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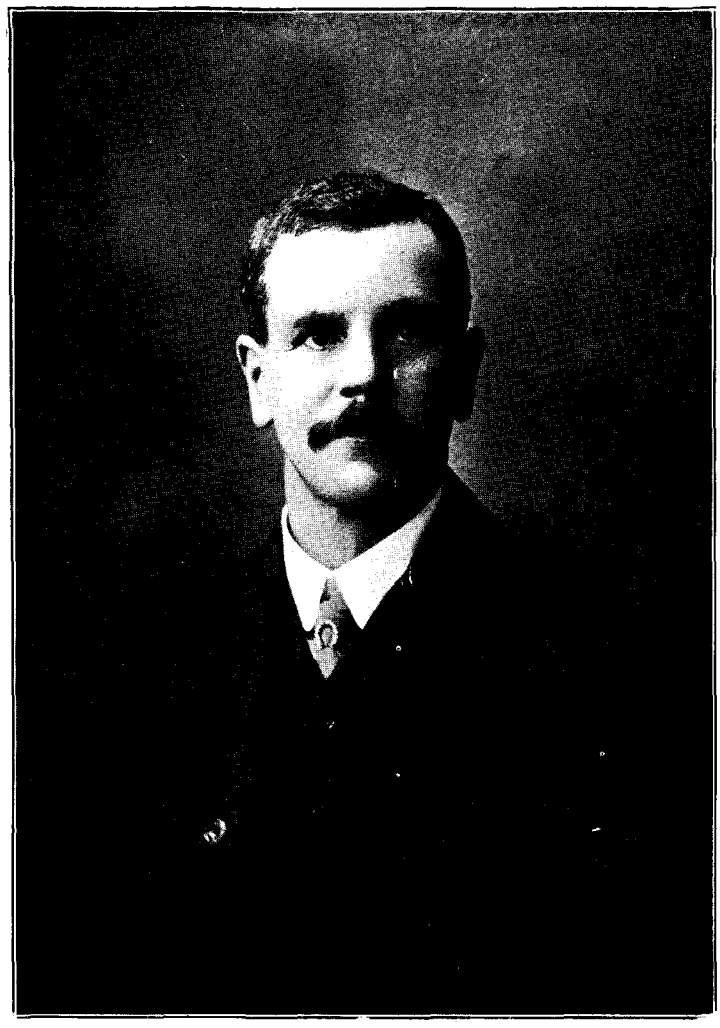
TELEPHONE MEN.

XLIX—ROBERT GILMOUR.

ROBERT GILMOUR was born at Paisley in 1865 and educated at the public school in that town. He entered the telephone service at an early age in the dual capacity of "operator and office boy," which goes to show that the operating of those days did not engage the undivided attention it now receives. Shortly afterwards a new line was brought on to the switchboard in the shape of a trunk wire connecting Paisley with Glasgow which, being one of the first trunk wires opened by the Company, created something of a stir.



After nine months' stay in Paisley Mr. Gilmour was transferred to Glasgow, then under the management of Mr. D. Sinclair. An appointment as Exchange Inspector enabled him to get a fuller insight into exchange methods. During his stay in Glasgow Mr. Gilmour assisted in frequent changes of switchboard apparatus, taking part in the transfer of the central switchboard from Queen Street to the Royal Exchange building, and in fitting up the first multiple switchboard in Scotland. This board, which was supplied by the Western Electric Company, was far in advance of anything previously adopted and made an enormous difference in the service.

At the end of 1886 Mr. Gilmour was promoted to be Local Manager at Kilmarnock in the Ayrshire district, and after a further three years he was again promoted to be Superintendent of Sub-Exchanges South of the Forth, with headquarters in Glasgow. He remained in this position about a year when he was appointed District Manager at Aberdeen and had some experience of the call wire working with a flat board which obtained in that town.

On the reorganisation of the Company's system by the late General Manager, Mr. Gilmour was promoted to be District Manager at Dundee. The North of Scotland, which hitherto had been in Mr. J. D. Miller's charge was now placed under the control of Mr. F. D. Watson together with the rest of Scotland. Negotiations with the Dundee Town Council for underground facilities were in progress during Mr. Gilmour's stay in that town, but before a decision had been arrived at he was transferred to the District Managership of Ulster under Mr. Gill in March, 1896. At this time the Ulster district had just recovered from a very exceptional snowstorm, which broke down the whole system and put many lines out of use for weeks. The subscribers more severely affected were trying to force compensation from the Company, so that among Mr. Gilmour's first duties in Ireland was that of meeting, along with the members of the local board, a deputation from the subscribers to hear their grievances, and after some discussion matters were arranged. The service was then single circuit overhead, but the Company, after completing the necessary agreement for underground facilities with the Corporation, changed its system to underground metallic circuiting, having at the same time secured a suitable site for a new building. The change in due course was carried out with satisfactory results. Mr. Gilmour installed the first central battery switchboard in Ireland, that of Londonderry, the system being also changed from overhead to underground.

In July, 1909, Mr. Gilmour was transferred as District Manager to Edinburgh under the superintendentship of Mr. F. D. Watson, which position he now holds.

On more than one occasion there were negotiations with the Belfast Corporation, and these were rendered much easier by reason of the esteem in which Mr. Gilmour was held by the members of the Corporation and by the city officials.

Cautious and attentive he won a high place in the minds of the subscribers, while his loyalty, zeal and ability to organise a large staff so as to make a district work efficiently and smoothly, cause him to be highly regarded by those who have been in contact with him.

We much regret that for some time recently Mr. Gilmour has not enjoyed the best of health, and we feel that the unanimous wish of all who know him is for his speedy restoration to health and strength.

THEORY *v.* PRACTICE IN CONTRACT WORK.

By C. S. LIVEMORE, *London.*

As a reader of the JOURNAL it has occurred to me that a short article on contract work in London might not be out of place. I have chosen the above for a title not from a pessimistic view but to try and help others who at present are quite ignorant of the working of contract officers in London. It has often been stated, and is still being asked by some departments, "Of what use is the Contract Department and its staff?" What a question! Where would all the other members of the Company be without such a department? Has it not built up the whole concern and, as the last balance sheet shows, is still building. May it continue!

We have had several well-written articles on contract work, which mostly apply to the provinces, and in them the main factor appears to be theory; but in London (by which I mean the City area), this factor does not govern, for it is nearly impossible to carry out our work on theoretical lines, and the contract officer is left to work from the practical side. I doubt whether there is any other centre in England, Ireland or Scotland, that comprises such a number of general trades and various businesses as London, so that the rule applying to the one, is quite inapplicable to the other, as can easily be proved.

Theory tells us to take a certain street, canvas the whole, card all non-subscribers, and educate them up to placing an order with the Company; it must increase business, etc., etc.

Practice shows one-third of the street already connected on the telephone, one-third warehousemen, one-third agents; the business of the two last mentioned is to come into contact with each other not by telephone but in person, for goods are to be carried and inspected before buying transactions can take place.

Another street consists of either stockbrokers or jobbers. Of the former, practice will show that all of any standing are already connected, and of the latter a large percentage are here to-day and gone to-morrow.

The occupants of another street are mostly of the merchant or shipbroker type. With the former, one often finds that it is hard to make both ends meet, or that business does not warrant the cost of the telephone. Of the latter type a very large percentage are subscribers.

Another section of the community are the bankers, who will often have their branches connected with the telephone for the special benefit of head office information, but not for public use, as transactions are not accepted by voice alone.

Again, there is the solicitor, who ignores the telephone because by letter or interview he charges his well-known 6*s.* 8*d.*, whereas for communication by telephone his client often repudiates the charge.

One provincial article states that the public will not to any great extent come into the Contract Department, so that theory demands that the contract officer should go to the public. How little this state of things obtains in the City of London, where one of the very first things a man starting in business does—and practice proves it—is to seek out the rates for installing the telephone, and the contract officer following up the enquiry, can always by easy methods secure the order.

There is one branch that theory overlooks, and that is the grand system of auxiliary canvass, and to my mind this is a great point where the practical contract officer in London shines in all his glory. The work, patience and perseverance in following up suggestions are well worth mentioning, for at times theory has been shown the door, but practice well handled has gained the order.

BOLTON DISTRICT BENEVOLENT SOCIETY.

THIS society is in a very flourishing condition. According to its balance sheet its receipts during the year were £49 15*s.* 8*d.*, and after deducting all expenses, the payment of £9 9*s.* in grants to infirmaries and the payment of £18 9*s.* during the past year in grants to members of the staff requiring assistance, it has a balance in hand of £17 8*s.* 10*d.*

THE TELEPHONE LOAD LINE.*

By H. DEANE, *Assistant Traffic Manager, London.*

THIS subject is particularly interesting from many points of view. From a telephone standpoint it is, to begin with, of considerable antiquity. In comparison other branches of traffic work are of recent origin. For instance, the systematic observation of service is a new development. The training and education of the operator have only been scientifically understood and carried out of late years. All the fascinating studies connected with junction working are quite of recent origin. The telephone load line, on the other hand, like the poor, has always been with us. It existed long before a Traffic Department was thought of. When, a few years ago, a person enquired what was meant by traffic, and of what it consisted, the answer he obtained was, "Well, there's the load line ——"; but the enquirer could obtain no further information.

The telephone load line should be a subject interesting to all, because it is one of the oldest of records; it existed before the days of specialisation. Even those who are ignorant of traffic matters in general knew something of the load line. Then, again, so far as the traffic engineer is concerned, it is a subject of the greatest importance, and which presents many problems of interest.

The load line is a curve record which represents the telephone traffic at an exchange during a certain period. It has three distinct uses. By its means we are enabled to determine whether the operating staff is sufficient; we are able to arrange the duties of an operating staff to the best advantage; and from it we obtain the necessary particulars in order to estimate for future switchboard equipment.

Before dealing in detail with the uses of the load line, I should like to consider several questions. The first question that suggests itself is this: At what times of the year should this record be taken? Before we can answer this question we ought to know the causes that govern the variation of telephone traffic. These are three in number. To begin with, we have variations caused by the seasons of the year. The effect of the season upon traffic is, in London, a very regular thing. A glance at curve No. 1 shows this variation very clearly. The curve represents the calling rate per direct exchange line during each week in 1909 at those C.B. exchanges fitted with registers; and, as the principal exchanges are involved, the curve may be looked upon as representative of the London traffic.

Secondly, additional lines are constantly being added to the system, and these naturally increase the bulk of the traffic. Thirdly, the use of the telephone among existing subscribers is constantly increasing. To a great extent this is dependent upon the extension of the system. The larger the telephone system becomes, the greater is the inducement to use the telephone. But suppose the system were not increasing; even then we should expect an increasing calling rate on account of the extended use of the telephone among the existing subscribers. When we notice, therefore, that the calling rate of the principal services is increasing, we must attribute it to a combination of the causes I have specified.

Now, in order to ascertain at what times of the year the load line should be taken, we should consult curve No. 1. It is clear, I think, that this represents the traffic variations due to the seasons and the extended use of the telephone. Our object is to ascertain what times of the year are representative of the traffic. Once we have ascertained this point, the principal object of taking more than one load line at an exchange is to deal with the changes brought about by the increase of the system.

If the load line is not taken at representative times of the year, so far as season variations are concerned, we run the risk of taking worthless records. We also unnecessarily complicate the excellent principle of estimating the operating staff in advance, because, under such conditions, we have to estimate not only what traffic there will be at a particular time because the season has changed, but also what effect additional lines will create.

* Abridged from paper read before the London Telephone Society (Traffic branch).

Some traffic men think that the times of the year when a load line should be taken should be near the average line shown in curve No. 1. If the variations of traffic due to the seasons were small throughout the year this would be a safe policy to adopt. But our curve shows that this is not the case. It is, of course, true that some of these variations are directly due to the Bank Holidays. The decrease of traffic at such times may be considered as artificially lowering the average line. If we mentally eliminate these effects, however, we shall find that there are two occasions during the year when the curve rises considerably above the average line. I refer to the periods from about the end of February till the end of July and from the end of September until the end of the year. I feel confident that if, during these periods, we employed an operating staff based on the average weekly traffic we should, during a considerable portion of such periods, be incommoded to such an extent that the same standard of service could not be maintained. It becomes a question how much higher than the average we should go. I have specially marked on curve No. 1 the weeks during which the load line is taken, and it will be seen at the side what relation the traffic during these weeks bears to that during an average week.

Suppose, now, we eliminate the effects of the Easter and Whitsun holidays by drawing the dotted lines shown and take the average traffic during all the weeks above the average line. We obtain a higher average line, which, in my opinion, should indicate when the load lines should be taken.

If we work on this principle, we shall find that it will not be convenient to take the load line at regular intervals as at present; and this brings me to my second point. Having ascertained at what time of the year we should take the load line, how many times during the year should the load line be taken? This will naturally depend upon the use to which we put the record. We must chiefly be guided, I think, by the growth of exchanges. If the development is very great it might be worth while to take a load line at frequent intervals. Where there is little or no development we might rest satisfied with a load line taken once and for all, so long as we are certain that it was taken during a representative time of the year.

Having determined how often it pays us to take the load line, and if we should take it at some exchanges oftener than at others, it becomes a question on which day of the week this record should be taken. There can be little doubt that this day must be representative. By this, I mean that it should either be an average day if the traffic variations are not excessive or the average of at least three busy days if these are considerably busier than the remaining days. Exchange managers should be guided by the figures included in table A which shows the relation between each full working day and the average day. Such figures should be obtained for each exchange, and the load line should be taken on that day in each case, which approximates to the conditions I have specified.

TABLE A.

RELATIVE VALUE OF THE DAYS OF THE WEEK FROM AN ORIGINATING TRAFFIC STANDPOINT: FROM A RECORD TAKEN AT ALL EXCHANGES FITTED WITH REGISTERS IN LONDON DURING THE WEEK ENDING FEB. 13, 1910.

Monday	·98
Tuesday	1·00
Wednesday	1·01
Thursday	·93
Friday	1·02
Average full working weekday	1·00 (taken as the unit)
Saturday	·65
Sunday	·68

Then we have to consider this point. Should the load line be taken for the whole 24 hours, or for twelve hours, or during two distinct periods corresponding to the times when the day and night staffs are on duty? From one point of view a record taken for 24 hours is very necessary, especially at those exchanges where the night traffic is considerable. The traffic engineer often wants to know such items as the calling rate per direct line, the ratio of the day to the busy hour traffic, the percentage of junction calls and so forth, and undoubtedly such figures should be based on a record taken during 24 hours. On the other hand, when we wish to deal with such an important item as the day load of an operator, it is desirable to keep the work of the day and night staffs quite distinct. Speaking generally, if we divide the day into two periods of twelve hours we also separate the work of the day and night staff.

The last question in this connection is this: Should the load line be taken in hourly or shorter periods? The advantages of dealing with hours instead of half-hours from an engineering point of view are well known. We get rid of traffic rushes and obtain a more reliable figure to work upon. But if we are dealing with the arrangement of operators' duties, it is more advantageous to consider the half-hour as the unit of time. A whole hour, especially in the morning, is too long a period to elapse before we bring additional staff on duty. Even were it possible not to consider this point in the morning the operators' hours of duty and the arrangement of their meal times would demand a shorter period than an hour as the unit. The half-hour is the usual period adopted.

We now come to the actual taking of the load line record at exchanges, and the first thing that suggests itself is what calls it is necessary to record. As far as the "A" operator is concerned the general practice of recording all calls which originate from subscribers, whether effective or ineffective, as well as those *effected* on the operators' initiative appears quite sound; although there are some who contend that since the ticket system was introduced this rule places the operator at a slight disadvantage compared with the work with which she was previously credited. It will be seen at once that *some* ineffective calls which previously originated from subscribers and which formed part of the record are now no longer made, because subscribers who pay by the call now depend upon the operators' promise to complete ineffective calls. It is better to keep the instruction as it stands, however, than to allow operators to record all the ineffective attempts they make to complete calls.

The present instruction to the "B" operator to record all connections, whether to subscribers' lines or to the engaged signal is also a sound rule as far as it goes. I am of opinion that the "B" operator should, in addition, be given credit for the junctions she changes when requested to do so by "A" operators. Our object should not be, as some suppose, to record at the incoming end what is recorded at the outgoing end, for a little reflection will show that this can never be accomplished; but rather to credit the "A" and the "B" operators with the operating they do.

The American practice of distinguishing between the calls which originate from the various services, although greatly complicating the record, has some advantages which appeal chiefly to the traffic engineer. These particulars, so helpful to him in design, are at present difficult to obtain with any degree of accuracy.

We have now to consider how the load line record should be taken by "A" and "B" operators. As far as originating traffic is concerned, we could choose between (1) a pad record, (2) a register record and (3) a peg record. As regards the first, our past experience goes to prove that it would be difficult to obtain a correct record. It would be very difficult to supervise such a record, and I may mention that the supervisor plays an important part in the taking of an accurate load line record. A register record, however alluring at first sight, does not give us what we want. We are unable to distinguish between local and junction calls, and it is impossible to read all the position registers at a given instant. A peg record appears to answer the purpose best. It is simple, it is easily supervised, and it is accurate. So associated has it become with the load line record that the latter is usually called "the peg count."

Although the peg record may be considered the best means of recording originating calls generally, it is possible that at small exchanges with no multiple or with a large amount of local working its advantages are not quite so obvious.

It would be possible to employ the call counter method to record originating calls; but the disadvantages are fairly obvious. Each operator would require two call counters in order to discriminate between local and junction calls; it would be difficult to read all the counters at a given instant; and the actual readings of the calls would be unnecessarily complicated.

These disadvantages to a certain extent exist in the recording of incoming calls where the call counter method is used; but here we have to consider whether a peg record would offer still further disadvantages. We must remember that at most exchanges the majority of incoming connections are made to the subscribers'

multiple, in a portion of which the recording pegs are inserted, and, if the peg method were employed to record incoming calls, the cords would be in the "B" operators' way. Again, a "B" operator, on the average, deals with more connections in a given time than an "A" operator, and, if she has to attend to a busy position, she may not have sufficient time to move a peg after each incoming connection. A call counter, which, under such conditions, may be held in the hand whilst an operator establishes connections, appears to answer the purpose best. Unless the operators, however, note the readings at the conclusion of each half-hour it is impossible for the supervisor to do this accurately by herself.

