

THE Telegraph and Telephone Journal.

VOL. XII.

OCTOBER, 1925.

No. 127.

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TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XXI.—

MR. J. F. EDMONDS.

THE subject of our notice this month, Mr. John Francis Edmonds, the Chief Inspector of Telegraph and Telephone Traffic, was born on May 8, 1880. He entered the service of the National Telephone Company in 1896, and his experience of the telephone service in all its phases during the past thirty years is surely unique. Here is the record of his service :—

1896-1899 :

Engaged in engineering maintenance and construction ;

1899-1902 :

In charge of switchboard construction staff in London ;

1902-1904 :

Metropolitan Workshops Superintendent and Technical Assistant to the Metropolitan Superintendent ;

1905-1911 :

Metropolitan Traffic Manager ;



1912-1919 :

Superintendent of Traffic in the London Telephone Service after the transfer of the National Telephone Company's system to the Post Office ;

1919-1923 :

Assistant Controller, London Telephone Service, in charge of the Traffic Branch ;

1923 :

Appointed Chief Inspector of Telegraph and Telephone Traffic.

Mr. Edmonds has been an Associate Member of the Institute of Electrical Engineers since 1902. In 1918 he had the honour of being appointed a Member of the Order of the British Empire.

Apart from his technical responsibilities, Mr. Edmonds has always given particular care to the comfort and welfare of the staff under his control, and the exchanges of the London Telephone area provide ample evidence of his influence in this direction.

THE POST OFFICE ENGINEER AND HIS WORK.

I.P.O.E.E. NORTH EASTERN DISTRICT CHAIRMAN'S ADDRESS.

By T. B. JOHNSON, M.I.E.E.
(Chairman, North Midland Centre, Institute of Electrical Engineers.)

In the inaugural address to the North Midland Section of the Institution of Electrical Engineers on "The vocation of the Electrical Engineer" I drew attention to the wonderful development of electrical engineering during the last 50 years, and the further development which might be anticipated in the near future. From these premises stress was laid on the importance of a proper realisation on the part of the Electrical Engineer of his vocation. This address is largely a development of the former one with special reference to the Post Office Electrical Engineer.

ELECTRICAL DEVELOPMENT.

The extent to which electrical engineering has developed during the lifetime of many of us is remarkable. Familiarity does not always breed contempt, and there are two electric marvels which seem to stand out pre-eminently. The first of these is the electro-magnet, the basis of all telegraphic and telephonic work, by means of which a Mechanical Engineer with a knowledge of the laws of electricity can overcome almost any problem. The electro magnet was in use over 50 years ago, but the second marvel—the dynamo—only became practicable after that time, and in its power seems to exceed even the growing of two blades of grass where only one was before, for by the dynamo we get light, heat, and power of various kinds in enormous quantities apparently out of nothing. That the mere turning of a mass of iron in an electro magnetic field, *i.e.*—a coil of wire in which an electric current is flowing—should make available all the electric appliances we see in such huge numbers, seems truly miraculous.

A third wonder has recently been discovered—the amplifying valve. By this means an entirely new era has been opened to the telegraphic and telephonic engineer, making possible the transmission of speech from one end of the Kingdom to the other, or from the extreme boundary of North America to that of South America, by underground wires; and I think there is good reason to anticipate that it can be further developed in such a way as to become of considerable use to power engineers also, as, for instance, in the transmission of power in comparatively small quantities to outlying centres, thus saving the provision of costly sub-stations and the wages of attendants.

In a recent address to the Institution of Electrical Engineers the President estimated that the use of electricity in this country would be increased by 100% within the next five years, and that, consequently, existing power stations would, to a large extent, need to be replaced. There can be no doubt that the large extension of telephony which has been in progress since the war will continue, and at an accelerated rate, and that, consequently, many of our exchanges will become inadequate. It is in the extension and replacement of exchanges rather than in the provision of wires that we have to fear difficulty, and it is of urgent importance that new buildings and extensions of buildings should be provided with greater celerity than they have been in the past.

The development of automatic telephony will be the greatest of all. Prices, which have been falling fairly consistently since the war, have now reached approximate stabilisation, and the Department has definitely launched a considerable programme of the replacement of manual by automatic exchanges.

