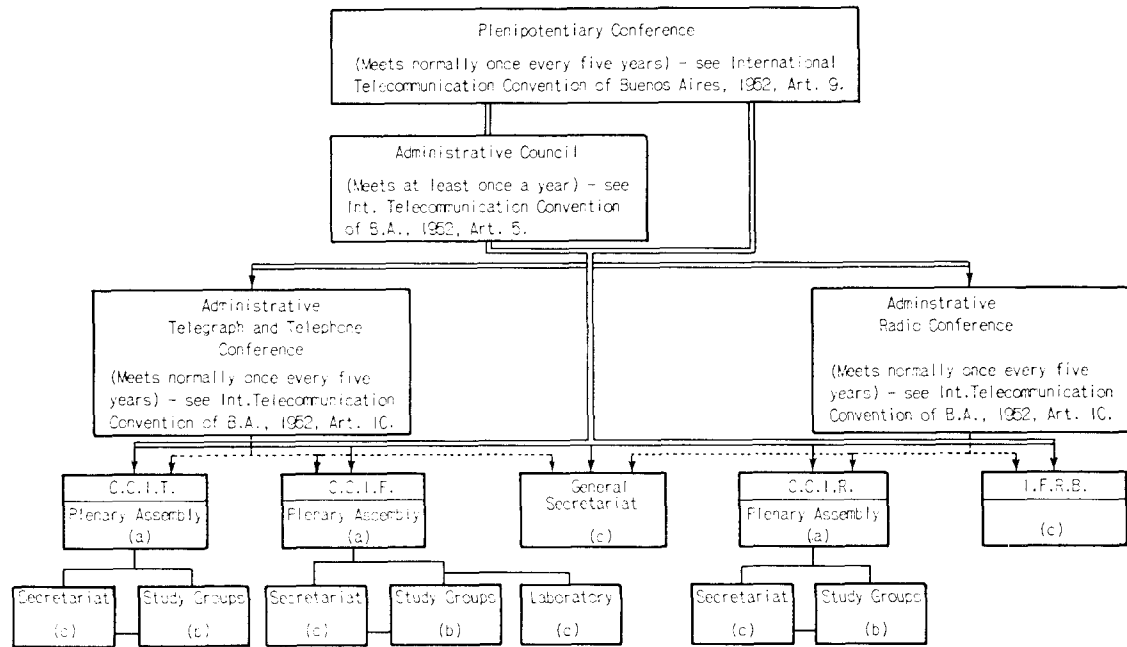
a C.C.I. in which it is not interested—except, indeed, in so far as these expenses consist in the pay of permanent staff borne on the ordinary budget and thus shared by all. Finally there is the printed-matter budget, which covers practically all the publications of the Union. This is in the form of what is known in the United Kingdom as a “commercial account”, with a turnover of the order of 1½ million francs (say, £125,000) a year; and, with minor exceptions, each of the Union’s publications is costed and sold at cost price (including a percentage for overheads). In this way each country pays for as many copies of each document as it cares to order. (Incidentally, documents which interest the public can be obtained by anyone at his own expense). I think it is safe to say that this policy of *selling* the Union’s publications to its Member governments is saving these governments a relatively substantial amount of money each year, since none of them is tempted to indent for more copies than it really needs. Thus unnecessary editions, or unnecessarily large editions, are avoided, and economical methods of reproducing documents are encouraged.

Calculating the Unit

Moreover, even in the basic matter of the proportion in which Member countries share in paying the cost of running the Union, the voluntary principle operates, since each Member country of the Union selects independently the number of *units* which it is prepared to pay. The financial value of a unit is then arrived at by dividing the total amount to be paid, as shown in the annual budget, by the aggregate number of units subscribed for. This system applies both to the ordinary and extraordinary budgets.