I have already referred to the accuracy of the peg count method, and it may be of interest to know that during the four load line records taken in 1909 at those exchanges fitted with registers there was only an average percentage error of ·6. To put it more plainly, taking the register count as correct, the peg count was less than this by ·6 per cent. Now that our system of registering calls is uniform we can directly compare the register and peg counts. In connection with this point, I am uncertain whether the peg recording of following on calls is quite appreciated.

I think it will be agreed that this degree of accuracy in taking the load line record is excellent, and reflects great credit upon the operators, the supervision and the management. The system of checking the accuracy of the peg count at particular positions during the record by means of the position registers is quite admirable, and should, in my opinion, be universally adopted.

Before we can represent the load line record in graphic form, we must investigate three important points. I refer to the valuation of calls, the operators' loads and the relation between an operator's efficiency and the positions she has to cover.

The time valuation of telephone calls is a subject to which, in my opinion, sufficient attention has not been given by the traffic expert, and I regret that the limited space at my disposal will prevent me from giving it that consideration which it deserves. During the early part of last year some work was done in connection with time values by the Metropolitan Traffic Department. The "A" operator's chief operations were separately observed at the two largest C.B. exchanges, and the average valuations of local and junction calls were synthetically calculated. It was necessary to determine the destination of all junction calls in order to calculate the exact proportion of calls that required different amounts of supervision and so forth. Pay call office calls had to be separately valued, and the correct percentages of calls ineffective due to various reasons had to be considered. The complication was very great, and, when the time values had been ascertained, it was felt that they did not exactly represent working conditions. It will be readily understood that it is impossible to predict the amount of supervision necessary on any call, especially a junction call; and this is, as a matter of fact, the chief reason why theoretical calculations are at variance with actual practice.

Lately this important study has been again considered, but on different lines. Our object has now been to determine exactly what is done under working conditions. It has been well observed that the amount of work which an operator does in connection with a call is dependent not only upon what she has to do, but also upon the time at her disposal. If an operator, at a given time, is slack, she will give extra supervision to her calls, supervision which she could not afford to give under other circumstances, and which, to a great extent, may be unnecessary. If the supervision of the operator and the observation of her work are on right lines, however, it will generally follow that what is done in practice is right; and it is on this assumption, which is considered reasonable, that the figures in table B are of value. The more observations made the more will the average time values increase in practical value.

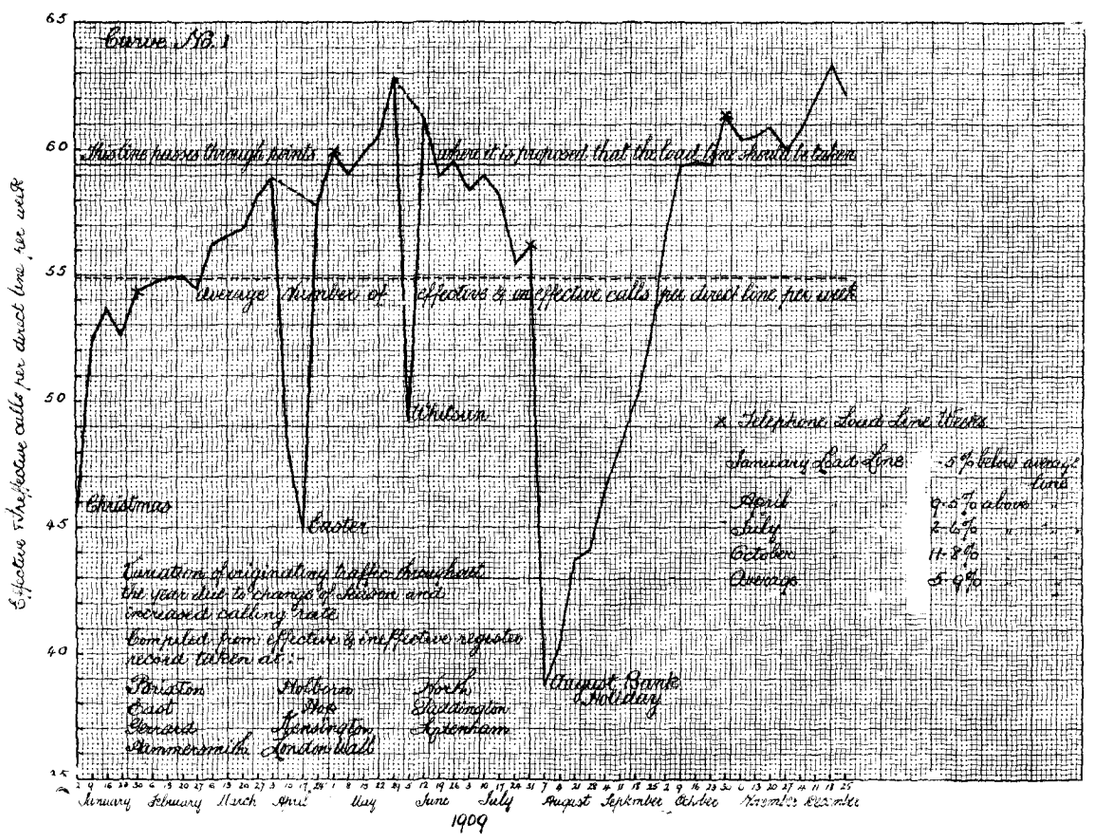
TABLE B.

TIME VALUATIONS OF TELEPHONE CALLS: FROM OBSERVATIONS TAKEN DURING JANUARY, 1910.

Exchange.	System.	Average time valuation of local calls.	Average time valuation of junction calls.	Average value of a junction call in terms of local calls.
London Wall..	C.B. (1)	11·46 seconds	16·12 seconds	1·41 seconds
Gerrard ..	,,	11·38 ,,	16·41 ,,	1·44 ,,
Average ..	,,	11·42 ,,	16·26 ,,	1·42 ,,
Avenue ..	Magneto (self-restoring indicators).	12·14 ,,	20·12 ,,	1·66 ,,

For the experiment average operators were observed at the exchanges shown. A stop watch was used which was cumulative in its operation, so that the total time taken by a series of operations could be ascertained. The watch was started the moment the "A" operator took up an answering cord to answer a subscriber or the moment her hand moved towards the local jack if she happened to be anticipating the call. Immediately she went out of circuit to attend to other work the watch was stopped, and it was restarted on every occasion when she had to re-enter the circuit for whatever reason. A slight difficulty occurred when observing the time taken to clear the connection. This is sometimes an overlapping operation, and sometimes a connection is cleared by an adjacent operator. In order not to complicate the work of the observer, however, the time of clearing—namely, from the moment the "A" operator commenced to depress the register key at C.B. exchanges till she had finished guiding back the plugs into their sockets—was considered as a portion of the legitimate time value of the connection.

In order that such observations may be of the greatest value, a proportion of difficult calls, such as those that originate from pay call offices, should be included. The various kinds of ineffective calls should also be proportionally represented in the average time values. These conditions obtain



at exchanges in which the various services are distributed on each "A" position, and where a large number of observations has been carried out. The more we depart from an up-to-date C.B. exchange with distribution carried out on right lines the more we approach the sphere of the special position, and the more difficult it is to obtain representative observations. Everything possible has been done to overcome these difficulties in the special observations which have lately been carried out.

The figures in table B refer to the average time values of local and junction calls at the two principal C.B. exchanges and at the chief magneto exchange in London. The striking similarity between the time values at London Wall and Gerrard Exchanges will be noticed, and it will be seen that the average value of the junction call in terms of local calls is 1·42. The ratio at present in use, and which was calculated on theoretical lines some time ago, is 1·6 : 1. We use this same ratio for Avenue Exchange, but it will be seen that in this case the ratio in use is lower than it should be.

The average local call valuation is dependent not only upon the type of exchange under consideration, but also upon the size of the exchange and other causes. No one will deny that it takes less time to handle a local call at a C.B. exchange than at a magneto exchange, other things being equal. But it is quite possible for the time value of a local call at a C.B. exchange to be greater than that at a magneto exchange if the C.B. exchange is large compared with the magneto exchange. The local call time value depends a good deal upon the extent of the subscribers' multiple, the proportion of auxiliary lines, private branch exchange working, local change of numbers and so forth. The time value of the junction call depends upon the extent of the junction facilities, the way in which the outgoing junctions are arranged and marked and upon other reasons.

The question of whether the local call should be considered as the unit in London has often been raised. It is thought by some that the direct order wire call is a more constant unit. There is less variation, it is argued, in establishing a junction connection owing to the contraction of the outgoing junction multiple, and it being at the same level with respect to the operator than in establishing a local connection. The time of disconnection is also a more constant figure in the case of junction calls. What may be desirable for London, however, may not be so for the country as a whole. Besides, it may be contended that however desirable it is to employ a unit which is fairly constant, it is, after all, the average value of that unit with which we are concerned.

Two points must never be lost sight of in connection with these valuations. Not only must we know the time relation between the average local and junction call, but we must also know the actual time value of our unit, the local call. It is quite possible for the ratio between the local and junction call time value to be the same at two exchanges, and yet the unit at the one exchange to be considerably greater in value than that at the other exchange. The importance of this point will be more fully realised when we come to deal with the question of operators' loads.

It has already been remarked that the size of the exchange, as well as the type, affects the time value of local calls. The type of exchange must similarly affect the time value of junction calls; but there is no direct connection between such time value and the size of the exchange. At one time we used to vary our "junction valuations" as they are usually called, in proportion to the number of subscribers at different exchanges below a certain size. Now we employ a more logical method. We vary the junction call valuations in proportion to the junction facilities at different exchanges. Table C shows the figures we at present work upon. It will be seen that these valuations lie between 1·6 and 2·2. From a theoretical standpoint we were fairly satisfied with these limits at one time, although we were not quite so certain of the intermediate values given in table C, so much depending, of course, upon the actual time value of the local call. The figures have, however, given us something to work upon in the past, and they are under revision at the present moment. Standards we are not absolutely certain about are better than no standards at all; just as a bad government is better than no government at all—an opinion which was frequently expressed by Macaulay.

(To be continued.)

TELEPHONE WOMEN.

XLVIII.—HENRIETTA SPEARING.

HENRIETTA SPEARING, Clerk-in-Charge, Cardiff, entered the service in April, 1895, as an Operator at Paddington, and was subsequently appointed to be Supervisor at Gerrard Exchange in December, 1902. She was afterwards transferred to King's Cross and London North Exchanges, until in July, 1905, she was transferred to the London Training School. In May, 1907, she left the Training School for Gerrard Exchange as Supervisor, and in the early part of 1909 was made Travelling Supervisor for the City Exchanges.

HENRIETTA SPEARING.

Miss Spearing has only taken up her duties at Cardiff since May, 1909, but her exceptionally varied career has fitted her for taking charge of any exchange where it is necessary to control staff, and she knews how to keep the respect of the operators under her.

Cardiff Exchange has lately been transferred to common battery working in new premises adjoining the General Post Office, and Miss Spearing will now have an opportunity of using her large experience in training the operators at Cardiff in common battery working.

She has a pleasant manner in dealing with complaints, and has always been able to satisfy the subscribers, which is at times a matter of no small difficulty.

XLIX.—MARION JAMIESON.

PAIRS and pairs of hands manipulating, with bewildering dexterity and no apparent object, a sea of papers—papers of all shapes and sizes, from tiny scraps to huge sheets. Such is the visitor's first impression of the Glasgow fees office, but a moment's stay reveals order in the seeming disorder, and the guiding spirit of it all is discovered in an unobtrusive figure seated at a small table. Thus do we meet the subject of our sketch.

Miss Marion Jamieson joined the staff in January, 1898. She was made one of the four clerks who prepared Post Office fee accounts under a supervisor, in a small room which now forms part of the "Royal" testroom. After a few months this work was put under the charge of the Post Office fee journal clerk, and the four girls were taken into the general office.

After a short experience, Miss Jamieson was made the senior of the four girls. It is of interest to note that during all these years, although the work must have been rapidly increasing, four clerks have continued to cope with it until quite recently, when, owing to the addition of junction calls, it became necessary to add a fifth.

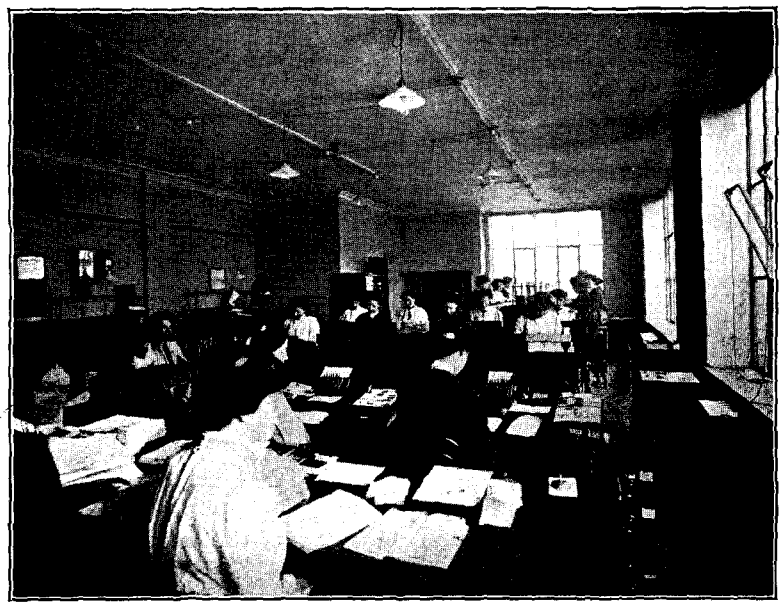
When Miss Jamieson had been three or four years in the service she was put in charge of the Post Office fee journal. The

MARION JAMIESON.

practice continued of having a male clerk in charge of the sub-department, but he was at this point relieved of the journal work. Miss Jamieson's work whilst in charge of these journals was characterised by extreme neatness and unfailing accuracy. So marked were these qualities that audit clerks have referred to them specifically in reports.

In addition to the Post Office fee work, girls were employed upon the records in connection with limited services—measured, message, party message and omnibus—and as these services rapidly expanded a large staff was gradually built up. In the middle of the year 1907 the introduction of new measured tariffs and, simultaneously, of ticket-recording gave a further impetus to this work. When, therefore, at the end of that year, serious want of accommodation was found in the Glasgow office, and it became necessary to send out a section to fresh quarters, it was decided to send all the girl clerks, then numbering seventeen. They were consequently transferred as the "Fees Department" to a handsome and well-equipped office in the just-completed Anchor Line buildings. A supervisor was required to take complete charge of this branch, and the appointment was given to Miss Jamieson.

Since then expansion and re-organisation have been the order of the day. The new system of recording was introduced during the year 1909. Until its introduction the bookkeeping proper in connection with all these services had been carried out at the general offices, but at this point most of it was transferred to the Fees Department. Three of the Glasgow exchanges have been transferred from ticket to meter recording. The staff now numbers 24.



TRUNK FEE DEPARTMENT, GLASGOW.

Though previously inexperienced in control Miss Jamieson has skilfully guided her forces through the mazes of all the change and growth. Of quiet and unassuming disposition she possesses that happy knack of inspiring her assistants to loyal and enthusiastic effort. She is deservedly popular with her own staff and with all others who come into touch with her.

Miss Jamieson's favourite pastimes are cycling and reading, and while she pursues both with a good deal of enthusiasm she courts the sensational in neither. She enjoys a long spin and can cover a considerable distance in an afternoon when so inclined. She prefers the standard authors to those of the more modern school and has a particular preference for Dickens.

THE ANNUAL REPORT OF AMERICAN TELEPHONE AND TELEGRAPH COMPANY FOR THE YEAR 1909.

WE quote the principal paragraphs dealing with the progress of the Bell system in the States:—

At the end of the year the number of stations which constituted the system in the United States was 5,142,692, an increase of 778,063; 1,508,790 of these were operated by local, co-operative and rural independent companies or associations having sub-license or connection contracts, so-called connecting companies.

The total mileage of wire in use for exchange and toll service was 10,480,026 miles, of which 649,308 were added during the year. These figures do not include the mileage of wire operated by connecting companies.

Including the traffic over the long-distance lines, but not including connecting companies, the daily average of toll connections was about 517,000, and of exchange connections about 19,925,000, as against corresponding figures in 1908 of 463,000 and 18,500,000; the total daily average for 1909 reaching 20,442,000, or at the rate of about 6,582,300,000 per year.

The amount added to plant and real estate by all the companies, excluding connecting companies, constituting the system in the United States during the year 1909 was:

For exchanges	$20,958,700
For toll lines	6,316,100
For land and buildings	1,425,300
	$28,700,100

BELL SYSTEM IN THE UNITED STATES.

	Dec. 31, 1895.	Dec. 31, 1900.	Dec. 31, 1905.	Dec. 31, 1908.	Dec. 31, 1909.	Increase, 1909.
Miles of exchange pole lines	25,330	30.451	67,698	108,539	113,893	5,354
Miles of toll pole lines	52,873	101,087	145,535	161,452	164,111	2,659
Total miles of pole lines ...	78,203	131,538	213.233	269,991	278,004	8.013
Miles of underground wire	184 515	705.269	2,345.742	4 909 449	5.337 436	427.987
Miles of submarine wire	2,028	4,203	9,373	19,906	22,698	2,792
Miles of aerial wire	488,872	1,252,329	3.424,8 3	4,901.363	5,119,892	218.529
Total miles of wire	675.415	1,961,801	5,779,918	9.830,718	10,480,026	649,308
Miles of toll (trunk) wire	215,687	607.599	1,265,236	1,737,039	1,804,552	72,513
Miles of exchange wire	459.728	1,354,202	4,514,682	8,098,6 9	8,675,474	576,795
Total	675.415	1,961,801	5 779.9 8	9,830.718	10.480,026	649,308
Total exchange circuits	237,837	508,262	1,135.449	1,668,211	1,829,942	161,731
Number of exchanges...	1,613	2.775	4,532	5 043	4,968	75†
Number of Bell stations	281,635	800,880	2,241,367	3,215 245	3,588,247	373,002
Number of Bell connected stations*..	27,807	55,031	287.348	1,149.384	1,554,445	405,061
Total stations	309,502	855 911	2,528,715	4 364,629	5,142.692	778,063
Number of employees	14.517	37,067	89,651	98.533	104,956	6,423
Number of connecting companies ...	...	...	...	7.721	10.354	2,633
Exchange connections daily	2,351,420	5,668,986	13 543 468	18,499,376	19,925,194	1,425,818
Toll connections daily...	51,123	148.528	368,083	463,021	517,341	54,320

* Includes private line stations. † Decrease.