METHODS OF CHARGING FOR CALLS.

Interesting questions arise in connection with the methods of charging for calls. As you know, the Hull Corporation still has, among other rates, one which includes all local calls, and a suggestion to provide telephones (like water) on a rateable value basis is being considered there. That inclusive rates are wrong and unfair has been proved so conclusively that one need not labour that question again, and I do not think that the objections can be overcome by basing the rentals on a rateable value basis. It is doubtless approximately correct that the charges for the supply of water can be based upon the rateable value of premises, though even here it is open to considerable exceptions, but in the case of telephone calls, the numbers of calls made from business premises of the same value vary so largely as to provide an unfair basis for the telephone rental. In defence of our system of making an annual charge for the telephone plus a definite charge for each call I would quote the practice of the Leeds Corporation (and other Corporations) Electricity Department in providing electricity for light, heat, and cooking on a first payment (which is, however, based on the rateable value of the house), and then a charge of $\frac{1}{4}$ d. per unit for all units, which is practically the same as a charge for each telephone call. I think more might be done in the way of varying the telephone charges at different hours of the day, and that local calls as well as trunk and junction calls might be treated in this way. In one large manual exchange (in this district), which may be taken as representative of the whole, the calls rise from 600 at 9 a.m. to 4,400 between 10.0 and 10.30, dropping to 1,200 at

1.0 to 1.30 p.m. and rising again to 3,400 from 3.0 to 3.30. If the sharp peak in the middle of the morning and the similar one in the afternoon could be taken off, and the calls distributed over the less busy hours, the savings in circuits, apparatus sections, and staff would be so considerable that they are well worth the trouble involved; and in the same way as people have found that many of their trunk and junction calls can be transferred to the less busy hours of the day by the inducement of a lower rate, so could many local calls be transferred to other hours if they could be made at a lower rate.

INTERNATIONAL TELEPHONY.

The efforts which are being made to promote international telephony are deserving of the most earnest attention. Here again, the invention of the thermionic valve has opened up an entirely new vista. As you will remember, the British Military authorities were enabled by the use of valves to maintain telephonic connection between England and the headquarters of the Expeditionary Force in France, while the Germans could not only keep up telephonic communication with their headquarters in France and Poland, but also right through to Constantinople. Mr. Gill, when President of the Institution of Electrical Engineers, devoted great energy to the advocacy of an International Board for controlling international telephony, and great progress has already been made in this direction, all countries having now all combined in friendly co-operation towards this end. I think international telephony will do a great deal more towards producing international peace than many much more costly and showy schemes could do. When Englishmen, Frenchmen and Germans are in constant communication by telephone with each other they will realise each other's qualities better, will get to know and understand each other's point of view, and will ultimately realise that there is no more justification for war between them than between England and Scotland. Every engineer or designer, or maintenance man, or operator, who helps people to communicate with one another is thereby helping them to understand each other, and to promote greater and more cordial understanding. The path to international peace will be cleared in binding men together, and all must endeavour to realise a common ideal—the advancement of international communication.

THE WORK OF THE ENGINEER.

New wealth must be created to replace the appalling losses during the great war, and it is being realised more and more that Engineers are among the men upon whom this replacement largely depends, and there can be no doubt that the telephone is one of the most potent instruments in the creation of new wealth.

If the work of the Electrical Engineer has such great influence on the conditions of life and the progress of mankind, it is evident that he must realise the obligation to the community which this places upon him. How does the Electrical Engineer look upon his job? What does he think of it? because upon what he thinks of it will depend very largely how he does it. If on the other hand, he looks upon it simply as an unpleasant necessity which has to be undergone in order that a certain amount of money may be paid to him periodically, it cannot be expected that he will fulfil his responsibilities.

There must be some guiding principle actuating a man in his work whether he realises it or not. To what general principle or motive can I appeal in such an audience as this? The religious motive may not be the most suitable one to refer to on such an occasion, and if a system of ethics be tried difficulty at once arises from the numerous and conflicting systems. On the whole, therefore, I think the best basis is that of citizenship. We are not living separate lives, but form part of an ordered community, and social laws must be made and observed in order that social life may be lived in the best way, and the guiding principle of this is "Service."