It is true that the existing compromise between two opposing principles in the field of finance is not without its critics. At the Plenipotentiary Conference of Buenos Aires, 1952, some countries strongly advocated that all the expenses of the Union should be centralized in one unified budget, with obvious advantages in simplicity of accounting and control. Other countries, however, regarded the maintenance of the present degree of “voluntariness” as possessing overriding advantages, and in the end the Conference compromised on the compromise by leaving matters alone for the next five years while instructing the Administrative Council to study once more the pros and cons of a change in the direction of unification. An interesting development at the same conference was the

ORGANIZATION OF THE UNION (October 1953)



(a) Meets normally every three years. See International Telecommunication Convention of Buenos Aires, 1952, Art. 7. and the annexed General Regulations, Chapters 12 and 13

(b) Continuously operative by correspondence; meet as and when necessary; see the General Regulations, Chapters 15 and 16

(c) Continuously operative

widening of the scale of contributions, which formerly ranged from 30 units to 1 unit and now ranges from 30 units to $\frac{1}{2}$ unit. In spite of this wide range of contributions, no single Member country pays more than about 5 per cent. of the total annual expenditure of the I.T.U.¹ (All Members have equal rights, whatever they pay.)

Another interesting feature of the I.T.U.'s financial structure is that its constitution provides no "sanctions" against the non-payment of contributions due; overdue contributions merely carry interest.

Broadly speaking, and in relation to a wider field than that of finance, it may be said that the "voluntary principle" permeates the whole structure and organization of the Union, but that the

¹ The budgets of some of the other international governmental organizations present a rather striking contrast in regard to the apportionment of the expenses among the Member countries.

extent to which it should be applied in various fields is a matter of compromise and discussion.

In order to complete - so far as possible within a short space this very broad picture of the functioning of the I.T.U., it is necessary to say something about its relationship with the other specialized agencies of the United Nations, with representative non-governmental international bodies (such as the International Chamber of Commerce) and with the U.N. itself.

The relations between the I.T.U. and the other specialized agencies vary greatly. Some of these agencies, such as the International Labour Organisation, operate in a field which hardly overlaps that of the I.T.U. (It should, however, be mentioned that in regard to administrative matters, such as the recruitment of staff and the placing of contracts for office supplies, there is close collaboration between the I.T.U. and all the

specialized agencies having their seat in Geneva. This is effected in the main by more or less informal meetings of the officials concerned. The I.T.U. is, however, formally affiliated to the Administrative Tribunal of the International Labour Office (a staff appeal tribunal) and also to the (Staff) Sickness Insurance Fund of the same Organisation). In the case of other agencies, however - particularly the International Civil Aviation Organisation and the World Meteorological Organisation - there is a very fruitful field of active collaboration. This comes about because civil aviation and meteorological services are very large users of telecommunication services and have very special needs. There is therefore frequent representation of these two agencies at I.T.U. conferences and meetings, and vice versa.

No Formal Agreements

It is worth noting that the authorities of the I.T.U. have not so far found it necessary to conclude any formal agreements with these agencies practical collaboration seems to work just as well without. At an intermediate level is the collaboration of I.T.U. with agencies such as U.N.E.S.C.O. and the World Health Organisation. The latter is not normally much concerned with telecommunication, but has successfully invoked the help of the I.T.U. in regard to the treatment of a special class of international telecommunication in which it is interested in the course of its functions in controlling epidemics. U.N.E.S.C.O. is, of course, closely concerned with press services and broadcasting, both of which are very large users of telecommunication; no difficulty has been found in arranging for the necessary collaboration at the official level.