The amount added in 1900 was $31,619,100; in 1901, $31,005,400; in 1902, $37,336,500; in 1903, $35,368,700; in 1904, $33,436,700; in 1905, $50,780,900; in 1906, $79,366,900; in 1907, $52,921,400; and in 1908, $26,637,200, making the total expenditure for additions to plant during the ten years $407,172,900.

During the year $44,838,900 were applied out of revenue to maintenance and reconstruction purposes.

The total expenditure for maintenance and reconstruction charged against revenue for the last seven years was over $231,500,000.

The charges against revenue for maintenance and reconstruction are no more than a conservative policy would dictate. It is necessary to make suitable provision for any change of plant and equipment required by the evolution and development of the business.

In the meantime the public is getting the benefit of the surplus and reserves without cost to it.

All that was said last year about the permanency of the plant could be re-said and emphasised this year. Steady improvement is being made in both plant and apparatus, but as the lines on which it is based are of a permanent character the process is one of evolution, not revolution. Careful comparative studies seem to warrant the statement that there is no one of the larger public service corporations that has a greater ratio of plant value to its outstanding obligations than has this company, nor has the plant of any other such company as great a ratio of realisable value to the book valuation.

Real estate, underground conduits, copper wire, cables of lead and copper, rights of way on private property—which represent such a large proportion of the company's assets—have a permanent value in the business and even a realisable value outside of the business which would be no mean asset.

There can be no boundaries to a telephone system as it is now understood and demanded. Every community is a centre from which the people desire communication in every direction, always with contiguous territory and often with distant points.

Every exchange must be the centre of the system.

The gross revenue collected from the public for telephone service by the Bell system—not including the connected independent companies—was $150,000,000; an increase of nearly $12,000,000 over last year. Of this, operation consumed $50,000,000; taxes, $7,000,000; current repairs and maintenance of property and provision for depreciation, $45,000,000.

The surplus available for charges, etc., was $48,400,000, of which $10,220,000 was paid in interest, and $24,000,000 paid out in dividends to the public.

The capital stock, funded and floating debts outstanding in the hands of the public at the close of the year were $581,300,000. The surplus of liquid assets was $57,200,000, leaving $524,000,000 as the net obligations of all the system to the public.

Against these obligations, the companies had property $612,600,000—an excess of $88,600,000, or 17 per cent.

In addition, there is the intangible property, such as licenses, contracts, patents, rights of way, etc.—not including any public franchises—of great value, which it would now be difficult to obtain at any price.

In every case where the public authorities have appraised the plant of the companies, the valuation has been far in excess of the book valuation. It is within the bounds of conservatism to say that the obligations of all the companies outstanding in the hands of the public are represented by 150 per cent. of property at a fair replacement valuation of the plants and assets, *not including public franchises*.

The report makes the following observations on the Bell Company's policy:—

The Bell system was founded on the broad lines of "One System," "One Policy," "Universal Service," on the idea that no aggregation of isolated independent systems, not under common control, however well built or equipped, could give the public the service that the interdependent, intercommunicating, universal system could give.

This is no recent or new idea or theory. It is co-existent with

the business; in fact, the theory was evolved and developed before the business, and the business has been developed on that theory.

To develop the business it was first necessary to develop the "art." It was unique, nothing like it existed; the whole art of the practical application of electricity was new and undeveloped.

To develop the business to the best advantage all the best in the way of instrumentalities, apparatus and methods must be controlled. Apparatus and methods at the start were crude, but new instrumentalities and new methods were suggested from daily association, practice and study.

It was necessary to develop these, improve and reduce the useful to practice, and eliminate the worthless. For this purpose a staff of technical, electrical and mechanical operating experts must be gathered together and educated. To educate and assist these, to enable them to do intelligent work, avoid repetition and duplication, all that had gone before and all that was being done here and elsewhere must be known. For this purpose a bureau of research and information was formed. Patent and legal experts must be employed and educated to secure the advantage of this work and study, as well as to furnish protection in the use of the patents.

A highly developed manufacturing organisation under proper supervision and control was required to reduce to practical use these ideas and inventions, as well as to secure the standardisation and uniformity of instruments and apparatus.

To ascertain which were the best of the methods being evolved in field practice, to educate the others in the use of them, to assist generally in the development, and to bring about standardisation of operating practice and methods, a staff of travelling experts, observers and teachers was placed in the field.

It is necessary to the growing and constantly improving business that this work be continued. It is being done much more economically and far more effectively by this company than it could be done by the associated companies, and without expense to them except so far as it is covered by the miscalled "rental" of telephones.

The preliminary work was certainly difficult enough. Add to that the necessity of educating a doubting, hesitating public who looked on the invention as little better than a toy, and some idea of the task can be formed.

In the promotion and exploitation of the business two methods were possible.

One company covering the whole country. This would require a large executive and administrative staff in the field, and a large capital which, at the time, it was impossible to secure. Under this method, State organisations would also have been necessary to hold franchises.

The other way was to enlist a large number of individual workers, each with some capital, large faith and expectation, with great capacity for work, who would cover the field and develop the business.

To insure a common policy and central control, all licenses were issued for small units of territory under restricted terms, confining the business entirely within each territory. The parent company owned and furnished the telephones, had all reversionary interests or rights in the territory, and the right to connect the units with each other for the purpose of forming a universal intercommunicating telephone system. For this purpose the long-distance lines and other toll lines were built. Under these temporary licenses certain rentals, so-called, or royalties, were paid to the parent company for the use of the telephones and other inventions owned, and also as compensation for all the many other services rendered, as described above. When these licenses were made permanent and included all future as well as all existing inventions, and the right to the business within the units of territory, the parent company retained an interest in the business which was represented by a stock interest in each company.

These licenses called for a continued certain percentage of the stock of the company, but this right was soon waived by the parent company.

Through purchases to defeat the attempts of hostile interests to get possession of some of our associated companies, through the necessity of financing the companies for the purpose of keeping up with the demands for development, and through the purchase of its *pro rata* of new issues, the American Telephone and Telegraph Company acquired its large holdings.

The book valuation of the American Telephone and Telegraph Company's interest in the share capital of the associated operating companies Dec. 31, 1909, was nearly $306,000,000; *of this only $16,000,000 was received through contract or for licenses.* The balance, $290,000,000, was obtained under precisely the same conditions that shares have been received by the other shareholders.

As regards competition the report says:

There is not, nor can there be, any competition between these local associated operating companies, as under the conditions under which they can use the instruments and inventions, they must operate entirely within their respective territories; nor can there be competition in the telephone exchange systems operating in the same territory such as exists between other public utilities, certainly not such as exists between two gas companies or even between a gas and an electric light company.

The telephone system does not give you a "commodity" or a "product," or even a "service" except so far as it is service to make up a "path" or "line" or "highway" for personal communication with a party at some distant point.

The value of a telephone system is measured by the possibility of reaching through its connections *any one—at any possible place.*

There can be said to be no limit to those with whom one may desire communication at some one time or other. Ordinarily your communications are confined to a certain few other subscribers; occasionally you may wish to reach certain others, but there are times when it is an absolute necessity to get a connection with some one possibly unthought of or unknown before, and the importance of this connection may be vital.

A purely *local* exchange has a certain value.

If it has, in addition to its local connections, a connection with outlying contiguous localities, it has a largely increased value.

If it is universal in its connections and intercommunication, it is indispensable to all those whose social or business relations are more than purely local.

A telephone system which undertakes to meet the full requirements must cover with its exchanges and connecting lines the whole country. Any development which is comprehensive must cover some territory which is not, and may never become, profitable in itself but must be carried at the expense of the whole. *It must be a system that will afford communication with any one that may possibly be wanted, at any time.* To do this the system must offer a connection of some kind, and at such rates, as will correspond to the *value* of the system to *each* and *every user.*

"Interdependence," "intercommunication," "universality" cannot be had with isolated systems under independent control, however well connected. They require the standardisation of operating methods, plant facilities and equipment, and that complete harmony and co-operation of operating forces, that can only come through centralised or common control.

Wherever two systems exist, each has, with the exception of a percentage common to both, a different list of subscribers. Those of large and extended social or business connections must connect with both, while those who do not connect with both get only partial service—the same character of service offered by two street car lines, each having its tracks on and running through the principal main street of the town but each extending into and serving entirely different sections of the community.

Offering a connection with a so-called competing exchange, having a list of subscribers either entirely or largely different, is offering a different service, except so far as they connect the same subscribers, and there it is of no benefit, as either one would serve the purpose. Two exchanges, each with the same list of subscribers, cannot, in the nature of things, exist. One or the other would be unnecessary, because a subscriber would be paying twice for the same service when either exchange gave all that could be obtained from both. It would be like paying two fares each time you ride in a street car to maintain a parallel line, although you could ride in but one at a time. Competition of that character increases the cost to you. Competition is only of service when it reduces your cost or increases your service.

By reason of duplications—duplication of investment, duplication of operation—competition in telephone systems cannot, in the

nature of things, produce economy in operation, and without economy there can be no reduced charges.

With only one system, at once is eliminated the duplication of subscribers' lines—so also is eliminated the greater part of the unused and idle staff, equipment and plant, and with this are also eliminated capital investments, capital charges, operating salaries, plant maintenance and depreciation. That it contributes also to the comfort and convenience of the subscribers is in itself no small consideration.

No one can dispute the fact that the Bell methods and system are the standard and have been accepted as the best the world over.

Telephone rates have fluctuated. Beginning with simple and crude instrumentalities and methods, with small developments, the rates were low. As facilities increased, as methods and apparatus improved, and apparatus almost new and hardly in use had to be discarded to make place for new and improved methods, rates had to be increased.

In the New York City exchanges apparatus and plant practically good as new to the value of over eight and one half millions of dollars have been discarded because new improvements had made them obsolete, nearly all between the years 1883 and 1902, and the same is relatively true of any exchange system. As methods, plant and apparatus become more fixed and permanent, methods of operating improved, operating expenses declined, and reductions in rates followed—not because of competition.

A FEW ECONOMIC PHASES OF THE MEASURED RATE.*

BY GEORGE HEY, *Contract Manager, Oldham.*

So much has been said and written in praise of the measured rate that it would be invidious on my part to add more, and I content myself with a frank and sincere expression of admiration on the equitable and commercial principles upon which it is based.

When these tariffs were generally adopted about three years ago throughout the various districts, the staff had to divest itself entirely of all its old ideas and practices, both in regard to securing new subscribers to the tariffs and in the supplying of telephone service under them. New principles and standards were given to govern all subsequent administration of the rates and control of the traffic which these tariffs gave rise to.

The new measured rate confirmed the equitable principle of the old message rate, which it superseded, but in the adoption of a graduated scale and other fundamental improvements, it extended the scope and range of telephone tariffs in order to meet, as well as to create, an increasing demand for telephone service.

As concerning the staff of the Company, a new era may be said to have dawned, which brought with it larger possibilities for development and the exercise of those extensive powers of organisation and adaptation which a rapid and extensive growth of business must call forth, and did, in practically every branch and department of the business.

The measured rate brought into great prominence two important and particular phases, which are the spirit and essence of the measured rate from an economic point of view.

First.—The telephone call under the measured rate was indelibly stamped as a commercial entity.

Second.—The telephone line, or "direct line" became possesed of a higher potential power as a revenue earner.

I wish to submit a few remarks bearing upon these two points, and some observations and deductions which suggest themselves as having a direct economic bearing thereon.

(1)—THE MEASURED RATE TELEPHONE CALL.

Under the new tariffs a definite rental is charged for the installation of the line, instrument and other plant, as the necessary and visible medium for the transmission of calls. A graded scale of charges is fixed, under which subscribers may purchase calls in proportion to their requirements.

From the period of the adoption of the measured rate the outward call upon such lines assumed a fixed and definite value, and the transmission of such valued calls became of special pecuniary interest. The "valued call" became to the Company and the subscriber a commercial commodity which is designated "traffic." To all intents and purposes, the Telephone Company is engaged and employed in the conveyance or transmission of this traffic from one telephone station to another for its numerous customers, in the same way as a railway company, tramway company or any firm or corporation is employed and interested in the conveyance of traffic from place to place, where the "traffic" may be either in the form of human beings, live stock or merchandise. An increase in the traffic carried by a railway company means the employment to better economic advantage of its rolling stock, its stations, organised staff and affects the ratio of profit.

Increased or diminished traffic carried by the Company over its lines and between its numerous and various telephone stations has practically the same economic effect in increased or diminished earnings and profit.

The unit of traffic is the "valued call," and under the measured rate the valued call will, I believe, play an important part in the profitable development of the telephone business of the future.

The old flat rate, which was the principle tariff in operation up to 1907 for a direct line, in its application had no dividing line between the rental paid for apparatus and the service. For a fixed rental of, say, £10 (generally in the provinces) all the means was afforded for an unlimited number of calls being originated within a defined area or group of exchanges. The telephone call under that tariff was therefore of no fixed or definite value. The subscription covered not only the line, instrument and all essential plant, but the service also.

At that time, and under those conditions, the economic interest centred in the flat rate rental. Under the measured rate it is focussed in the traffic the line carries, or in the volume of valued calls originated on it.

The business tariff A starts at a minimum of 500 calls for £6, and is graded up to 4,600 calls per line at a charge of £15 12*s*.

The residental tariff B for originated calls begins at the minimum 300 calls for £5 up to 900 calls for £7.

It is in the flexibility of these tariffs that their greatest merit is found, and upon this their success during the past three years has rested. The tariff is adopted to meet the requirements alike of the large and small user.

This flexibility indicates the economic potentialities of the measured rate direct line. This is evident by a comparison with the now obsolete flat rate tariff. The measured rate line is capable of earning in calls during each year £11 12*s*. for 4,600 calls, which, added to the installation charge of £4, reaches £15 12*s*. The old flat rate was limited to a rental of £10 per annum, but without limit as to number of calls.

From the Company's point of view, therefore, it may be said that the prime object now in erecting telephone lines is to carry "traffic." The highest economic advantage, and that on which the Company's organisation rests and is based, is to employ these lines to their full carrying capacity. In such a consummation the Company would realise the fullest benefit upon its outlay.

The same argument applies to the subscriber. It is desirable that he should secure the greatest utility through the service upon his outlay. Every facility which can be put in his way to encourage and induce his increased use of the telephone, whether for inward or outward calls, is to the subscriber's advantage as well as to the Company's benefit.

But, unfortunately, these are ideals which are realised to only a very modified extent.

From some figures which I have been kindly supplied with this will be seen. The figures show the total number of outward calls originated by 100 measured rate subscribers during the entire rental year, under the business tariff A, and 100 measured rate subscribers under the residential tariff B.

These particulars were extracted from the records of this district in the order they appeared in the books, so as to procure a fairly representative statement of actual earnings.

Under tariff A (calls guaranteed, 500 per line):

52 made *less* than the guaranteed number of "calls," and the Company derived the minimum of £2 on each line only.

*A paper read before the S.E. Lancashire Telephone Society.

48 *exceeded* the number of guaranteed calls, and the lines were thus more profitably employed.

Under tariff B (calls guaranteed 300 per line):

48 made less than the guaranteed number of calls, and the Company derived the minimum of £1 only on each line.

52 exceeded the guaranteed calls, and the lines were more profitably employed.

This summary causes one to reflect that after all in telephone traffic we are dealing with a peculiar commercial commodity. You will agree there is no given law which governs the incidence of the ebb and flow of telephone traffic. Some special event or circumstance in a given district, area or exchange may produce an impetus in a given desired rise in the traffic of a group of subscribers, and possibly there may be a corresponding inactivity in other channels which lead to a diminution of traffic, fully compensating for the rise, and leaving the net result the same.

By reason of the fact that each call now is a definite charge upon the measured rate subscriber, telephone traffic, as observable in the records, may not inaptly be termed "shy" and immobile, and this possibly to the same degree and extent as it was before abundantly active and extravagant, under the old flat rate.

The measured rate, however, has had a powerful effect in reducing the "engaged" call, as well as in reducing the number of redundant and frivolous calls.

From all these considerations it will be apparent that much responsibility rests with the traffic or operating staff for the careful registration of all effective calls upon measured rate lines. An intelligent interest taken in such duties is desirable from each operator, while a conscientious regard to the faithful carrying out of the regulations bearing on such recording is commendable and should be encouraged.

But, after all, as members of the staff, operators, clerks, inspectors, wiremen, contract officials and others, we may ask ourselves the question, in what way can we, or do we, affect the economic earning powers of a measured rate line? Our duties, mostly, do not admit of our conveniently inviting a subscriber to use his telephone oftener. The subscriber, in that respect, may be considered to be alive to its useful purposes and economic advantages in connection with his own business. We may, however, as opportunity offers, or as our especial duties direct, point out the advantages to a subscriber of increasing his facilities by providing himself with additional lines, or additional stations, for the reception, distribution or transmission of his calls. But in increasing the growth of traffic, or the sale of additional calls, the staff generally can do little.

The particular staff responsible for giving a good service appear especially to be in the position of helping to secure an increase of traffic, and it is universally conceded that a good service *does* conduce to that end.

(*To be concluded.*)

TENSION AND SAG IN OPEN WIRES.

BY J. F. COOTE, A.M.I.E.E., *Engineer-in-Chief's Department.*

THE tables for the tension and sag in open wires formerly published in the Company's Engineering Instructions were based upon the assumption that the wire is inelastic, and that changes of temperature are alone operative in causing alterations of length, with consequent alterations of stress and sag. The assumption thus made—that the elasticity of the material may be ignored—leads to very erroneous results in the calculated values, and in practice it has been found that wires erected in accordance with these tables are usually much too slack for good regulation. In consequence of this, foremen who carry out such work have come to run wires without regard to stress or temperature, except in so far as their experience guides them as to the tension to which they should be pulled up. Although this may give fairly good results in the hands of an experienced wireman, it is far from being a satisfactory method for general use.