In all civilised states it is realised more and more that service must be the spirit guiding men in their relations with the community. It is interesting to note that an association representing rich men, in asking the Chancellor of the Exchequer for the reduction of the super tax, claimed that their money is that which is of the greatest service towards expanding trade, etc., and that it would, therefore, be a service to the community to have the tax reduced or abolished. It must not be understood that I agree with their recommendation in any way, but simply quote it as showing that even they realise they must appeal to the spirit of service to the community. Surely to us whose lives are definitely spent in the public service the appeal to base our work on the principle of service comes with double force. It is difficult to realise or state the relationship between individual effort and the world's progress, yet everyone who carries out his work to the best of his ability is contributing something to the advancement of mankind.

May I now devote some attention to the particular problems of the Post Office Engineer, and to a number of points to which he should give consideration. I do not propose, owing to lack of time, to deal with the question of the recruitment of engineers, or of training before entering the Service, but to deal only with questions for those already in the service.

It will have been noticed that for some time past competitive examinations have been held for Probationary Assistant Engineers and Inspectors, some of these being open and others limited to men already in the Service, and I would urge you to do everything in your power to draw the attention of likely young men to these examinations, and to encourage them to study in preparation for them. I have said more than once, and I still believe, that there are sufficient young men with intelligence and grit in the Engineering Service to rise to the technical requirements of the Department so long as the requirements are made known, and ample time is given to men to prepare for them.

These requirements are now met, and I greatly hope that, with the sympathetic encouragement and help which we older men can give, our young men will rise to their opportunities and prepare for these examinations in sufficient numbers not only to justify them, but also to lead to an extension of the percentage of posts to be filled by limited competition.

In drawing attention to the qualities required apart from examinations, I should place first in importance what has been called the "engineering mind." It will be noticed that practically all engineering problems have to be decided upon the balance of advantage and their commercial practicability, including in many cases the trend of future events, and that instead of slavishly following the decisions arrived at in previous cases which at first sight appear to be identical, each case really needs a decision based upon a survey of the circumstances of the particular case. For instance, in one case underground work is justifiable, while in another case where the number of wires affected is precisely the same it is not justified. In the first case, for instance, the ground may not be made up, and is likely to be paved shortly, while in the second case the road or footpath has already been paved, and replacement would be costly. Similarly, we lay ducts in grass margins sometimes at footway depth, and sometime in roadway depth where it seems likely that the part which is now covered by grass will become part of the paved roadway. In one case we spend money in providing higher poles or longer arms in order to lift wires which are below the standard height, because in this case there are cross roads, and the fields are arable or meadow, so that high loads of hay or corn may reasonably be expected. In another case, the cost of raising the wires would not be justified, because there are no cross roads and the fields are all pasture, and consequently there is no traffic likely to interfere with the wires. In these cases the decisions are not really contradictory, but are in conformance with the balance of the various considerations. These examples could be multiplied *ad lib.* and the Engineer should make every effort to cultivate the balanced mind.

Another extremely important point is the need for better English, in which many electrical engineers are notoriously less efficient than they should be. If an Engineer cannot present and explain his proposals in good style, opportunities for getting those proposals adopted are often lost. To be able to write a good clear letter, or report upon a complicated subject, and explain shortly and correctly what you mean, what you have seen, or what you want, are important requirements for all people, and engineers should try to equip themselves well in this respect. It is not unusual to see a report in which the salient feature is hidden in a mass of verbiage, instead of standing out clearly and prominently. Complaints are often heard of the difficulty and trouble of clerical work, but it does not seem to be realised that officers making these complaints lay themselves open to the suggestion that they are thereby confessing their weakness in this important respect. It is well worth while for Engineers to realise the need for improvement in this respect, and to take a class course in English, or, at all events, to indulge in steady reading in some good book on English composition.