Mention should be made of a general administrative problem not yet wholly solved - which, in existing conditions, is inherent in the relations between international governmental organizations, such as the I.T.U. and the other specialized agencies of the United Nations; that is, the possibility of conflict between decisions taken by the responsible conferences of two international organizations on points where their fields of action overlap. Since the membership of the two organizations usually consists largely of the same countries, it might be supposed that the majority of the Member governments, acting officially in conferences, would always take the same view on the same subject. However, it sometimes happens

in practice that they do not; the representatives of a particular government at a conference of one international organization do sometimes express a different view from that expressed by other representatives of the same government when the same point comes up at a conference of another international organization. This comes about, of course, because they are necessarily looking at the point from different angles, the views from which need to be co-ordinated, either at the national or at the international level. In such a case, there is no definite constitutional provision for the resolution of a possible resulting conflict, which, if allowed to develop to the point at which the view of each organization is hardened, is liable to cause some confusion and appreciable waste of time. The remedy seems to be, on the one hand, at the national level, to improve co-ordination between the different governmental departments concerned in briefing representatives to international conferences; and on the other hand, at the international level, to ensure the earliest possible agreement in each particular case by both the interested agencies as to which one of them is the proper body to take the final decision. So far as the I.T.U. is concerned, the difficulty is especially liable to arise in cases where another specialized agency is interested in international telecommunication services from the point of view of a particular section of the users. It seems likely, however, that experience will diminish difficulties of this sort, which, though sometimes tiresome, have never been disastrous.

Observers

As regards non-governmental international organizations, of which the International Chamber of Commerce is one of the best known in telecommunication circles, the constitution of the I.T.U. permits the Chamber to be represented by observers at I.T.U. conferences and meetings in which it is interested from the point of view of the commercial users of telecommunication; the same may be said in general of other important international non-governmental organizations. Such rights of representation are on a reciprocal basis.

With the U.N. itself, the I.T.U. has a basic formal agreement, referred to earlier in this article. The I.T.U., as a technical organization, is not of course concerned with many of the problems dealt with by the various organs of the United Nations. It makes, however, an annual report on its work

NOTES AND NEWS

Teleprinter Automatic Switching Completed

THE OPENING OF THE TELEPRINTER AUTOMATIC Switching Centre at Brighton, on April 11 marked the closing phases of a project for modernizing the telegraph service which originated in a committee formed in 1935. The traditional method of working in the telegraph service was over point-to-point circuits, but this involved repeated manual retransmissions of many messages, and was both costly and a potential cause of delays and errors. In 1935, therefore, the Telegraph Retransmissions Committee was set up "To investigate and report upon the considerations involved in reducing the number of retransmissions by means of direct dialling between teleprinter offices".

As a result of the work of this Committee and the successful tests of model equipment, the Post Office Board decided in 1938 to proceed with a trial of an automatic switching system. Progress was suspended by the war, but afterwards the pre-war plans were resuscitated and the design brought up to date to take advantage of the latest techniques. Supply difficulties following the war caused further setbacks, and it was not until October, 1950, that full scale pilot equipment was brought into service at London North and Birmingham.

Traffic has declined steadily since the war and the plans have, therefore, been reviewed from time to time until we now have a network of 22 switching centres interconnected by voice-frequency channels. Brighton was the last centre to be brought into service. Out of a total of 500 offices on the complete network fewer than 100 small offices still remain to be connected and it is hoped to convert most of these by June of this year.

The automatic switching equipment used is similar to telephone equipment, but has certain additional features. The final selectors, which are all of P.B.X. type, give "suspense" and "overflow" facilities. Thus, a call for a busy line can wait about a minute for it to become free, but if it remains busy the call is diverted to a nearby large office from which the telegram is retransmitted.

Another difference is that tones as used on an automatic telephone system to indicate the progress of a call are replaced by teleprinter signals, automatically produced by a special signal generator. The signals used are the same as those agreed for the international Telex Service, such as, "MOM" standing for the French word "moment", and denoting that a call is held temporarily in suspense awaiting a free line.

The Teleprinter Automatic Switching Scheme puts telegraphs a step ahead of telephones because it is, in effect, a nation-wide dialling system. The capital cost of making the whole system automatic has been about £1,500,000, which included nearly £500,000 for new teleprinters. The system will, however, save staff and thereby reduce the overall cost of running the service by about £500,000 a year. The possibilities of exploiting it further within this country are now being considered. Should it be possible to extend the scheme to Eire, and even perhaps to the Continent later, further economies and improvements in the service might be realized.