It was in view of the recognised failure of those tables to meet practical conditions that the writer went into the question of the effect of elasticity upon the behaviour of open wires under varying conditions of temperature, and calculated entirely new tables for 100-lb. hard-drawn copper and 40-lb. bronze wire—the two types of open wire most generally used by the Company—and, in addition, carried out a long series of observations, on wires specially erected for the purpose, to ascertain to what extent the old tables were erroneous in their representation of what actually occurs, and how far the new tables were in accordance with the facts of the case.

In an article on "Sags and Stresses in Overhead Wires" in the NATIONAL TELEPHONE JOURNAL, December, 1906, Mr. T. Fletcher referred to these calculations and experiments, and quoted two of the tables which I worked out. Mr. J. Poole also gives them in his *Telephone Handbook* (page 361), but as in both cases the matter is only briefly referred to, and as the subject is one which is of interest to all engineers who are responsible for this branch of the Company's work, it is proposed in the present article to deal rather fully with the subject, and, in order to make it as useful as possible, to show in detail how the necessary calculations to allow for elasticity may be made.

Before coming to these it may perhaps be best to consider briefly the old tables and the formulæ upon which they were based.

Let l = length of span in feet.
L = ,, wire in the span in feet.
W = weight of the wire in pounds per foot.
θ = change of temperature in degrees F.
T_o = tension at the minimum temperature in pounds.
T = ,, ,, higher ,, ,,
D_o and D = the corresponding sags in feet.
k = co-efficient of linear expansion per 1° F.

In constructing a table of tensions and sags, the minimum temperature and the factor of safety to be allowed at that temperature are first settled, and this factor of safety fixes the tension. Thus, in the case of a 100-lb. hard-drawn copper wire whose breaking load is 330 lbs. we may adopt a minimum temperature of, say, 20° F. and a factor of safety 3.

The tension T_o at the minimum temperature will therefore be

$$\frac{330}{3} = 110 \text{ lbs.}$$

Now a wire suspended between two fixed supports takes up a curve known as a catenary, and the tension and sag are related by the formula

$$D = \frac{w l^2}{8 T} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Hence the sag corresponding to a span of 150 feet will be for a tension of 110 lbs.

$$D = \frac{0{\cdot}01894 \times 150^2}{8 \times 110} = 0{\cdot}48 \text{ feet.}$$

So that we have the values of the tension and sag at the minimum temperature. To find the corresponding values at any higher temperature the formula used in obtaining the old tables was

$$D = \sqrt{D_o^2 + 0{\cdot}375\, k\, \theta\, l^2} \quad \ldots \quad \ldots \quad (2)$$

k for hard-drawn copper being taken as 0·00000956, the sag for a rise of 40°, *i.e.*, an actual temperature of 60°, will be

$$D = \sqrt{(0{\cdot}48)^2 + 0{\cdot}375 \times 0{\cdot}00000956 \times 40 \times 150 \times 150} = 1{\cdot}86 \text{ feet.}$$

Now from formula (1) it is seen that the tension in a wire varies inversely as the sag or

$$\frac{T}{T_o} = \frac{D_o}{D} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

and therefore $T = \frac{0{\cdot}48}{1{\cdot}86} \times 110 = 28{\cdot}4$ lbs.

In a similar way the values of the tension and sag at any other temperature were obtained.

It will be noticed in formula (2) that there is no quantity dependent upon the elasticity of the wire, but only one depending on the temperature, and for this reason the values arrived at must necessarily be inaccurate.

The degree of inaccuracy will be at once seen, if we consider the case just taken. The change in tension found above for 60° is that due to the increase of length consequent upon the rise of temperature, and this increase is 0·00000956 × 40 = 0·0003824 of the length of the wire. But did such a change of tension as from 110 to 28·4 lbs. occur from the effect of temperature alone, this very change would in virtue of the elasticity of the wire cause the wire to shorten up by an amount equal to 0·00001146 (110 − 28·4) = 0·000935 of its length, 0·00001146 being the co-efficient of elastic expansion per 1 lb. tension for a 100-lb. H.D. copper wire. The decrease of length would thus be more than twice the elongation produced by the rise of temperature. As a matter of fact, however, the tension never falls to 28·4 lbs., but as the temperature gradually rises and the wire lengthens the elasticity comes into play and shortens it, and the final tension for any given temperature is determined by the equilibrium of these two opposing forces. It will be seen later (Fig. 6) that in the particular case we are considering the tension would be, not 28·4 lbs., but 82 lbs., and the shortening of the wire is only 0·000321 of its length, which is slightly less than the expansion caused by the increase of temperature. From this it is obvious that, so far from elasticity being a negligible factor in the calculation, its effect is of the same order as that caused by an alteration in temperature, and it can therefore on no account be omitted from the calculations.

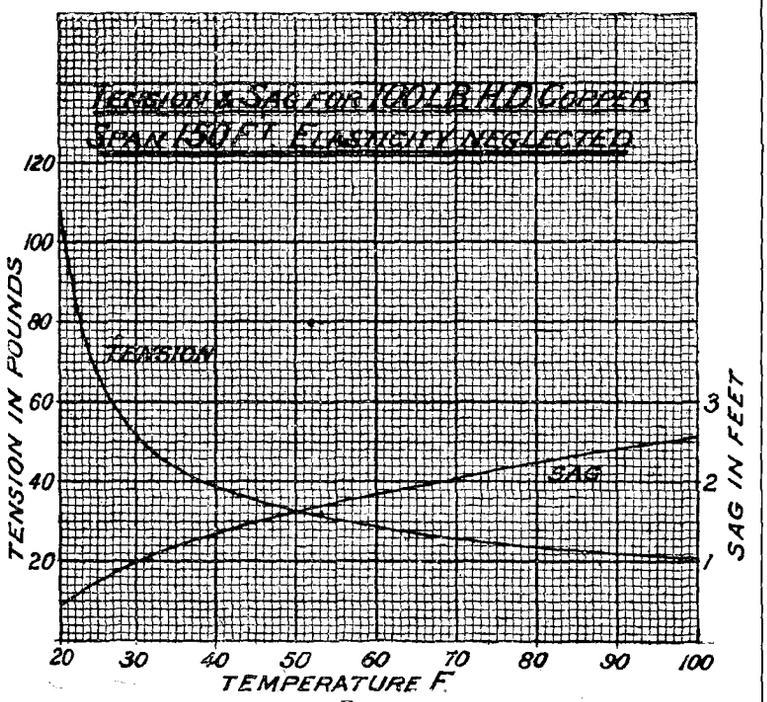


FIG. 1.

As a sample of the results obtained by the foregoing method, the tensions and sags for a 150-feet span of 100-lb. copper wire, taken from the old Engineering Instructions, are given in Table 1, together with the curves plotted from them (see Fig. 1).

The latter may be taken as characteristic of the general shape of the curves obtained when elasticity is ignored.

TABLE 1.

100-*lb. H.D. Copper. Span* 150 *feet.*

Temp. F.	Tension (lbs.).	Sag (feet).	Temp. F.	Tension (lbs.).	Sag (feet).
20	110	0·48	70	26	2·07
30	52	1·02	80	24	2·25
40	39	1·35	90	22	2·42
50	33	1.63	100	21	2 58
60	29	1·85			

In this curve the very sudden change of tension between 20° and 40° should be particularly noticed, because it never occurs, and is exceedingly misleading.

We have now to consider a method of calculation, in which the elasticity of the wire is fully taken into account. Various methods have been given from time to time for doing this, and, of analytical ones, the simplest is perhaps that due to Prof. B. Hopkinson.

In this method it is necessary to start by assuming a series of sags, from which the corresponding tensions are at once obtained and then calculate out the corresponding temperatures. From these figures curves can be plotted, which give the values for any intermediate temperature.

Table 2 shows in detail the method of doing this, in the case of a 100-lb. hard-drawn copper wire, for a span length of 150 feet.

TABLE 2.

Sag (feet).	Tension (lbs.).	$\frac{L}{L_u}$	$\frac{L}{l}$	$\frac{L_u}{l}$	Expansion due to change of temp. $\theta°$.	Change of Temp. $\theta°$.	Actual temp. $t°$.
0·48	110	1·00126	1·0000277	0·99877	0·00000	0	20
0·54	98·3	1·00113	1·0000348	0·99891	0·00014	16·5	36·5
0·62	85·2	1·000976	1·0000463	0·99907	0·00030	35·3	55·3
0 71	75·2	1·000862	1·0000594	0·99920	0·00043	50·6	70·6
0·79	67·2	1·000770	1·0000743	0 99930	0·00053	62·4	82·4
0·88	60·9	1·000698	1·0000907	0·99939	0·00062	72·9	92·9
0·96	55·6	1·000637	1 0001087	0·99947	0·00070	82·4	102·4

Column 1 gives the assumed sags, the first of which is that for the given tension at the minimum temperature.

Column 2.—These are the tensions worked out from the sags in column 1, by formula (1).

Column 3 is obtained from column 2, $\frac{L}{L_u}$ being the ratio of the actual length of the wire (L) at temperature $t°$ to the unstretched length (L_u) at the same temperature. It is equal to 1·00001146 T.

Column 4 represents the ratio of the actual length of the wire (L) at $t°$ to the span length (l). It is equal to $1 + \frac{8\,D^2}{3\,l^2}$. This value is obtained from the geometry of the catenary.

Column 5 is the ratio of the unstretched length (L_u) at $t°$ to the span length (l), and is obtained by dividing column 4 by column 3. Instead of actually dividing, it is quite accurate enough to take this as equal to 1 + (4th col. − 3rd col.).

Column 6 is the expansion due to an increase of temperature (θ), and is obtained by taking the value of column 5 for any temperature and subtracting from it the value at the minimum temperature.

Column 7 is the increase of temperature (θ) corresponding to any given expansion, and is obtained from column 6 by dividing it by 0·0000085, the co-efficient of linear expansion per 1° F. This value of the co-efficient was specially determined for Prof. Hopkinson by Prof. Ewing.

Column 8 is obtained by adding the value of (θ) in column 7 to whatever temperature is selected as the minimum to be worked to, in this case 20° F.

(To be continued.)

THE NATIONAL TELEPHONE STAFF BENEVOLENT SOCIETY, LONDON.

THE following grants have been made during April:—

Traffic Department (one)	£1 4 0
Engineers Department (four)	13 10 0
Stores Department (one)	5 10 0

Number of grants made since formation of society, 256; value £753 13*s.* 4*d.*
Donations received: £15 10*s.* 8*d.* Number of members at April 30, 2,859.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

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VOL. V.] JUNE, 1910. [No. 51.

THE BELL TELEPHONE COMPANY'S REPORT.

ONCE again in reviewing the annual report of the American Telephone and Telegraph Company, we have to draw attention to the astounding figures both of development and expenditure which it exhibits. It is no new story, and the moral which adorns it is likewise by no means new, but unfortunately as regards Europe it has lost none of its force. What we said in 1906 might be said again with some variations in the figures quoted. One cannot help contrasting the one or two million pounds spent annually on telephone development in Germany for instance, or the £400,000 to £450,000 (as will be seen from another column) spent in France, or the expenditure of a million to a million and a quarter by our own Post Office, with the annual amounts of not less than five millions, and in some cases more than sixteen millions, laid out by the Bell Company on additions to plant. The annual increase in stations is not less amazing. The increase alone for 1909—viz., 778,063—is greater than the total number of telephones in Great Britain and Ireland, and Great Britain, it must be remembered, possesses more telephones than any country in Europe except Germany. One is accustomed to think of the United States as immeasurably more vast than any European country, but its population is only about 25 per cent. more than Germany's, and by no means twice that of the British Isles. Yet there are roughly 8,000,000 telephones in the United States and 600,000 in this country, a proportion of considerably over ten to one instead of less than two to one. It is not, therefore, entirely to the immense extent of the States that we must look for the explanation of the above-mentioned huge figures nor to the superior quickness of the Americans in appreciating and utilising facilities afforded by new inventions. The explanation lies rather, we think, in the steady development of the system by a far-sighted policy only practicable when there is a fair certainty of a long period of enjoyment and a commercial interest in results.

This policy is evidenced in the report in many ways, such as in the maintenance of a research organisation involving great expenditure from which few results could be expected for years. The United Kingdom by its deliberate adoption of a limited term has short-sightedly deprived itself of just this very aid which painstaking and scientific research would have ensured for the future development of the industry. In fact, the whole history of the Bell Telephone Company, and indeed of the development of the telephone system in America, is a signal triumph for private enterprise conducted in a public-spirited manner. Unhampered by royalties and restrictions it has developed rapidly and naturally, or rather it has developed with the luxuriance of a garden whose soil has been scientifically enriched by a skilful gardener. For it will be seen from the report the constant pains taken and expense incurred by the Company to improve plant and methods; indeed, their studies of traffic and development have formed models for the whole telephone world. Europeans, dependent as regards capital which is the life-blood of the system on all kinds of political considerations which sway Governments and Treasuries, must regard with envy the ease with which money is obtained and the businesslike liberality with which it is expended in America. What wonder that capital is readily forthcoming when it goes to supply a public need, an immense convenience, which is gladly paid for by those using it, and which earns handsome returns? But no less wonderful must that state of things appear under which the capital is not forthcoming, in which the public demand is not satisfied, and the development of one of the greatest social and commercial aids of our time is artificially restricted ,and at the same time a source of public revenue neglected. This surely is a phenomenon at which future economists will marvel and admirers of our age fail to explain.

TELEPHONE LOADS.

THE exhaustive paper on the "Telephone Load Line," by Mr. H. DEANE, of which we publish the first instalment in another column, will be of especial interest at the present time when much has been heard in the Press on the grievances of operators in other telephone administrations. It is by such close and scientific study of the question as this that the apportioning of the load of each operator's position is arrived at and an equitable uniformity of work obtained from each. From some extracts from a report on the French Postal Budget which we publish it will be seen that although in Paris the average number of subscribers attended to per operator's position is less than in London their work is actually more harassing because there is no scientific distribution of the load and many are overworked whilst others in consequence have not enough to do.

In a task such as operating it is obvious that it is the quality rather than the quantity of the work which is harassing, and the proper distribution of the busy subscribers over the positions and the provision of suitable arrangements for referring all troublesome calls to monitors does much to smooth the operator's way and enable her to handle with ease a heavy load of straightforward calls where a much lighter load of irregular and harassing calls would be more than she could bear. In this matter, as in other matters of administration, order is everything. To be fully employed is no grievance, and with this end in view the load is determined; but to be worried is quite another thing. The monitorial system is

introduced to relieve the operator of all worry and of all troublesome calls; the supervisor combines with her supervisory duties the rendering of assistance in times of pressure. We do not seek to make light of the exacting and continuous duty performed by our operators day in and day out with, on the whole, great conscientiousness and dispatch, but we wish to remark on the careful study and attention which is given to the details of their work and the constant watchfulness which is exercised to fit the burden to the back.

THEORY AND PRACTICE.

IN an article which we published on the difference between "Theory and Practice in Contract Work," the writer seems to suggest that there is some natural opposition between the two terms, and there is no doubt that his view is shared by many. Theory and practice are, however, complementary to each other. Sound practice is based strictly on theory, and theory is evolved from sound practice.

The thoughtful worker pondering over the principles of his daily practice evolves new theories, which in their turn become the basis of the ordinary man's practice. Which was first in the world is as much a matter for speculation as the problem of the hen and the egg. Did primeval man originally encounter physical and moral problems at haphazard and found theories according as he was successful or unsuccessful, or did he first invent some crude kind of theory and act upon it, modifying and amending it as practice suggested? Did he attack the aurochs or the great elk with his rude weapon without some theory as to how the latter should be most effectively used, or will it be claimed that he depended entirely on practice? If so, was not that practice based on some primitive theory? Probably it was, for it is impossible to embark upon any new course of action without some rough theory as to how we are going to act. In any case, the line between immature half-considered theory and tentative, experimental practice is often a fine one. The first man to employ steam as a motive power must have formed a theory of its expansive properties before he attempted to use it. By practice he would be able to fix his theory more exactly, and this exact theory would form a law to guide future practice. Alike in arts, sciences, and industries practice must be preceded and guided by theory, if not by accepted theories at least by those of the artist or worker himself.

The explanation of the popular idea of antagonism between theory and practice lies in the fact that purely practical and purely theoretical men are equally incomplete and contemptuous of one another. The man skilled by long practice and experience in the workshops looks down on him who comes armed only with book-knowledge, while the man trained and taught by theory despises him who would be completely lost if called upon to do anything outside his everyday practice. The man who is steeped in theories which he has never seen applied, and the man versed in practices of which he is ignorant of the underlying principles will probably be found wanting when put to the test. It is clear that one must supplement the other, and if experience is the more pleasurable we cannot afford to dispense with the theory upon which laws are founded.

GOETHE'S Mephistopheles says:

> Grey is all Theory, dear friend,
> And green the golden tree of Life.

But theory is more a thing apart from practice in life than in work. In the former we are instructed by instinct and impulse; in the latter we must be guided by that acquired knowledge which is born of theory. After all, what Mr. LIVEMORE says, in effect, is that, considering the standard theoretical principles of contract department working not applicable to a certain part of London, he has evolved theories of his own.

HIC ET UBIQUE.

LIKE the dog's fabled first bite it seems that in France the irritated telephone subscriber is to be allowed his first swear. At any rate we read in the Press that hitherto the subscriber using strong language to operators could be cut off from all communication without warning. Henceforth the short-tempered will receive an admonition on a first offence. On a second display of feeling they will be cut off for two days, while a series of personal complaints of a subscriber's language will lead to rupture of the contract.

"HEART-BEATS a hundred miles away." So run the headlines in the daily papers, referring not to the telepathic sympathy of lovers separated by pitiless space but to the sound-magnifying telephone of Mr. Sydney Brown. Thus are the most cherished figments of the poets reduced to plain fact by the advances of science.

IN the *Electrical Engineer* appears a quotation from a German paper entitled "Automatic Telephony." It reads:

> We Germans seem to be in too great a hurry in this matter. Friends in Munich are loud in their complaints. They say that they are greatly hampered in talking to us here in Berlin. They could do it quicker if they could catch hold of the receiver in the good old way. It may seem strange to talk about the common or garden telephone as an old-fashioned instrument, but at the same time the automatic devices do not yet quite seem to be able to entirely replace the human hands.

Careful readers of the JOURNAL will gather from our remarks on page 130 of Vol. II and page 144 of Vol. IV that we quite agree.