One is surprised sometimes to hear doubt and even ridicule thrown on books of rules and regulations and the impression that everyone is expected to be familiar with every rule or regulation issued. I have never met any officer of high standing who had this idea, but what is expected is that a man should be familiar with the rules and regulations referring to the particular branch of work on which he is engaged, and that he should refer to others when in doubt or difficulty. It is obvious that in such a service as ours, working without a book of rules would be chaotic, and it seems only common sense that when a difficulty has been raised in one place and overcome, the decision arrived at should be embodied in a rule book, and so save difficulty and loss of time when similar questions arise in other cases. Books of rules and regulations are, in fact, simply aggregate common sense, and we should try to get at the spirit of a rule, and what is intended to be done (or prevented) by means of it. Let us take one well-known set of rules as an example—those dealing with the treatment and, where necessary, the punishment of offences. It is, of course, very troublesome, and even seems a great loss of time, to go through the procedure involved in reporting and getting explanations for breaches of rules, and a supervisor often feels how much better it would be if he could administer some short and sharp punishment on the spot. It must be remembered, however, that a well-known principle of British justice is that a man cannot be punished until his guilt has been proved, and that it is better that a few guilty men should escape than an innocent man should be punished. As an extension of this principle, it is clear that when a man commits an offence it causes annoyance to his immediate supervisor, and that supervisor cannot be expected to be in a sufficiently judicial frame of mind to deal with the case justly; it is, therefore, required not only that a man should be given precise particulars of the offences he is charged with, but opportunity given him to reply, and that the punishment should be administered by someone sufficiently far removed from the effects of the trouble caused by the man's offences to be able to deal with it without having his mind affected by the trouble and annoyance. It is also important that similar punishments should follow similar offences in different localities.

A knowledge of accounting is also of great importance. It is not expected, of course, that a man should be an accountant, but he should have sufficient knowledge of the Department's accounting methods, and of the principles underlying, to be able not only to apply them, but to see their advantage, as well as to be able to discuss them, and to see whether improvements can be effected.

It is essential that a man should develop powers of organisation. One of the most important qualifications is the judgment and management of men. We are told that "The proper study of mankind is man," and it is certainly

one of the most interesting and difficult. We know quite well that each man has different qualities, different gifts and powers, and the good supervisor takes great care in utilising these varied gifts to the best advantage.

A very important quality is that of loyalty both to the Department and to our colleagues and subordinates. Some years ago a series of articles appeared in which an American, writing to his son studying business methods in Europe said, "If you work for a man, work for him. Study his interests. Speak well of him. If you cannot speak well of him, leave him." Whether a man is employed by a private employer, a municipality, or government department, it is not his job to point out to other people faults in his employer, and we who are employed in the Government service are not playing the game when we go out of our way to denounce what is called "red tape," or expose to the public gaze what we imagine to be weak points in the administration. It is distinctly our job to see that the particular work entrusted to us is carried out as efficiently as possible, and that any improvements which we can suggest should be suggested to the Department itself; and if they are not accepted it should be remembered our superiors have the same spirit of loyalty to the Service which we claim for ourselves, and the same desire to improve it where possible, and that if our suggestions are not accepted it is generally because of good reasons with which we are often not familiar or do not sufficiently realise.

Loyalty to subordinates is a great quality, and is well worth cultivating. If a subordinate in doing his best makes a mistake, he should be advised and protected by his supervisor. We should try to serve the men under our supervision as well as control them. When there is work to be carried out which is of a difficult nature, or new in character, it is far better and more honest to discuss the matter with the man who is going to carry out the work, find out his difficulties, and see that he has a clear understanding of what is required, than to throw the work at him, and then write smart censorious endorsements when the job is not carried out satisfactorily. A great deal can be done by supervisors of all ranks in smoothing out difficulties. Instead of questions respecting instructions being met in the spirit of "Those are the orders—you have got to carry them out," they should be explained and discussed, and the reason for them arrived at, and suggestions, or, if necessary, remonstrances from the subordinates should be enquired into, and suitably represented to headquarters. Industrial troubles are chiefly due to misunderstandings and suspicion, hence fairminded and loyal supervisors can do a great deal to remove this atmosphere. We must carry out our duties in such a way that men of different ranks will look on each other with mutual respect, and what we should seek for is not popularity, but to earn the respect of all with whom we are associated. I should like to add that consideration for others is not weakness, but can be combined with great strength of character. Some men think they are kindhearted when they are simply weak, and have not the necessary firmness to carry out unpleasant duties, especially in connection with other members of the staff. Some men, for instance, shrink to report adversely when questions of promotion are concerned, because they have not the strength of character to do their duty to the Department and tell the exact trouble, and give their calm judgment, because this would result in disappointment to colleagues.