The Editorial Board

Mr. J. F. Greenwood, C.B., has been appointed Chairman of the Editorial Board of the *Journal* in succession to Mr. R. J. P. Harvey, C.B. The change is consequent upon Mr. Greenwood's appointment as Director of the Inland Telecommunications Department of the Post Office, Mr. Harvey having left that post to become Director of the Radio and Accommodation Department.

Mr. Harvey has been Chairman of the Board since 1949. The *Journal* is greatly indebted to him for his wise leadership and readers will join the Board in thanking him for all that he has done for the *Journal* and in wishing him continued success in his new post.

Colonel A. H. Read, C.B., O.B.E., T.D., and Mr. H. A. Ashton, C.B.E., have resigned from the Board on their retirement from the Post Office.

to the Economic and Social Council. This report is submitted to E.C.O.S.O.C. by the Administrative Council of the Union, after discussion on the basis of a draft prepared by the Secretary-General in consultation with the Heads of the other organs of the Union. The Agreement with the U.N. also provides for mutual representation at conferences, and the U.N. is in fact regularly represented by observers both at the annual meetings of the Administrative Council and at the larger conferences of the Union, including, of course, the Plenipotentiary Conference. The I.T.U. arranges to be represented, in so far as its resources permit, at meetings of the U.N. dealing with matters in which it has an interest. These include the meetings of the E.C.O.S.O.C. itself and also a number of meetings at the official level which are arranged to discuss administrative problems which the U.N. and some or all the specialized agencies have in common. The amount of administrative work involved by these arrangements is considerable.

So far as executive work is concerned, the most important field in which the I.T.U. directly assists the U.N. is the operation, in the field of telecommunication, of the Expanded Programme of Technical Assistance. The arrangements for this are covered by a special agreement between the Secretary-General of the I.T.U. and the Secretary-General of the U.N., approved by the Administrative Council of the I.T.U. in 1952 and subsequently endorsed by the Plenipotentiary Conference of Buenos Aires.

Experts for U.N.

Broadly speaking, the administrative work in connection with Technical Assistance projects in the field of telecommunication is handled by the United Nations Technical Assistance Administration, but the I.T.U. undertakes to find candidates for posts of experts in its field who are required by countries demanding assistance under that Programme, and also arranges suitable programmes of study for the holders of fellowships and scholarships under the Programme who are studying telecommunication matters. Both these activities depend on the collaboration of the governments Members of the Union, who are asked to propose suitable candidates as experts and to offer facilities for the training of fellows and scholars. The candidates' qualifications and the programmes of study proposed are reviewed in each case on a standing committee at which the

Secretary-General presides and of which the Heads of the other permanent organs of the Union and the Assistant Secretaries-General and the Vice-Director of the C.C.I.R. are members. This Committee also reviews the reports of the experts on the results of their missions and those of the fellows and scholars on the results of their courses of study, and advises the United Nations Technical Assistance Administration with a view to helping it to assess the value of the results achieved.

It is not easy to give an overall picture of the activities of the I.T.U. in a small space, and the reader will wish to be referred to sources where he can find fuller information. There are, unfortunately, very few up-to-date studies available, but a reasonably comprehensive and very scholarly account of the I.T.U. in English exists in the form of a recent Doctorate thesis by Mr. G. A. Coddling, Jr., a review of which will be found in the *Telecommunication Journal* of the I.T.U. for November, 1952.¹ This thesis is fully documented and, apart from the considerable amount of information which it contains itself, will be found useful to readers who are in search of references to basic documents, such as reports and minutes of I.T.U. conferences, dealing with aspects of I.T.U. activities in which they are specially interested. The reader is also referred to the Report of the Administrative Council to the Plenipotentiary Conference of Buenos Aires, 1952, and to recent and current articles on various aspects of the work of the I.T.U. in the *Telecommunication Journal*, published in English, French and Spanish, by the General Secretariat at Geneva.