WHAT the *Daily Express* describes as the greatest dog story on record is to the effect that a terrier which was accidentally shut up at night in the shop of Mr. J. M. Tierney, tobacconist, of Cleethorpes Road, Grimsby, knocked the receiver off the telephone and attracted the attention of the operator at the exchange to his predicament by barking loudly into the instrument.

The operator at once communicated with Mr. Tierney and the dog was released.

Our Hull correspondent whilst saying that the facts have been verified and are quite correct, adds that the feat is due, he thinks, not so much to the dog's intelligence as to the convenient position of the telephone for getting its receiver knocked off by the restive dog.

THE new submarine cable between Abbot's Cliff, Dover, and Cape Grisnez, was laid on May 5 by the cable ship *Faraday*. The *Faraday* began paying out the new cable at seven o'clock in the morning, and had laid it right across to Cape Grisnez, a distance of eighteen nautical miles, before noon. This new cable is to be used for telephoning only and has loading coils inserted. The equivalent of this cable if unloaded would be 2·377 and when loaded the equivalent becomes 7·286, so that the improvement due to loading is 3·06 times. The cable is at present buoyed both off Abbot's Cliff and Cape Grisnez, and all that is necessary is to splice it up with the land cable on either side of the Channel connecting London and Paris. This work will be done by the Government telegraph steamer *Monarch*. There are now eight Channel cables from Dover.

OUR Italian contemporary *Telegrafia e Telefonia* asks us to call the attention of our readers to the fact that an album, containing 50 original photographs of the offices destroyed by the earthquake in Sicily, groups of telephone officials and other interesting scenes, is being sold (price 5*s*.), for the benefit of those employees affected by the disaster, in which some 300 officials met with their death and many others lost everything they possessed. A series of 40 pictorial postcards with the same views as in the album is obtainable for 2 francs, or including 5 centime stamp and the office stamp of Messina, 4 francs (about 3*s*. 2*d*.). The Editor will be pleased to accept orders.

THE TELEPHONE CRISIS IN FRANCE.

WE have before us the Report on Posts and Telegraphs made by M. Charles Dumont for the Budget Commission charged with the examination of the French Budget for 1910. He devotes over 70 pages to telephone questions, and is very outspoken in his criticisms. The report, i deed, is couched more in the style of a newspaper than a blue book, Section IV (The Telephone Service) beginning as follows with a heading in large type :—

"IL Y A PEU DE TÉLÉPHONES EN FRANCE.

"The telephone administration has been unable to see or do its duty. The telephone does not render to the nation, to its commerce, to its industries, business, social relations, to those who travel for pleasure or business, the services which in other countries State administrations or private companies have obtained from this marvellous instrument of intensified life and accelerated communication—the telephone." Here follow tables and figures showing the poor development of France in comparison with other countries.

"Our system is poor. Almost everywhere the service is mediocre and even bad. . . . We confine ourselves to the Parisian telephone crisis. It has lasted more than ten years with alternating recrudescences of intensity. It sums up all problems in their most difficult aspect. . . . Is it necessary to describe the misfortunes of the telephone subscriber? The disheartening wait while the receiver rests mute at the ear—the fleeting distant voices, conveying confidences of which one can make nothing—another subscriber waiting one knows not where.

"At length the long-expected voice of the operator is heard. Our number repeated by her mingles with three or four others cried out by other operators.

"Won't the subscriber answer? Is he at home? Is his line in order? one waits to know.

"While one waits suddenly an unknown voice demands a number, and despite our denials insists that we are the operator at the Saxe Exchange, or Sablons or Desrenaudes.

"For how many hours during these ten years have Parisians endured this torture, supplicating, demanding, resigned, and smashing at times their telephones, having them repaired again, taking new hope, contented almost if an official letter explains to them there are technical causes for their tribulations, counting on the days when things will be better.

"Despite all, the subscribers increased from 19,351 in 1898 to 44,863 in October, 1909.

"The telephone, as a matter of fact, adapts itself so marvellously to the exigencies of the life of our times, encumbered with occupations, appointments, curiosity, pleasure—that, in spite of nervous crises and broken apparatus, a few more satisfactory communications and a few journeys saved suffice to renew the patience and hope of subscribers."

The report goes on to say that during the last three years the transfer of the multiples in the central exchanges of Paris and the fire at Gutenberg Exchange have aggravated the crisis. At La Roquette, an exchange of 4,200 subscribers, the lines out of order reached 764 in four days. At La Villette, 4,500 subscribers, the faults mounted up to 2,371 in the first fifteen days of October. "These figures are frightful," says the report. "They proclaim a veritable disorganisation of the service. . . . To have dared to inflict the crisis of the transfer without having foreseen and taken the necessary measures that it should be rapid and scarcely perceptible, remains an unpardonable fault on the part of the telephone administration."

The administrative and constructive departments have been unified by M. Millerand and a single responsible administration formed for the construction, maintenance and working of the telephone system. Among the proposed reforms some are immediately realisable, while others presuppose an extension of the system and a notable increase in the number of subscribers. "To awaken initiative and determine responsibility," says the report, "to utilise rationally the material and staff at hand, this is the crying need of the moment. To construct new exchanges, to fix new tariffs, to substitute perhaps another system of switching for the manual multiple on the central battery, these at present are thoughts for to-morrow. To wait until you can do better what you can now do well is a proof of idle inertia. Not to foresee in the present working the exigencies of the future leads to costly blunders and demonstrates an unpardonable lack of foresight."

It is almost a surprise, says M. Dumont, to find in the established staff of the telephone service so many men of high technical value and so hard working. Why have their efforts produced such mediocre results? Because they are misplaced, their functions are ill-defined, and their decisions do not result in rapid movement nor affect the whole of the machine. It is well that there are no longer two directors nor two parallel hierarchies of bureaucrats opposing each other. Good results should follow this initial change. A technical department will study complete programmes for working an ever-better system ever-better equipped.

In criticising the faults on lines and instruments the report points out that France is the only country in the world where subscribers are free to choose their own types of instruments. They exceed one hundred varieties, and although the administration does not provide them it has to maintain them. Can it be wondered at that the percentage of faults is high? For this reason the central battery system was not adopted in its integrity. Economy, says M. Dumont, is a bad reason for this. After the experience gained the necessity of regular working is of prime importance, and a supplementary expense of some few francs would be quickly recouped by decreased cost of upkeep.

The report criticises in turn the administrative staff, the switching system, the operating staff, enquires into the nature and extent of faults, discusses the extension of the system and goes into the question of large exchanges and long lines, or small exchanges and short lines, and the question of party lines and the reform of tariffs generally. Dealing with the question of operating, it says that the signalling system wants improving, the hours of service require consideration, and the arrangements for the recruiting and training of operators overhauling. In Paris there are far fewer subscribers per operator than in London or Berlin, yet owing to inequitable distribution of lines the best operators are allotted all the heavily loaded lines and are quickly overcome and discouraged, and the idea of being overworked when a colleague not far distant is idle is not conducive to good results.

The report is exhaustive and interesting, and insists throughout on the necessity of immediate reforms. The state of French telephony is due in some degree to the half measures which have been taken to bring the service up to date, but the list of annual capital expenditure on page 132, from which it appears that only £400,000 to £450,000 a year has been expended on the service in recent years, accounts for much.

TELEPHONY IN JAPAN.

BY W. NAPIER.

In the December, 1909, issue of the JOURNAL there appeared two photographs of the new Shiba Exchange in Tokyo. As the opportunity does not often arise of obtaining first-hand information regarding telephone exchanges in Japan it appears to me that some further photographs and particulars will be of interest to the readers of the JOURNAL.

Fig. 1 shows four of the six exchanges which serve Tokyo; the Honkyoku building contains the trunk exchange as well as the local exchange. Figs. 2 and 3 show the switchrooms in Honkyoku and Naniwa Exchanges. The operators in the Japanese exchanges wear uniforms which they provide themselves, operators wearing maroon-coloured skirts and supervisors purple skirts. In the summer white blouses are worn and in the winter black blouses, by both operators and supervisors; the sleeves of the blouses have, near the cuffs, a band of ribbon, the operators wearing pink, the supervisors green and the senior supervisors white ribbon.

Fig. 4 shows the operators' garden at Shiba Exchange; this is the only exchange at which a garden has been provided. Fig. 5 shows the operators' sitting-room at Honkyoku Exchange; the

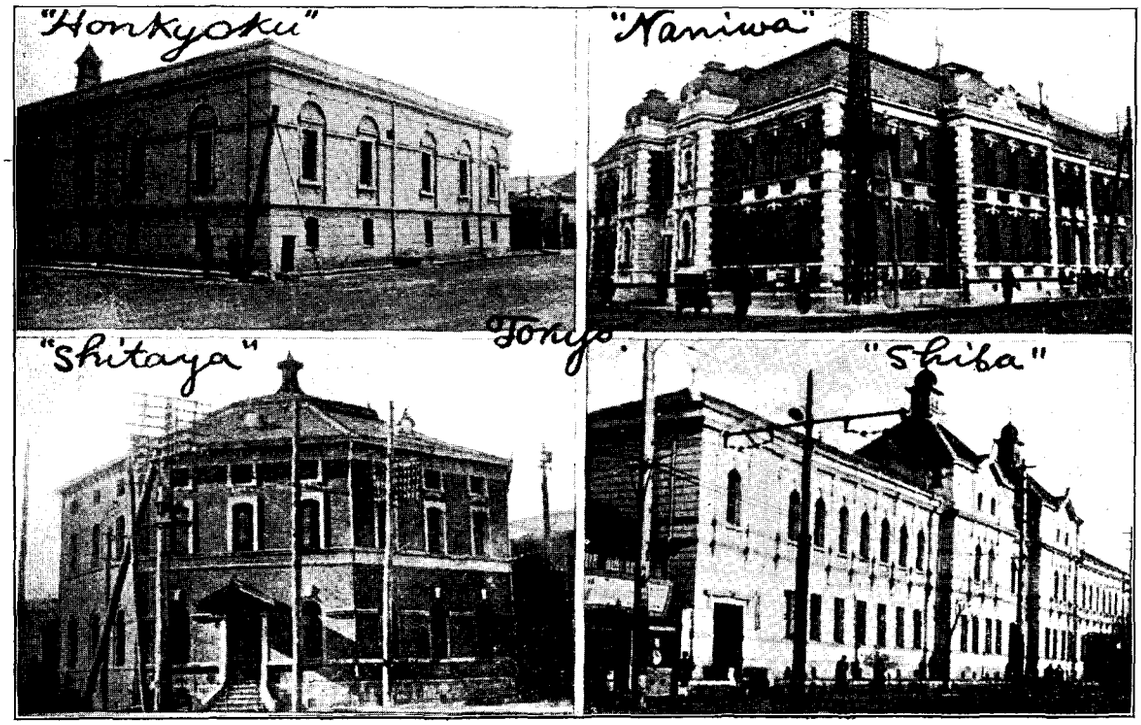


FIG. 1.

operators kneel on the floor, which is completely covered with a kind of cushion made of fine woven straw, each cushion being about 6 feet by 3 feet in size. The round object in the foreground of the picture is a firebox, in which Japanese charcoal is burnt.

In Osaka, the second largest town in Japan, there are about 10,000 exchange lines served by three exchanges — Higashi (East), Nishi (West) and Minami (South). Each of these exchanges was specially built for telephone exchange purposes. The Higashi building contains the local exchange with about 4,300 lines and also the trunk exchange, which is shown in Fig. 6. Minami Exchange has a Western Electric Company's central battery equipment of standard type, the other two exchanges having magneto equipments with self-restoring indicators.

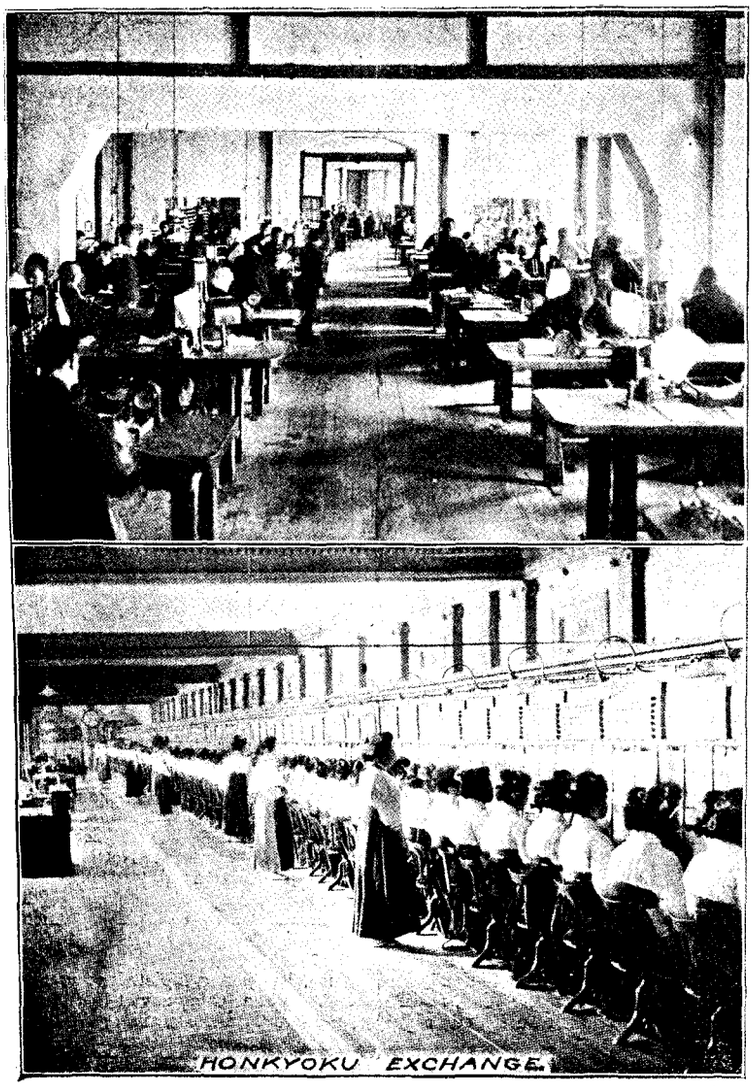


FIG. 2.

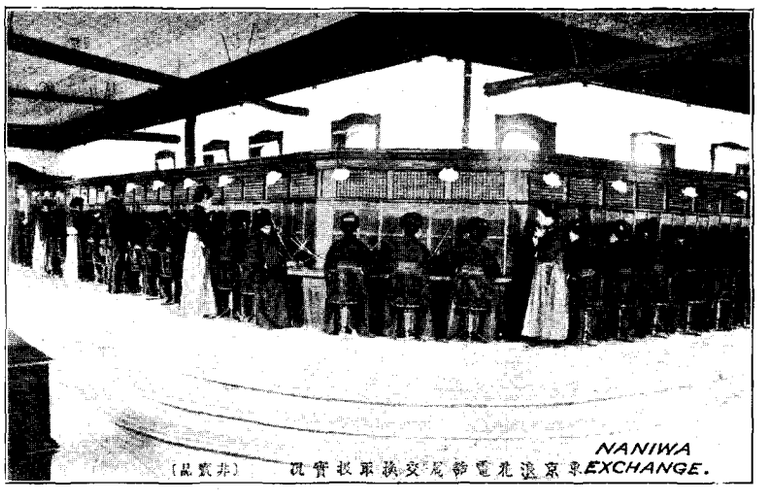


FIG 3.

FIG. 4.—OPERATORS' GARDEN.

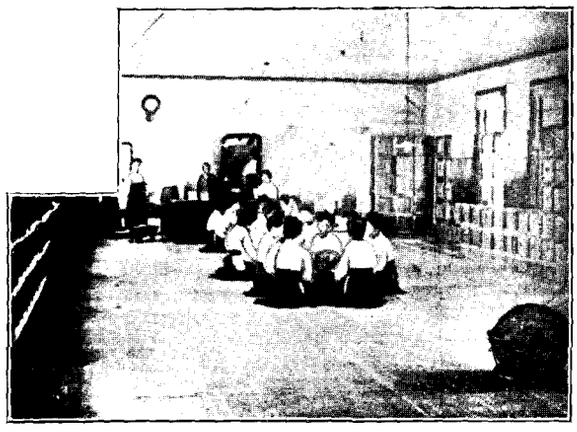


FIG. 5.—OPERATORS' SITTING ROOM.

The following are some traffic data for these four exchanges, extracted from a peg count taken on July 10, 1909, and show that the subscribers make a large use of their telephones :—

Exchange.	Honkyoku (main exchange).	Naniwa.	Shitaya.	Shiba.
System.	Self-restoring indicators.	Self-restoring indicators	Magneto: lamp signals.	Central battery.
Number of subscribers' exchange lines	3,336	4,514	3,199	1,256
Number of exchange stations	4,072	5,222	3,495	1,355
Number of originated calls per day	56,031	81,591	43,357	17,420
Percentage of outgoing junction calls	76	49	77	84
Number of incoming junction calls per day ...	48,782	45,601	27,021	11,192
Number of "A" positions...	45	55	35	14
Number of "B" positions...	22	22	17	9

Trunk talking is carried on between Tokyo and Nagasaki, a distance of about 1,000 miles.

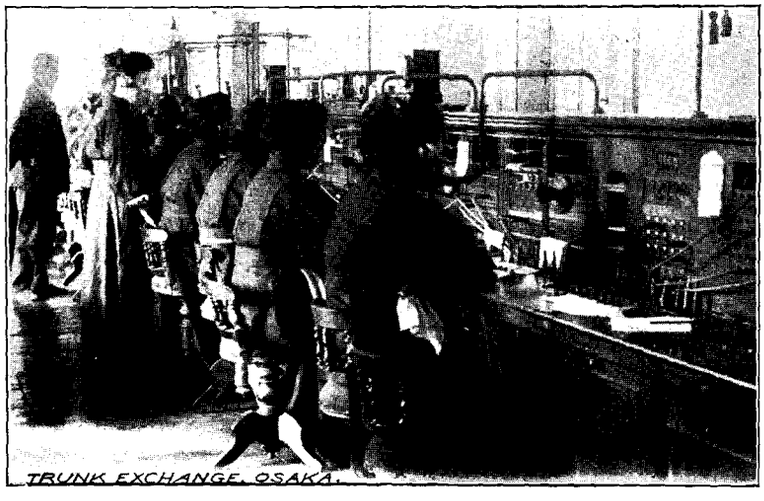


FIG. 6.