There is another important question which often leads to trouble, but it must be faced. A man says in effect, if not in words, "I have at the expense and trouble of study and hard work gained an amount of knowledge, which I am now asked to impart to other people. This will diminish my importance and prestige. Why should I pass this information on to other people instead of leaving them to learn it for themselves?" To begin with, I would quote the old proverb "He who serves best profits most," and say that we must put this question like others to the test of "service." If we can serve the Department, and through the Department the public, by spreading knowledge of which we have become possessed, it is our duty to do so.

A point occurs which may appear a small one, but by means of it official relations may be greatly improved. If letters or official endorsements irritate you, do not answer them while suffering from irritation. Let them wait until the next day, when we shall find that instead of the smart counter-irritating endorsement which we had in mind at first, we can answer it in a much more conciliatory manner, and so prevent further recriminations and loss of time.

Let me remind you of the parable of the talents. One man had ten talents, another five, another only one, and severe condemnation was meted out to the man whose sole care was to give back his one talent—no more and no less. Who is the modern type of that man? It is the man who says "I am paid so much per week or per month, and I will give that value in service, and no more." He is frequently like the man in the parable in being poorly endowed with talents, and in his anxiety to give no more than the value of his wages he often gives less. A man whose work is "second best" will become a "second rate" man. On the lower ground of policy this idea is a great mistake, and on the higher ground of principle it is distinctly wrong. An employer is entitled to a man's best work, and a better salary or higher position can only be justified on the ground of good service already rendered.

In conclusion, I would urge that we must look upon ourselves as public trustees, and cultivate a high sense of service and duty to our superiors, our subordinates and the public. This sense of the importance of one's duty should not be confused with self importance. To have a high sense of the importance of one's work is likely to promote modesty and humility, while a man who has a high sense of his own importance becomes conceited, and suffers from swelled head.

In trying to summarise the whole of this address in one sentence I would conclude "The greatest service the ordinary man can render is to carry out his daily work in a spirit of service to God and man."

NOTES ON TELEGRAPH PRACTICE.

By G. T. ARCHIBALD.

X.—Concerning External Circulation of the Routing of Telegrams (Continued.)

THE routing arrangements outlined in the preceding chapter had the effect of placing all lines on the same level of importance and obscuring the lines which should form the main arteries of the telegraph system. Thus the question arose, when multiplex development came to the forefront, as to how certain "backbone" routes, which should be equipped with multiplex apparatus, might best be utilised in order to promote the greatest efficiency and secure the greatest economy.

Accordingly the present routing scheme was drawn up. As will be seen from Fig. 5 the country is split up into 11 Sections or Zones, the Zone Centres being London, Bristol, Cardiff, Birmingham, Liverpool, Manchester, Leeds, Newcastle-on-Tyne, Edinburgh, Glasgow and Belfast. The remaining offices in each Zone are classified as:—

- Area Centres.
- Group Centres.
- Minor Offices.

A Zone Centre forms the principle transmitting centre between offices within its Zone and all other Zones.

An Area Centre collects and distributes traffic to and from offices within its area. In every case the area centre deals with sufficient traffic to justify direct communication with one or more zone centres in addition to the parent zone centre.

A Group Centre is the general collecting and distributing centre for minor offices grouped under it.

A minor office sends and receives its own traffic only and does not, as a rule, transmit telegrams between other offices, although exceptionally, it may do so.

Every zone centre and area centre is also the group centre for its own minor offices and every zone centre is an area centre for the group centres directly associated with it. Figure 6 shows diagrammatically the method of classifying telegraph offices and circuits.

The various telegraph circuits are divided into two categories, basic and non-basic. Basic circuits are those which must be maintained, irrespective of the amount of traffic. These include circuits between (a) a minor office and its group centre (b) a group centre and its area centre (c) an area centre and its zone centre and (d) a zone centre and another zone centre.

These types of circuit are shown in Fig. 6 in the above order as M1-G1, G1-A1, A1-Z1, Z1-Z2.

Exceptionally a basic circuit from a minor office may be connected to another minor office and from a group centre to another group centre.