Several of my colleagues in the I.T.U. have added to my debt of gratitude to them by helping me to clarify the ideas adumbrated in this article; but for the views expressed I am, of course, wholly responsible.

Million Words on the Queen's Tour.—During March despatches amounting to 213,647 words about the Royal Tour were received by the Post Office from Australia and 2,945 words from Singapore.

Since the Royal Tour started over a million words have been sent to London via Post Office Cable and Wireless for delivery to newspapers and news agencies.

¹ This thesis was written before the Plenipotentiary Conference of Buenos Aires, but that Conference (see the *I.T.U. Telecommunication Journal* for July, 1953), after reviewing the whole structure of the Union, made no radical change in it.

Colonel Read became a member of the Board on his appointment, at the end of 1949, to the post of Director of Overseas Telecommunications at Post Office Headquarters. A great enthusiast for the *Journal*, he has made a notable contribution to the Board's work during the past few years. He is



Colonel Read

shortly taking up appointment as Telecommunications Attaché at the British Embassy in Washington and the Editorial Board are sure that he will carry with him the good wishes, not only of the Board but also of all readers of the *Journal*, for success and happiness in his new appointment.

Mr. H. A. Ashton has been Deputy Director of the North Western Region since 1947 and since 1951 has been one of the two regional representatives of the Board. With his wide knowledge of telecommunications problems and his experience in public relations, Mr. Ashton has been a tower of strength to the Board and the members would like to record their appreciation of the work he has done, both personally and as representing the men in the field. Readers will join with the Board in wishing him health and happiness in his retirement.

★ ★ ★

Trunk Mechanization.—An important step in the mechanization of the trunk telephone service was taken on Saturday, February 27, 1954, with the opening of the "outgoing section" of London Trunk ND Faraday exchange. This non-director trunk switching unit which incorporates the motor-driven uniselectors serves the exchanges in the London Group, and enables trunk-controlling operators to obtain dialling access to subscribers and operators at exchanges throughout the United Kingdom.

At present access is provided through the switches of the unit—by dialling two or three digit codes—to 14 zone and sub-zone centres and

28 group centres but ultimately this will be extended to all zone and sub-zone centres and some 77 group centres.

The "incoming section" of the unit is expected to open about February, 1955. It will provide dialling facilities in the reverse direction to those mentioned above, that is, from zones, sub-zones, and group centres to exchanges in the London Group.

Observations and artificial traffic tests made since the unit was opened indicate that a satisfactory standard of service is being given.

★ ★ ★

Pecker Problem.—Damage to telegraph poles by woodpeckers has recently been reported in the Press. At one place it was thought that the birds, which have a taste for bees and at times will even raid a hive, were attracted by the humming of the wires which they mistake for bees.

A correspondent in *Country Life* has, however, pointed out that, instead of citing the woodpeckers as a nuisance destroying public property, the Postmaster General should be grateful to these sagacious birds for calling attention to those poles which have rotten patches in them at a height not easily obvious to telephone inspectors at ground level. He adds that the woodpecker does not bore a hole into sound timber, but only into those tree trunks, boles and branches where internal rot is accommodating the insects in which the bird is interested. The poles which have received the woodpecker's attention would perhaps have snapped off during the first severe gale.

★ ★ ★

Tudor Telephone Exchange.—The Tudor Telephone Exchange at Muswell Hill, London, N.10, was converted to automatic working on January 14, 1954. It has the latest automatic equipment and functions as one of the most modern telephone exchanges in the country and capable of accommodating 9,300 subscribers.