I am indebted to Mr. Risuke Wakameda (Electrical Engineer in the Department of Communications, Tokyo), who is at present in this country studying the telephone business, for the above pictures and information.

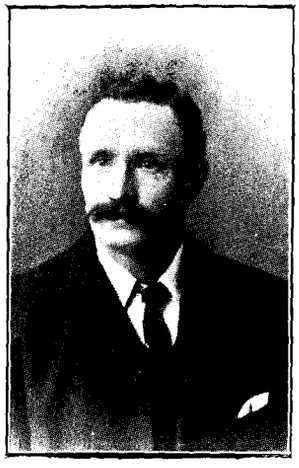
LONG SERVICE MEN.

MR. W. CLEARY, Assistant Engineer, Manchester, completed 30 years' service on Feb. 28 last. He joined the service at Bolton on Feb. 28, 1880, and took charge of the Manchester Ship Canal installation during its construction in October, 1890. He was transferred to Manchester to assist in the metallic circuiting, and in the transfer from the Royal Exchange to Central under Mr. Watts in 1893. Mr. Cleary is of a very genial nature and is deservedly popular with the staff at Manchester.

W. CLEARY.

FOREMAN CHARLES BUSH, whose photograph is here reproduced, has been engaged in outside telephone work since July, 1880, so that next month he will have completed 30 years of service. He was first of all a wireman, employed by the Edison Telephone Company, in London; in 1883 he was appointed foreman, and has been continuously employed in that capacity since. This is surely a record amongst the outside staff.

In the first ten years of his service Foreman Bush worked in various districts of London, but for the last twenty years he has been engaged in the City. He can recall being one of those employed in running the first telephone wires that were erected in London; these lines ran from Billiter Square to Tooley Street, the Thames being crossed in a single span. It is rather difficult to imagine, with our present telephone development on the south side of London, what the result would be of any attempt to supply service by open wires across the river.



CHARLES BUSH.

One other recollection of Foreman Bush's early telephone experiences is the disastrous snowstorm of 1886, when practically every pole in London was down. In more recent times he had charge of a good deal of important work connected with the metallic circuiting of the City subscribers.

During 30 years' experience of clambering about in all sorts of dangerous positions he has fortunately met with no serious accident. He, however, recalls how, shortly after his engagement by the Edison Company, he was occupied in making fast the butts of some stays on the side of a building while suspended in a boatswain's chair, and the foreman, who was standing on the parapet watching operations, unfortunately missed his footing, and, falling into the street, was killed. This accident so upset the man who was holding the end of the rope to which the chair was suspended that he let go the rope, and had the subject of this sketch not succeeded in clutching at a window sill, from which he was ultimately drawn up to safety, a double fatality might have ensued.

Foreman Bush is an enthusiastic supporter of the City Football Club, and has served on the local committee of the Staff Transfer Association. He contrasts favourably the more scientific methods of engineering work to-day with those which prevailed in his early days.

MR. J. T. COOK, Engineering Inspector, Nottingham, completed 25 years' service with the Company on May 2. Mr. Cook was the first member of the construction staff employed in Nottingham and ran the lines for the two subscribers with which the old Nottingham Exchange in Bottle Lane was opened in November, 1881. Mr. Cook left the service in 1883 and joined again in May, 1885, since which date his service has been continuous. He had experience of a large amount of junction work in the early days, running the first twisted junction from Nottingham to Loughborough with the No. 11 galvanised iron wire, and also dealt with the sections Nottingham-Manchester, Nottingham-Sheffield, Nottingham-Mansfield, Derby-Leicester, Nottingham-Leicester, and Northampton and Wellingboro'. The first district manager he served under was Mr. Joseph Chambers, who had headquarters at Leeds, and since the opening of the Nottingham district he has served under five district managers and five local managers.

MR. W. H. CROOK, Chief Clerk, Swansea, has just completed 25 years' service, having joined the Western Counties Telephone Company at Bristol in April, 1885. He was transferred on July 1, 1900, to Gloucester, and on April 4, 1906, to Swansea.

THE STAFF DINNER AND ANNUAL MEETING OF OFFICERS.

As our readers are aware these annual functions were postponed from May 27 on account of the lamented death of His late Majesty King Edward VII. The new dates which have been fixed are June 23 for the Dinner and June 24 for the Officers' Meeting.

Visitors.—Mr. Theodore Newton Vail, president of the American Telephone and Telegraph Company, was a recent visitor at Telephone House.

AN ECHO OF THE FARADAY MEMORIAL AT BARNSBURY.

THE following extracts from the recently published *Life of Lord Kelvin*, by Professor Sylvanus Thompson, will be of interest to our readers:—

An interesting ceremony, which linked together the names of Faraday and Kelvin, took place at Barnsbury on November 24, 1906, when Lord Kelvin unveiled a memorial tablet to Faraday in the room where Faraday, as an elder of the Sandemanian Church, used at times to preach, and which had now been transformed into a switchroom of the National Telephone Company. Lord Kelvin's words on this occasion were spoken with great emotion. . . .

Lady Kelvin wrote to Miss King, saying "Your uncle was the only person present who had ever seen Faraday, except some of Faraday's own family; and he made his little speech on his personal recollections. It was all quite a success."

MONITORIAL WORK.*

BY MARIA CUTTING, *Monitor, Hull.*

IN the ordinary walks of life one meets from time to time with handy labour-saving methods, and wonders how life was possible without them. We may equally wonder how the work of the telephone switchroom was conducted without the aid of the monitor.

Every monitor who knows her work should be an absolutely reliable directory, with all the necessary qualifications of a detective for discovering information and supplying it to irate subscribers. Other qualifications are a temper which is never ruffled, limitless tact and a Job-like patience. It is also taken for granted that she is skilled in the handling of calls, and understands all the workings of her table, so that she can get full value out of it. She must also have a thorough knowledge of the current rules and regulations in existence in her department.

Readers uninitiated into the mysteries of the switchroom would be inclined to consider the ordinary day's work of a monitor, when written down, to be a fiction conjured up by a vivid imagination. The monitor by going into complaints and bottoming them brings to light faults, which are duly reported. Each complaint is made out on a docket, and when the trouble is located the cause of it is written underneath the subscriber's complaint.

After explaining the cause of the trouble and completing the connection when necessary, the flashing signal is given to the operator, who is instructed whether the call has to be debited or credited.

Subscribers often complain of careless operators connecting them to wrong numbers, when a search reveals the fact that the number asked for has long since been changed; that they are using a billhead, a card, an old directory, a list of their own making, or any other possible one but the correct current directory.

If the person asked for is not a subscriber, his name and address with the calling-subscriber's number is noted, and afterwards handed to the contract manager, so that he can communicate with the non-subscriber, and use every inducement to persuade him to have a telephone.

* Abridged from prize paper read before the Hull Telephone Society.

Said a lady subscriber the other day: "Can you give me Ellers at the corner of Dock Street?" "What are they?" asked the monitor.—"Timber merchants," was the reply. "Are not Horsley Smith's at the corner of Dock Street?" queried the monitor. "Oh yes, that's it," answered the subscriber. "No. 70" says the monitor. The flash-back signal is given and the monitor is soon busy in another direction.

"I want Arthur Booth, coal merchant," demands another. "Did they not go out of business some little time ago?" asks the ever-ready monitor, and then tactfully supplies the information (as if refreshing the subscriber's memory), "the manager commenced business for himself, you know." "Well, I want Capt. ——; he used to work there," says the subscriber. "Shall I connect you to the late manager? Perhaps he can supply the information?" He can, and the monitor learns that Arthur Booth has commenced business again under another name. All this time and trouble could have been saved had this been noted on the advice form when he again became a subscriber.

"Will you give me the number of the nearest doctor?" splutters some excited individual; "there's been an accident." "Where are you?" quickly demands the monitor. "—— Street." "Right, Dr. Blank; I'll connect you."

"I can remember the address; it is 32, Thoresby Street, but I cannot remember the name, nor the telephone number," complains a measured rate subscriber. "Is it Nurse Lonsdale you require?" asks the monitor. "Yes, that's it," delightedly comes back the reply. Another caller satisfied!

"Your operator says there is no reply from ——, and I know someone must be there," comes an angry voice. "Oh yes, I will give them another ring," says the monitor, and once more patience is rewarded. On being asked if their bell had not been ringing, this reply was received: "I have been in the mill, and one cannot hear the bell there for the noise." "You can have an extension bell put in for 5s.," says the monitor," and thus two birds were killed with one stone—the cause of the delay was explained to the subscriber and the contract manager gained an order.

Another lady asks for "Corporation Enquiry," and explains she desires to speak with them because she wants a telephone. "Why not have a National?" asks the monitor. "It is just as cheap, and there are more than twice as many subscribers to the National system as there are to that of the Corporation." "I do not mind who supplies it, so long as I get one," comes the reply. To finish the story, I may add that the contract manager got the order.

Extensions are not always shown in the directory as they should be, and thus led to the monitor ringing up a certain confectioner to enquire if he had an extension to his branch. "No, I have not," he answered. "Well, you are losing orders," he was informed, "shall I instruct our contract manager to call upon you?" "Yes, you might as well," said Mr. Confectioner, and again the National Telephone Company did business.

The operators were continually reporting a certain number. The reason of this was brought to light in a curious manner. One of the operators, a friend of the subscriber concerned, heard on a visit one day the howler proclaiming the fact that the receiver was off the hook. She drew her hostess's attention to the fact, and was instantly informed that the buzzing noise kept baby quiet.

Time and space will not allow of further instances of this branch of the monitor's daily routine; suffice to say that a whole book could be devoted to nothing else.

To put the whole case in a nutshell, the monitor is the speedometer of the service; she takes service tests; she listens in on operator's positions whenever time will allow, and helps the operator by removing difficulties.

It would seem that there is no end to instruments and general faults, and one is led to believe that so long as human agency is required in the switchroom so long will there be faults to be found.

One qualification mentioned in the opening paragraph of this paper was an almost limitless tact, and nothing ever spoken or written is more true. This is especially the case in towns where a

Corporation has a service in competition with the National Company, for subscribers can only be too easily lost to the Company by lack of tact. Of course, out of the multitude of complaints the monitor has to deal with there are a certain number which may be called "National" faults, but the vast majority are subscribers' faults.

In one instance a subscriber complained that a certain number was almost always engaged when he asked for it. After repeated attempts he at last got through, and was then informed by his correspondents that they had not been engaged. The monitor quietly promised to look into the matter. She then rang up the number, and was informed by them that they had not been engaged, because no one had been ringing them up. "Has anyone been using the telephone at your end of the line?" enquired the monitor. "Look here, this is a club with about 800 members," answered the man, "how do you expect me to know who is using the telephone?" "Well, has anyone been using it recently?" enquired the monitor. "I am only the attendant here," was the reply, "it is very possible it has been used; I'm not always here to see."

Some subscribers will complain in a blustering manner; some in a so-sorry-to-have-this-kind-of-a-thing-to-do sort of a voice; others in the monarch-of-all-I-survey manner; and others will be either insulting or profane as their temperament directs. However, most of all of these are amenable to explanations, and it is rarely indeed the monitor will fail to please if she treats all and sundry with cool, clear arguments and explanations.

Quite recently a subscriber came through to the monitor's table simply raving. He said the operator had told him the number he wanted would not reply, and he knew for a fact that there was someone to attend to the telephone at the other end. The monitor promised as courteously as possible to look into the matter. Every test was applied, and all proved the line to be in good working order, but still there was no reply. The monitor made out a docket, and an inspector was despatched to examine the instrument. His job was a very light one, for it consisted in removing a wad of paper that had been inserted so that the bell could not ring, thus saving someone work.

Perhaps the most annoying user of the telephone is the user of the automatic box. It is simply astonishing to what lengths people will go in order to get a free call. They will complain of disconnections, when inquiry proves the call had been finished some time since. They will ask for a number, enquire if the person they want is there, and if he or she is not, ring up and state that the wrong number had been given them. Just one instance. A man rang up and asked for 253, and was put through. Very shortly afterwards the clearing signal was given. He then made a call to No. 523, and the operator, thinking he had got the figures slightly jumbled, put him through. He cleared again and again, complained that the wrong number had been given, and asked for No. 472. This time the operator transferred him to the enquiry desk. The monitor, of course, told him he could only have another call when he had put another penny in the box. "But," he expostulated, "I want Mr. ——, and he was not at his residence, so I want his office." The monitor carefully explained the obvious, and he put another penny into the box.

The call office user will often complain that the penny will not go in. When requested to try another, he is much surprised to find it will. More often than not the user of the automatic box is not used to the telephone at all, and the trouble required to get him to turn the handle is better imagined than described.

Just another instance of monitorial usefulness. No. —— complains that he asks for a certain firm, and every time he is connected to a Hebrew tailor. "What number is it?" asks the monitor. She gets the number, and finds the subscriber to be quite right, the number according to the directory being that of the firm required. She decides to look into the matter. Sure enough a decidedly Hebrew voice answers the ring: "I am Jacobs, tailor," he says, "I can press your clothes and make them equal to new at a small cost." "But did not the Globe Parcel Express Company have these premises?" asks the monitor. "Oh, yes; but I am here now. They left, and I do not know where they are." "Have you taken over the telephone?" asks the monitor. "No, but I am using it," comes back the answer. The chief operator is informed and the contract manager advised.

The monitor is responsible for signing on and off of operators in the attendance register. She must advise the chief when an operator fails to come on duty. Every morning the operators must test their instruments with the monitor, as soon as possible after they take their places at the switchboard, thus ensuring that every instrument is in good working order.

Before concluding I should like to mention that the test operator renders the monitor invaluable aid in the testing of lines. It is more satisfactory for the subscriber to be told "line out of order" than that he should go away thinking that the operators are neglectful of their duty. Finally, all Corporation and Post Office delays and errors, all misusers, grumblers and information-seekers are dealt with by the monitor.

CORRESPONDENCE.

DEVELOPMENT.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL

I HAVE followed, with considerable interest, the controversy on "Development" which has been maintained in the recent issues of the JOURNAL. The necessity for accurate and up to date cable records is very essential to the working of our huge business at any time, but considered along with the fact that the winding-up of the Company approaches, with its transfer to the State, this question of record-keeping, which facilitates "development," graduates to one of incalculable importance.

The various methods suggested by your correspondents no doubt meet their particular requirements, but whatever their merits may be, they appear to me to involve the duplication of records, which on the face of it is not economical.

Some months ago, special statistics were asked for by the engineers in this district to ascertain the particular D. P.'s in which spare wires were available for new lines, in order to conserve the efforts of the canvassers to these localities.

The cable record card system which has been in use here for some time shows on card No. 2 the development at the end of each quarter; we were, however, asked to account for every lead used or thrown spare during that time, and here difficulties arose. A new card, something after the style of those described by your previous contributors, was considered and rejected in favour of a proposal to utilise the back of the existing "development" card. It is ruled as below:—

Folio.	Date.	Nature of work.	Spares.
100	4—2—10	New	18
131	18—3—10	Ceasement	19
173	8—5—10	Removal from ..	20
211	9—5—10	Removal to.. ..	19

In the "daily advert. book" each transaction has a folio number allotted, and when the alteration or addition is made on the card record an entry similar to that shown is made on the back of the development card of the D. P. in which the alteration occurs. The result of this is the test clerk is in a position to quote the number of spares in any D. P. at the moment of asking, and to account for every wire used by reference to the "daily advert. book."

This method has given entire satisfaction so far, and I shall be pleased to give any further details to any interested.

Hillhead Exchange, Glasgow, May 5. JAS. DONALDSON, JUN.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I HAVE read Mr. Baldwin's letter in the May issue of the JOURNAL with interest, and cannot but feel convinced that his remarks have been made on the assumption that the testroom card record system is in use in Bristol. This is not so. The book system exists; and, as far as I can gather, the card system (with which I am not acquainted) has, until quite recently, applied to London only, and up to the present no instructions have been received to inaugurate the same in the provinces.

In reply to Mr. Baldwin I will endeavour to explain more fully the value of the Bristol card system. In the first place he describes the system as one "for recording the number of working circuits at the D.P." This is only one—and that not the most important—of its *raisons d'être*.

As I previously mentioned, one can tell from these cards—

(1) Circuits that have been joined up
(2) " " ceased ..
(3) Growth in any *part* of the area ..

} from the date of the commencement of the cards.

The first two items seem to me essential; as, to an engineer, the nett figure is not the only one required. For when estimating for a scheme to provide until a certain date (say, 1/1/1912) it is necessary to know what the proportion of cessations to new lines is, in order that a certain amount of extra capacity can be allowed for the last year, if thought advisable. This would enable new lines to be joined up during that year without waiting for a circuit to be made spare by some subscriber ceasing. Average figures for the whole centre are of no use

for this, as the proportion of new lines to cessations varies very considerably in different areas.

The third item, however, is perhaps the most important, as it provides one with the data on which to base a development study for any particular *part* of an area. This has proved most useful in scattered areas, of which there are many, and in the following circumstances:—

(*a*) *Wayleave Difficulties.*—A span has to be removed, necessitating splitting up the area. What has been the development for each of the two separate parts of the area? This information if obtainable, will enable me with more accuracy to forecast the future growth. Here, again, *average* figures for the whole area do not suffice as many areas include both fruitful and unfruitful localities as regards telephonic development.

(*b*) *Underground Extensions.*—The same applies here as in case (*a*). What is the best division of the present area? The card system I have outlined will give great assistance in dealing with this question.

(*c*) *To see that the Plant Erected is Properly Utilised.*—The contract manager has estimated for a certain number of subscribers (say, 23) in a certain part of an area. On that understanding a 25-pair cable has been erected on the route supplying that part of the area. How is that developing? Are the subscribers being joined up as anticipated? If not, the contract manager must be advised, so that a more thorough canvass may be made of that locality. If the rate of development is above that anticipated, the contract manager must relax his efforts in that locality. In this way the engineer keeps a watchful eye on the utilisation of the spare capacity which has been erected. How does Mr. Taylor obtain this information from his card system?

Mr. Baldwin states that this information is "obviously indispensable," but I do not see how it can be obtained from his, or from any card system which does not give names and addresses of the subscribers joined up and ceased. Consequently, I do not understand the next sentence of his letter which states that "the information—with the single exception of that provided for in the last column seems quite valueless, etc."