Non-basic circuits are provided under certain conditions. The factors taken into consideration are:—

- (i) The traffic, which must not be less than 1·2 telegrams daily for each mile of the radial distance between the offices concerned.
- (ii) Transit Time, the difference between time on existing and proposed routes.
- (iii) Number of transmissions involved, and
- (iv) The type of apparatus on existing and proposed routes.

Subject to these conditions, non-basic circuits may be provided between two minor offices, between a minor office and a group centre other than its own, between a minor office or a group centre and an area centre other than its own, between a minor office or a group centre and its own zone centre or any other zone centre, between two group centres, between two area centres and between an area centre and a zone centre other than its own.

It will be obvious that with such a system the routing of traffic can be arranged in a scientific manner, and that changing conditions at particular offices can be catered for with very little trouble. If, for instance, the traffic at a zone centre shows signs of placing a strain on the instrument room accommodation or on the staffing arrangements, it is quite a simple matter to transfer one of its areas to the nearest convenient zone centre. Similarly, if an area centre shows similar signs a group centre can readily be transferred to another area, etc. One such case has occurred already, when it was found necessary to transfer the Preston area from the Liverpool to the Manchester zone, the change being accomplished with the greatest ease.

The principles of the new routing scheme are deserving of careful consideration and study, and the following details are furnished so that the scheme may be made thoroughly clear; the examples can be traced quite easily in Fig. 6.

Traffic proper to basic circuits, when not affected by non-basic communications is dealt with in the following manner:—

- (i) A minor office works to its group centre (Example: M1-G1).
- (ii) A group centre sends to its area centre traffic from all offices in the group for all other offices. (Examples: M1 to M12 via G1, A1 and G3: G12 to G15 via Z1 and Z2).
- (iii) An area centre sends to its own zone centre traffic from all offices in the area to all offices not served from the centres connected with the area centre. (Examples: G2 to Z5 via A1 and Z1: M5 to Z3 via A1 and Z1).
- (iv) A zone centre sends to other zone centres all traffic for offices in the respective zones not routed via area centres or group centres with direct communication. (Example: G4 to G11 via Z2 and Z1).

The routing of traffic over non-basic circuits is arranged as follows:—

- (i) A minor office working direct to another minor office. (Example: M14-M16).
- (ii) A minor office working to a group centre other than its own group centre uses the circuit for traffic for offices in the group concerned. Traffic for offices in other groups is included if transmission via a zone centre is avoided. (Examples: M17 to M19 via G5: M17 to M23 via G5 and G6).
- (iii) A minor office, or group centre working to an area centre other than its own uses the circuit for traffic for offices in the area concerned. (Examples: M39 to G2 via A1: M45 to M38 via G11, A2 and G9).
- (iv) A minor office or group centre, associated with an area centre to its zone centre uses the circuit for traffic for all offices other than those in the home area and in those zones or areas the centres of which are connected with the home area centre. (Examples: M2 to M49 via G1 and Z1: G1 to G8 via A1 and A2).

Where, however, offices in such zones and areas have direct communication with the home zone centre, traffic is routed via the latter if one transmission is saved in the case of provincial zone centres and if two transmissions are saved in the case of the Central Telegraph Office. (Examples: M30 to Z3 via Z2: G1 to G7 via Z1).