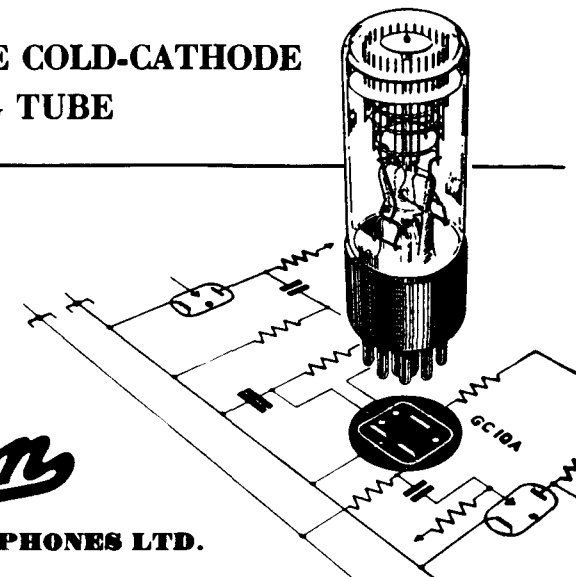
Nearly 8,000 subscribers' lines were transferred from the old exchange to the new, and the list of applicants waiting for service, which at one time exceeded 1,000, no longer exists. Although the new exchange adjoins the old, over 900 miles of wire and more than 160,000 joints were necessary to transfer subscribers' lines and links from other exchanges to the new equipment.

As a matter of convenience, the auto-manual switchboards serving "Tudor" subscribers who

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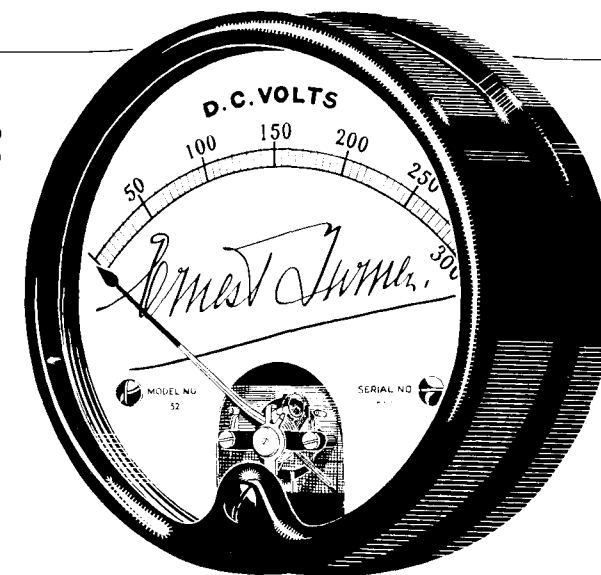
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dial "O", "TOL", "TRU", or "999" are situated at the Gulliver Telephone Exchange, Kentish Town, London, N.W.1.

To mark the change-over, the Assistant Post-



master General, Mr. David Gammans, M.P., officiated at a reception on January 19, 1954, which was attended by the Mayors of Hornsey and Finchley, the Deputy Mayor of Wood Green,

and the Chairman of Friern Barnet Urban District Council.

Our photograph was taken at the reception, which included a demonstration and description of automatic working by Mr. G. E. Brett, Executive Engineer, North Area, and afterwards the visitors were conducted on a tour of the new exchange.

★ ★ ★

Broadcast Receiving Licences. 13,350,136 broadcast receiving licences, including 3,173,024 for television, and 223,509 for sets fitted in cars, were current in Great Britain and Northern Ireland at the end of February, 1954.

During the month the number of television licences increased by 67,380.

★ ★ ★

New Regional Representatives.—Mr. W. F. Westaway has succeeded Mr. J. F. Golothan as Regional Representative for the South Western Region, and an additional Representative, Mr. C. R. Lane, has been appointed to the London Telecommunications Region.

Editorial Board. J. F. Greenwood, C.B. (Chairman), Director of Inland Telecommunications; C. O. Horn, Deputy Regional Director, London Telecommunications Region; A. Kemp, Assistant Secretary, Inland Telecommunications Department; Col. J. Reading, M.B.E., Assistant Engineer-in-Chief; Public Relations Department John L. Young (Editor); Miss K. F. A. McMinn.

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

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