The reason of the first and second columns is to facilitate investigations when a cable has been filled up and the contract manager is inclined to query whether the spares have been used legitimately, or whether lines have not been cut in from some other area, and thus utilised the spare capacity which should exist in accordance with his survey. And what will be more interesting and useful, if at the end of the period planned for, the card is compared with the survey plan giving the addresses where it was estimated the subscribers would be obtained?

As regards the economical side of the question, I do not agree that the system "is decidedly wanting"; for, as I previously stated, it requires but very little time to keep up if done daily. As to six entries being made for each line, this is but a small matter, as the information is simply taken direct from the "handing-in book" (which is the book in which particulars of all lines are entered when completed by the Engineering Department, and handed over to the Instrument Department for the fitting of the instruments).

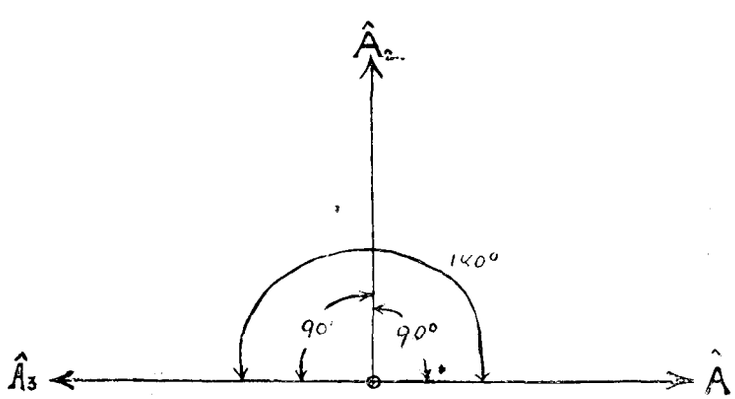
The back of the card could be squared for graphical representation as suggested by Mr. Baldwin; but it is doubtful as to whether the time spent in this way would be time well spent.

Bristol, May 18. E. L. PRESTON, Engineer.

$\sqrt{}$ OR $\sqrt{-1}$.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

AT the present time a considerable number of the staff are studying transmission, and judging by the requests for information there seems to be some considerable difficulty in understanding the meaning or significance of $\sqrt{}$ or $\sqrt{-1}$, and I venture to send you the following remarks in the hope that they may be of assistance to a few more members of the staff than I have been able to communicate them to.



Let $\hat{A}_1$, $\hat{A}_2$ and $\hat{A}_3$ above be three vectors of equal magnitude and in the same plane, and the magnitude of the vectors in the horizontal direction be considered + when measured from left to right and − when measured from right to left.

Then as $\hat{A}_3$ is equal in magnitude and direction to $\hat{A}_1$, but opposite in sense, it must be equal to $-\hat{A}_1$, which can be proved by setting the beginning of $\hat{A}_3$ at the end of $\hat{A}_1$ and thus obtaining their sum, which will obviously be zero. $\therefore \hat{A}_1 + \hat{A}_3 = 0$. $\therefore \hat{A}_3 = -\hat{A}_1 = (-1) \times (\hat{A}_1)$.

Now examine the diagram with a view to converting $\hat{A}_1$ into $\hat{A}_2$, as shown above. This can be achieved arithmetically by multiplying by (-1), and from the diagram it will be seen that to do it geometrically we must rotate the vector $\hat{A}_1$ through 180° or two right angles.

Suppose that this rotation be done in two equal stages, then at the end of the first stage the vector will occupy a position at right angles to the original vector $\hat{A}_1$. This new position is shown above as $\hat{A}_2$. If now the operation which has converted $\hat{A}_1$ into $\hat{A}_2$ be performed on $\hat{A}_2$ we shall obtain as a result the vector $\hat{A}_3$, which is equal in magnitude and direction to $\hat{A}_1$, but is opposite in sense, that is, equal $(-1) \times (\hat{A}_1) = -\hat{A}_1$.

Therefore the operation which we have performed geometrically by rotating $\hat{A}_1$ through 90° must be the same as we should perform arithmetically by multiplying $\hat{A}_1$ by $\sqrt{-1}$ as if we repeat this operation we should get as a result $\hat{A}_1 \times \sqrt{-1} \times \sqrt{-1}$ which is the same as $\hat{A}_1 \times (\sqrt{-1})^2 = (-1) \times (\hat{A}_1) = -\hat{A}_1$, which is the same as before.

From this it follows that the arithmetrical multiplication of a vector by $\sqrt{-1}$ is equivalent to the geometric rotation of a vector through one right angle.

East Exchange, May 17. H. S PECK.

STOCK DIFFERENCES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

AGAIN we are in the throes of stocktaking and have to face the usual differences, and, naturally, the many explanations, such as "Rats eating the Russian tallow," "Sun drying up the compo," etc., etc.

It is possible, however, to advance a real reason which at first sight might be placed in the same category.

For instance, the following case cropped up in this district, the veracity of which is vouched for by the local manager and officers concerned.

Whilst posting stores slips I came across one, which aroused my curiosity, owing to the fact that it bore mysterious yellow spots, and upon investigating I found that a figure which once existed had been completely obliterated by one of these yellow spots.

It appears that during some secondary battery tests a few drops of the sulphuric acid fell on the table and later the slip in question was accidentally laid face downwards on the same spot. The result was the complete discharge of the copying ink pencil figure.

Probably it will prevent this action being adopted as a method of adjusting stock when I remind the reader that a definite yellow stain remains where the acid touched the paper.

11, Bench Street, Dover, May 13. J. U. WOOD, Stores Clerk.

SUBSCRIBERS' APPARATUS CARDS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

EVERYONE concerned with subscribers' instrument records must concur with your Nottingham correspondent's views, expressed in your April issue, as to the necessity for such records being reliable.

Mr. Cockrem must have sorely regretted that no scheme existed at the time of the inauguration of C.B. equipment that would have assured his records being put in order automatically and thus have obviated the necessity of a check and of inflicting this duty on the inspectors.

Apparently the Nottingham records were not up to date, and unless it has been realised that "Prevention is better than cure," the work of checking will never cease.

In London the trouble was anticipated and suitable steps were taken to avoid chaos. Forms were prepared and compiled by the Fitting Department at the time instruments were changed. These furnished all necessary details of recovery and new equipment, and were passed on to the fault clerk in order that he might bring his records up to date.

Apparatus cards should always be entered up from Fitting Department's advices, and checks of apparatus would not then be necessary. It is always a questionable procedure to impose clerical duties on the instrument inspector, who is handicapped in the performance of his primary duty if he is called upon to devote his attention to the checking of apparatus and compiling of lengthy records.

In London, where economy ranks in the same line with efficiency, record keeping, as far as subscribers' apparatus is concerned, is not allowed to run riot, and we are inclined to wonder at the utility of the form submitted by your correspondent.

There can be but little object in summarising single instruments under such varied headings, and when a variety of classes of apparatus are dealt with such a record would be enormous.

We satisfy ourselves by keeping a summary of totals week by week in book form, headed as above.

LONDON WALL EXCHANGE.

Date.	Terminating on insts. Ex. lines. 1.2.3.4.	Terminating on insts. P. lines. 1.2.3.4.	Extension insts. 1.2.3.4.	Party line insts. 1.2.3.4.	Cab shelter and car call lines. 1.2.3.4.	Intercom. insts. on rental. 1.2.3.4.	Fire posts rented with trans. 1.2.3.4.	Answg. insts. & emergency answg. insts. 1.4.	Sales insts. maintained on rental. 1.3.4.	Switchboards counted as one inst 3.4.	Hire purchase insts. 1.3.4.	Fire alarm posts. 1.3.4.	Fireman's bells. 3.4.	Electrophone sets. 1.3.4.	Bell installations maintained. 3.4.	Terminating on swbds. Ex. lines. 3	Terminating on swbds. P. lines. 3	External extensions on switchboards. 3	Metaphones maintained free for 3 months. 3	Items 6 roa Return. 1	Official stations as per No. 3 Return. 2	Official and unofficial stations. 3	Stations to be periodically inspected 4
B. E.	6277	1585	9746	..	..	109	..	7020	576	1624	..	..	..	1	144	6853	2026	244	9	25314	17717	29194	27082
W. E. 7/4/10	17	10	19	..	..	..	..	18	2	4	..	..	..	..	..	10	5	1	..	66	46	68	70

This is all that is necessary to meet demands of any returns, and cannot be considered as duplicating work.

If information that cannot be obtained from the summary is required, it can be obtained by reference to the cards at a less cost than is entailed by keeping a perpetual record.

Salisbury House, E.C. E. RANDELL.

LONDON NOTES.

THE Benevolent Society have now published the balance sheet of the entertainments arranged during last season. The whist drives were a very popular form of entertainment, and yielded a substantial balance. Unfortunately the dance held in January was not a financial success; evidently tripping "the light fantastic toe" does not appeal to Londoners.

THE telephone society committee has appointed its various sub-committees for the year, and the preparation of next session's syllabus will now be taken in hand. It has been suggested that a presidential address should be delivered at the opening meeting; the suggestion is one which will doubtless be warmly approved by the members. It is probable also that the elementary lectures will be continued; if so, it is to be hoped that a larger number of the staff will patronise them than was the case last session. Perhaps the scope of the lectures and methods adopted are susceptible of some improvements; no doubt the new committee will consider in what way they can be made more attractive.

BANK Exchange staff held the last of their series of whist drives at "Ye Mecca," Ludgate Hill, on April 27. There was a surprisingly large attendance, considering that at the end of April most London men prefer their gardens to the best of indoor gatherings. Mr. T. Caparn, of Head Office Stationery Department, was warmly congratulated on securing the gentlemen's first prize. At the close cheers were given for the committee who had organised the season's drives so successfully.

MUCH sympathy is being extended by the staff to Messrs. Payne and Waller, both Senior Cashiers and old servants of the Company, and to Mr. Worthy, Local Engineer, Lee Green, all of whom are at present laid aside by severe illness. Mr. Payne has had to undergo a serious operation, but is now recovering rapidly. Mr. Waller and Mr. Worthy have been ordered a complete rest for some weeks by their doctors. It is to be hoped that a speedy recovery will take place in all three cases.

ARRANGEMENTS are now well in hand for the cricket match at Brighton on Saturday, June 18. The railway company have quoted a special fare of 3s. for the return journey, provided 100 are guaranteed. Apparently there will be no difficulty in obtaining more than the requisite number. There are several good cricketers amongst the London staff, but as considerably more than eleven have signified their willingness to play, there must necessarily be some disappointment. The Brighton staff have very kindly undertaken to provide tea free of charge for the team; provision will be made for the remainder of the party at a small charge. Mr. Clay, Mr. Harvey Lowe, and several of the chief officers hope to be there. The match will be played at the Sussex County Cricket ground at Hove.

THE sudden illness and death of His late Majesty, King Edward VII, had a considerable effect on the London traffic. The general anxiety prevailing on the afternoon of Friday, May 6, caused an abnormally heavy load at all exchanges. The serious turn taken by His Majesty's illness also made special provision necessary for the night service. Exchanges most affected were Holborn —which serves most of the newspapers—Gerrard, Paddington, Westminster and Kensington, the four last-named all dealing with West End traffic. Several of the day operators remained on duty until 11.30 p.m., and in anticipation of a rush on Saturday morning, extra operators were drafted in at 6 a.m. and 7 a.m. Saturday's traffic was enormous, the large drapery houses in the City and West End being particularly busy, presumably with mourning orders. At Westminster Exchange, where the calls from the Buckingham Palace private branch exchange are dealt with, extra operators were kept on duty until after the Sunday, and arrangements were also made for the Company's operators at the Palace to remain on duty continuously. Orders for two additional exchange lines to the Palace were received at noon on Saturday, and although the gangs had actually left the Company's premises for the day, men were got quickly together, and both lines were working by 6.30 p.m. on Saturday evening.

THE chess club has held its annual meeting, and appointed officers for next season. The medal in the club handicap tournament was won by Mr. Margetson, and presented to the winner by Mr. Harvey Lowe. It has been decided to re-enter the league next year; also to start a draughts section. As an inducement for new members to join, the entrance fee, to those who pay before October next, will be reduced to 1s. A large increase ought to reward the enterprise of the committee.

GLASGOW NOTES.

THE annual business meeting of the Operators' Society and Club was held in the Hillhead Exchange premises on the evening of Tuesday, April 26, when there was a large and representative attendance of members. Tea was served, and the company went over the premises and had the apparatus and equipment explained to them. The election of office bearers and other arrangements for next session were carried through, keen interest being taken in the proceedings.

MR. GEORGE EDWARD, Exchange Manager in training, has been appointed Exchange Manager in the Royal Exchange, and Mr. J. R. Craig, Fault Clerk, Argyle Exchange, has been appointed Exchange Manager in training.

WE regret to report the death of Miss Alice Rodger, Clerk in the Contract Department, which took place on May 3. Miss Rodger entered the service quite recently but she had already made many friends in the Contract Department who forwarded two wreaths as an indication of the esteem in which she was held.

Bell Golf Club.—The spring meeting of the club was held at Carntyne on April 30. The weather conditions were good save for a gusty wind, which rendered scoring high. The prize winners were—first, H. Thomson; second, G. Millar; and third, D. B. Hebenton.

MR. RISUKE WAKAMEDA, from Tokyo, Japan, visited several of the Glasgow exchanges last month and was specially interested in the work and methods of the Traffic Department.

THERE are indications that the spell of bad trade with which we have been contending for so long has now spent itself, and many signs point to a period of increased business activity and prosperity. None welcomes this change more than the contract officer as he now begins to earn the reward of his hitherto unremunerative spade work. The Glasgow Contract Department is responsible not only for the Company's business, but also for getting business in those areas being developed by the department, and the returns for April show good results for both administrations.

COMING events cast their shadows before. To prepare the way for 1912 the Post Office subscribers attached to the Hillhead and Govan Exchanges were transferred to the respective exchanges of the Company some months ago and last month saw the transfer of the first of the Company's subscribers to the Department's exchanges. On Saturday, May 14, the National subscribers attached to the Kirkintilloch and Lenzie Exchanges were connected to a new exchange opened by the Department at Kirkintilloch, and the National Cambuslang subscribers were transferred to the Department's exchange there on Saturday, May 21. In both cases the work was carried through successfully.

CHELTENHAM LOCAL SOCIETIES.

CHELTENHAM has three small local societies, namely, "The Benevolent Fund" (worked in conjunction with the Gloucester district), "The Telephone Society," and "The Outing Fund." The latter is dealt with as follows:—Every week each member contributes a sum of money from his or her wages towards their annual holiday. Sums from £1 to as much as £5 have been drawn out from this fund, which has been working most satisfactorily for the last two or three years. These funds entail a large amount of work on the part of the local hon. secretary, Mr. W. A. Taylor, and on Christmas Eve Mr. A. D. Pike, Local Manager, on behalf of the local staff, in the unavoidable absence of Mr. C. Elliott, presented Mr. W. A. Taylor with a fountain pen as a mark of esteem and gratitude for his unremitting work for the last two years.

NEWS OF THE STAFF.

Mr. C. W. BEAUCHAMP, Contract Officer, Chester, has been promoted to the position of Contract Manager for the Hanley district.

Mr. J. H. SWAIN, Exchange Manager, Central Exchange, Liverpool, has been appointed Traffic Manager for the Leeds district. Mr. Swain joined the Company's service in Liverpool as a clerk in August, 1892, and was appointed in August, 1900, Exchange Manager at the Central, which had then over 5,000 direct lines. Prior to leaving Liverpool to take up his new duties he was presented by the District Manager, on behalf of the staff, with an oak clock from the Central operators, past and present, and with a roll top desk from the rest of the staff.

Mr. R. S. GROSVENOR, Local Manager, Walsall, was presented on April 1 with an oak hallstand by the Walsall and Wolverhampton staffs on his leaving Walsall to take up the position of Local Manager at Coventry. The presentation was made by the District Manager, Mr. Archer W. Smith.

Mr. F. E. WATERS, of the Solicitor's Department, Head Office, has been made a Fellow of the Surveyors' Institution, on which we heartily congratulate him.

Miss MARY HADLEY, Travelling Supervisor, Traffic Department, Birmingham, has been promoted to be Clerk-in Charge of the new Edgbaston common battery exchange opened on April 30. Miss Hadley joined the service in 1898 and was promoted to be Supervisor at the Central Exchange on June 21, 1907. For some little time she gained experience by acting as Clerk in the newly formed Traffic Department early in 1907. She was promoted to be Travelling Supervisor on March 21, 1909, and in that position was responsible for the training of several travelling supervisors for the province. Her friends wish her every success in her new position.

Mr. ARTHUR MAY, Switchroom Manager, Leeds, has been promoted to Bradford as Traffic Manager.

Mr. WM. HIGSON, Exchange Manager in training, Dublin, has been appointed Switchroom Manager, Bradford.

Mr. W. BLACKBURN, Switchroom Manager, Bradford, on his transfer to Hull as Traffic Manager was the recipient of a silver teapot from his staff.

Mr. A. SPEIGHT, Chief Inspector, Keighley, has been promoted to the position of Electrician at Hull. His colleagues presented him with a slide rule on his departure.

Mr. R. J. SKELTON, Inspector, Harrogate, was presented with a safety razor outfit on his promotion to be Chief Inspector, Keighley.

Mr. H. J. MASKREY, Instrument Inspector, Halifax, has been promoted to Newcastle-on-Tyne as Switchroom Manager. As a parting gift the Halifax staff presented him with a shaving outfit.

Mr. R. KENWAY, on his transfer from Salisbury House to Telephone House as Storekeeper, was recently entertained at a smoking concert and presented with a marble clock by his friends in the London area.

Miss CHRISTINA E. MURRAY, Operator at Edinburgh Central Exchange, was the recipient of a gold bangle on leaving the service.

Miss JESSIE GALLETLY, Operator at Edinburgh Central Exchange, who recently left the service, was the recipient of a gold bangle from a few of the staff there.

Mr. F. DICKSON, Instrument Fitter, Belfast, was presented with a Gladstone bag and razor on April 27 on the occasion of his leaving the Company's service to take up a position in Canada. Mr. J. D. W. Stewart, the District Manager, made the presentation.

Mr. R. CHRISTIE, Exchange Inspector, was presented with a kit-bag, travelling rug and gold scarf pin on the occasion of his leaving the Company's service to go to Canada. The presentation was made by the Chief Inspector (Mr. Pulford).

Mr. G. F. CONNEFF, Cash Book Clerk, was presented by the members of the Dublin staff with a dressing case on the occasion of his departure to Canada. Mr. T. J. Early, Chief Clerk, in the absence of the District Manager, made the presentation.

Mr. J. O. EARDLEY, on his transfer from Bristol to Head Office, received a presentation from his colleagues as a token of their esteem, and an informal gathering gave him a hearty send-off.

Miss SUSIE EMERY, Operator, East Exchange, Birmingham, left the Company's service on April 21, after four years' service. Her colleagues presented her with *Tennyson's Poems* as mark of esteem.

Metropolitan Staff Changes.

Mr. P. E. RAPPS, Clerk, Cashiers' Department, Salisbury House, to be Clerk, Divisional Engineer's Office, Dalston.

Mr. H. WHITE, Engineer's Clerk, Bromley, to be Clerk, Sales Department, City.

Mr. C. R. RUTHERGLEN, Assistant Engineer, Greenock, to be Assistant Engineer, Lee Green.

Mr. E. GALLOWAY, Attendant, Salisbury House, to be Call Office Collector.

Mr. P. Walford, Apprentice, to be Assistant Engineer, City.

Mr. N. COLLINGWOOD, Night Watchman Inspector, to be Test Clerk, London Wall.

Mr. S. FOSTER, Improver at Metropolitan Workshops, to be Test Clerk, London Wall.

Mr. G. E. WOOD, Construction Foreman, Gerrard, appointed Chief Construction Foreman.

Mr. E. MERRIMAN, Fitter, London Wall, appointed Construction Foreman.

Mr. T. A. MASON, Inspector, Dalston, to be Test Clerk, Avenue.

Traffic Department—Promotions and Transfers:

Miss AGNES ANDREWS, Operator, Holborn, promoted to be Supervisor, Avenue.

Miss ANNIE FAZAKERLEY, Operator, North, promoted to be Supervisor, Kensington.

Miss RUTH BRIGGS, Operator, Dalston, promoted to be Supervisor, London Wall.

Miss CONSTANCE GREGORY, Senior Supervisor-in-Charge, Streatham, promoted to be Clerk-in-Charge.

Miss GERTRUDE RYDER, Supervisor-in-Charge, Palmers' Green, promoted to be Senior Supervisor-in-Charge.

Miss EVA MELDRUM, Avenue, was presented with a handsome handbag by a few friends on her promotion to be Supervisor at Bank.

Miss THERESA CASEY, Supervisor, Avenue, was presented with an ebony-backed brush, hand mirror, hat brush and comb in case on the occasion of her transfer to London Wall.

Miss CAROLINE WEST, Senior Supervisor-in-Charge, on leaving Walthamstow to take up a similar position at Ilford, the staff at the former exchange presented her with a silver shoe horn, button hook and glove button hook in case.

On the transfer of Miss FLORENCE DINGLE, Supervisor, Kensington, to a similar position at London Wall she was presented by her late colleagues with a gold bracelet.

On Miss AGNES HASELTON's promotion from the same exchange to a position as Supervisor at Gerrard she was presented with a portmanteau by the Kensington staff.

Miss JESSIE DREW, Supervisor, Avenue, was presented with a gold brooch set with amethysts and pearls on her leaving the Company's service to take up another appointment.

MARRIAGES.

Miss ALICE THURSTON, Chief Operator at Longton, has resigned from the Company's service, and was recently married to Mr. ROYDEN EDWARD DEAKIN, Test Clerk, Hanley.

Miss WILHELMINA NICOL, Operator at Leith, has resigned to be married.

Mr. W. H. FRIEND, Inspector, Ventnor, was presented on April 13 by the Isle of Wight staff with a striking timepiece on the occasion of his marriage with Miss MABEL ABBOTT, of London.

Mr. H. WELLS, of the General Superintendent's Office (Stores Department), was presented on the occasion of his marriage, which took place on April 30, with a marble clock and a pair of ornaments, subscribed for by the members of the Stores, Stationery and Engineer-in-Chief's Departments. The presentation was made by Mr. Chester.

Mr. C. D. KEMP, of the Head Office Audit Department, was presented with a marble clock and a pipe by the Secretarial Department on the occasion of his marriage on April 28.

Miss MARY A. TICEHURST, Senior Operator at Walsall, has left to be married.

Miss MUNDAY, Senior Supervisor-in-Charge, on leaving Ilford to be married, was presented by the operators in the East district with an oak palm stand and a trinket set.

Miss LILIAN SMITH, Operator, Avenue Exchange, London, was presented with a cruet by the staff on the occasion of her leaving to be married. Miss Smith was also the recipient of various other gifts, among which were dessert dishes, cheese dish, bread plate and table centre.

OBITUARY.

We regret to announce the death of Mr. GEORGE INGOE, Local Manager at the Bury centre, which occurred suddenly on May 18. He had only been off duty during the same day, and it is typical of his character that he sent word to the office that he would resume duty the following day. Mr. Ingoe had completed 30 years in the service, and was in his 56th year. He started with the gang and worked his way up to his present position. The sympathy of his many friends in the North-Western Province will be tendered to his widow and family.

We regret also to report the death of Mr. JOHN PORTER, the Company's Storekeeper, Aberdeen, which took place on May 14, after a long and painful illness. The staff sincerely mourn his loss as he was held in the highest esteem by all who met him. As a mark of respect the staff subscribed for two wreaths and representatives of the various departments were present at the funeral.

LOCAL TELEPHONE SOCIETIES.

Bradford.—The annual general meeting was held on May 13. The secretary's report showed an increase in the attendance of 3 per cent. over last session and a balance in hand of £2 1*s.* 4*d.* The election of officers for next session resulted as follows:—Hon. president, Mr. J. C. Chambers; president, Mr. H. B. Sutcliffe; vice-presidents, Messrs. C. Wood and J. Aked; committee, Messrs. G. Wicker, J. W. Stelling, T. W. Jowett, C. Brocklesby, and J. C. Walker; hon. secretary and treasurer, Mr. H. Shaw.

Cork.—The closing meeting was held on May 10. Mr. Kidd, District Manager, presided, and in the presence of a large attendance of members Mr. Lynn, Chief Clerk, read an excellent and interesting paper on "District Office Bookkeeping." The speaker treated the subject in a very practical manner as to the methods adopted in connection with office work. The paper was illustrated by diagrams. Lineman Inspector P. Carey gave a practical demonstration of clearing of faults, the subject being very ably dealt with, after which a very interesting discussion brought the meeting to a close.

Cornwall.—On March 2 a paper was read by Mr. T. Carter, entitled "Overhead Construction"; 100 per cent. of the members being present.

On March 23 two papers were read, one by Mr. D. J. Meikleton, Plymouth, entitled "Telephone Development and How to Sustain It," and one by Messrs. A. G. Wotton and C. Thomas, entitled "Instrument Fitting and Maintenance"; 90 per cent. of the members being present. The president, Mr. G. Hooper, occupied the chair at each meeting.

Dover.—The concluding meeting for the 1909-10 session was held in the district offices on April 22 (Mr. F. H. Duerth, Local Manager, Dover, presiding) when the District Manager, Mr. C. F. Ashby, addressed a good muster of members on the subject of "The Telephone Society and its Advantages to the Staff." Briefly reviewing the various papers given during the session, Mr. Ashby emphasised the good that could be derived by members of the staff attending the meetings, even if they were not directly connected with that particular branch of telephone work immediately under discussion. The lecturer's remarks were both interesting and instructive, and at the conclusion he was accorded a hearty vote of thanks. After the reading of the paper, the District Manager gave a few amusing and interesting experiments with a large plate glass electrical machine, briefly describing its action.

Hastings and Eastbourne.—A meeting of this society was held at Hastings on April 27, when Mr. H. Read (Chief Inspector, Hastings) read a paper on "Fault Finding," which proved very interesting. Mr. F. Armstrong (Local Manager) was in the chair.

Leeds.—The general meeting was held April 27. After transaction of business Miss Fotherby graciously presented the prizes awarded by the committee to 26 members for papers and attendance The prizes, in the main, consisted of books on technical and educational subjects. The election of officers and committee for next session resulted as follows:—Hon. president, Mr. J. C. Chambers; president, Mr. W. V. Morten; chairman, Mr. W. R. Senior; hon. secretary, Mr. G. H. Sargeant; hon. treasurer, Mr. J. H. Corlett; committee, Misses Fotherby and Parker, Messrs. Niemann, Scutt, Lawrence, Gillett and Baker.

Liverpool and Birkenhead.—The seventh and final meeting of the session took place on April 21, Mr. E. S. Francis, president, being in the chair. The occasion being the annual competition night eleven papers were read, as follows:—"Advantages and Disadvantages of the Bank Exchange from a Central Operator's Point of View," by Miss E. Smith; "Order Wire Operating at a C.B. Exchange," by Miss E. F. Nicoud; "A Few Difficulties of the Switch-room," by Miss G. Martin; "Private Branch Exchange Working," by Miss Dreaper; "Hints for Measured Rate Positions," by Miss Quigley; "Telephones and Operators," by Miss L. C. Coffee; "A Few Notes on an Operator's Career," by Miss G. Martin; "Some Causes for Slow Allotment," by Miss A. Walker; "Telephone Work in General," by Miss E. Caulfield; "A Few Thoughts on Supervision," by Miss F. Kerridge; and "Evolution of a Primary Cell," by Mr. Powell. The papers were exceptionally well written and of great interest. *Three prizes were competed for, two offered by the society, viz., £1 1s and 15s.* open to all members of the staff, and one of £1 kindly offered by the president for the best paper written by a member of the staff in receipt of a salary less than £1 per week. The winners were decided by ballot, Mr. Powell gaining the first prize and Miss G. Martin the second and also the president's prize. At the termination of the proceedings the District Manager, Mr. E. J. Hidden, moved a vote of thanks to the president; he referred in suitable terms to the thorough and earnest manner in which Mr. Francis had carried out the duties attached to this position, and these remarks met with general approval.

Luton.—On April 25, Mr. N. A. Saltmarsh, Local Manager, Watford, read his paper on "Works Orders." The question of keeping in local offices unofficial books arose and received a lot of attention. In particular a book for the recording of wire mileage on the various exchanges was thought by a large number present to be necessary. The general discussion was very interesting.

At the last meeting of the session, on May 10, seventeen five-minutes' competition papers were read to a large attendance of members. Eight prizes were given (four by the president, Mr. J. H. Wilson, District Manager), and were won by the following:—(1) A. Goodwin, Foreman, "A Few Points to Remember"; (2) J. Leggatt, "Dry-Core Cable Jointing"; (3) M. R. Crawley, "Returns"; (4) L. Sherratt, "Storekeeping"; (5) Miss Nash, "The Telephone Operator"; (6) Miss Stratford, "Operating"; (7) G. Humphrey, "Fitting"; (8) V. Kendrick, "Inspections and Inspecting." A special prize was given to Foreman W. Brown for the best paper on "Underground Construction." The writers are to be congratulated on the general excellency of their papers. A unanimous vote of thanks was accorded the president for the consistent interest he has displayed in the society since its inception three years ago.

North-Eastern London.—The sixth monthly meeting was held on April 25 at East Exchange (Mr. O. Morley Ward in the chair), when Mr. G. J. Gadsby read a paper on "The Training of the Telephonist." The subject was reviewed from both the engineering and commercial standpoint, and a strong case was made out for the necessity of workshop training. The paper was followed with great interest by those present, and the discussion was both lengthy and animated. The meeting was unquestionably one of the most successful this society has yet held.

Nottingham.—The ninth and last meeting was held on April 29. A paper was read by Mr. S. S Firth, Engineer, Nottingham, on "Some Notes on Engineering in the Midland Province." The paper was profusely illustrated by *lantern slides taken by the author, and was listened to with interest by a large* audience. Immediately after the paper the annual general meeting and election of officers took place. The following were elected for session 1910-11:—President, Mr. A. Coleman; vice-presidents, Mr. J. Scott and Mr. C. H. Sibley; hon. secretary and treasurer, Mr. M. B. Oldbury: lantern operator, Mr. E. Robinson; committee, Miss Nelson, Messrs. Aked, Cockrem, Cook, Earp, North and Saywell. At the close of the meeting Mr. Sibley presented prizes for the successful papers in the past session as follows:—Mr. E. Earp, "Transmission"; Mr. E. Gaskell, "Application and Development of Power to Telephony"; Mr. P. R. Cockrem, "Telephone Administration: How it is Organised."

Oldham.—A very interesting paper, entitled "A Few Economic Phases of the Measured Rate," was read before a good attendance of members at the Café Monico, Oldham, April 14, by Mr. George Hey, Contract Manager. The president (Mr. W. B. Cheetham) occupied the chair. An animated discussion followed, and the able manner in which Mr. Hey explained the various points raised proved that he had gone very deeply into the subject.

The annual general meeting was held on April 28, Mr. W. B. Cheetham presiding. The officers and committee for the next session (1910-11) were elected. The meeting was well attended; about 30 members, including those from the Stockport and Ashton centres, were present. The business meeting was followed by the society's annual dinner, when a repast of several courses was satisfactorily dispatched. The subsequent proceedings took the form of a smoking concert. Mr. Croasdale's (Ashton) and Mr. Chadwick's elocutionary and vocal efforts were much appreciated. Mr. Collier and Mr. Taylor (in the absence of Harry Lauder and Mr. Maskelyne) enlivened and mystified their audience with "Tobermory" and other favourite songs and feats of legerdemain.

Western (Metropolitan).—The last meeting of the 1909-10 session was held on April 27, on which occasion Mr. A. McGregor read an interesting paper on "Exchange Faults." A number of lantern slides loaned from Head Office were shown to illustrate points mentioned in the paper. The following were elected as officers and committee for next session:—President, Mr. E. W. B. How; vice-presidents, Messrs. J. McLeish and A. Wright; hon. secretary, Mr. E. Layton; committee, Messrs. G. E. Boniface, R. H. Drury, A. C. Greening, F. M. Hall, F. Hayden, F. C. Herbert, J. Johnson, R. F. Martin, J. H. Stewart, W. A. Sullivan and F. Woollard.

Tunbridge Wells.—The sixth and final meeting of the session was held at the Dudley Institute on May 10, when Mr. Cook lectured on "The Contract Officer and his Work." The lecturer dealt with the duties of the contract officer and the methods which should be adopted in dealing with the public. A discussion followed, and the meeting closed with a vote of thanks to Mr. Cook.

STAFF GATHERINGS AND SPORTS.

Bristol.—A successful whist drive to celebrate the closing of the telephone society session, 1909-10, was held on April 16 at the Cadena Café, when a party numbering 64 spent a most enjoyable evening. Mr. E. Seymour Cooper deserved the hearty vote of thanks accorded him at the close for his active interest in the successful organisation of the gathering.

On April 30 the members of the male staff of Bristol district held a dinner and smoking concert. Mr. E. Seymour Cooper presided and the company numbered 52. After an excellent repast, musical items were ably rendered by Messrs. J. Emlyn Jones, A. T. Mass, P. Shipp, J. T. Smith, W. C. Owen, J. Wilkins, F. C. Taylor, L. Saunders and F. J. Head, and altogether a most enjoyable evening was spent. Foreman J. Allen on behalf of the outside staff said, in a happy speech, he hoped that many such gatherings would be held in the future; this wish was echoed by all present. Mr. V. Jefferies, general secretary A.S.T.E., was also present.

Cardiff.—The annual staff dinner was held at Barry's Hotel on April 2. Mr. B. Waite, the District Manager, presided, and about 80 of the staff sat down to dinner. The usual toasts were drunk enthusiastically, the chairman's with musical honours. After dinner a smoking concert was held and a most excellent programme was gone through. Thanks are due to Messrs. T. Lucas, H. N. Garland, G. Bateman, C. Hooper, E. Jennings, E. Reid, J. Jones and W. Evans for the able way in which they contributed towards the evening's amusement.

Edinburgh.—The staff held the first ramble of the season on April 30. The route was by train to Gogar, on foot to Balerno *via* Dalmahoy, returning after tea by Lymphoy Grounds to Currie, thence to Craiglockhart and home. Sixty-three were present and a most enjoyable afternoon was spent.

Plymouth—The annual staff dinner took place at Genone Café, Plymouth, on April 29, when 35 members of the staff and friends were present. During the evening the chairman, Mr. G. Hooper, presented the prizes given by the Plymouth Telephone Society for the best papers read before the society during the past session; these were awarded as follows:—First prize, Mr. W. C. Harris, for paper entitled "Instrument Maintenance"; second prize, Mr. S. G. Tregillus, for paper entitled "Stores"; third prize, Mr. F. Knight, for paper entitled "Fitting." A most enjoyable evening was spent. The dinner was followed by an excellent smoking concert, the programme being contributed to largely by members of the staff. The arrangements were carried out by Messrs. Bennett, Evans and Walton.

South-East Lancashire.—*Football.*—The final contest for the possession of the cup offered by an anonymous donor for competition between the three centres in the district, under Association rules, was played off before interested spectators at Stockport on April 23. The opposing teams were Oldham and Stockport, and after a very keenly contested game, the latter team proved victorious by four goals to one. The trophy is now in the possession of the champions, who carry both honours and trophy with mingled modesty and pride.

Swansea.—A supper promoted by the local engineering staff took place at the Hotel Grosvenor on April 23, when a gathering of about 80 members and visitors attended. Mr. W. E. Gauntlett (District Manager) presided, and was supported by Mr. W. J. Hodgetts (Engineer). An excellent repast was followed by a most enjoyable musical programme, to which several members of the staff contributed. During the interval a silver cigarette case was presented by Mr. Gauntlett, on behalf of the staff, to Mr. E. Wheatley, who recently resigned the Company's service. The committee are to be congratulated on the success attending their efforts.

Tunbridge Wells.—A sports club has been formed among the staff at Tunbridge Wells, of which the District Manager, Mr. S. C. Smith, is president. Difficulty has been experienced in finding a suitable ground, but a tennis court has been obtained, and the members hope to turn their attentions to other branches of sport later on.