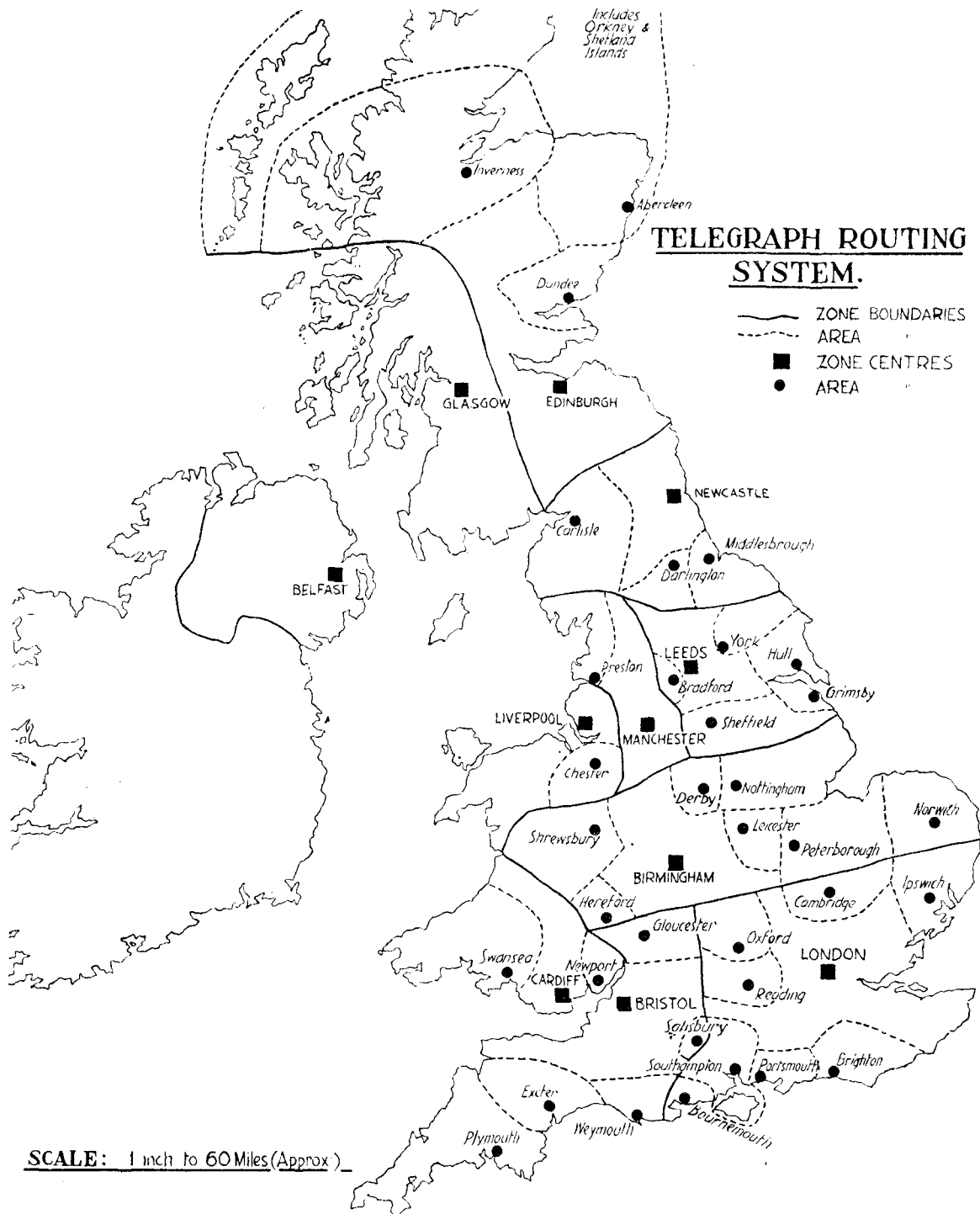


FIG. 5.

- (v) A minor office, in a group other than its zone or area centre, to its zone or area centre uses the circuit for traffic for all offices other than those in the group and in those zones, areas and groups, the centres of which are connected with the group centre. (Examples : M52 to G11 via G12 : M52 to A2 via Z1).
- (vi) A minor office or group centre working to a zone centre other than its own uses the circuit for traffic for all offices in the zone concerned subject to the exceptional routing arrangements described in a later paragraph. (Examples : M27 to G12 via G7 and Z1 : M28 to G1 via Z1).
- (vii) Two group centres in direct communication use the circuit for traffic between the offices in the respective

groups. Traffic for a third group centre reached direct through one of the group centres concerned is circulated over the circuit if transmission through a zone centre is avoided. (Examples : M51 to M45 via G12 and G11 : G5 to G7 via G6).

- (viii) Two area centres in direct communication use the circuit for traffic between the offices in the respective areas. (Example : G1 to G8 via A1 and A2).
- (ix) A circuit between an area centre and a zone centre other than its own is used for traffic between the offices in the area and all offices in the zone concerned, subject to the exceptional routing arrangement described in the following paragraph. (Example : M7 to G6 via G2, A1 and Z2).

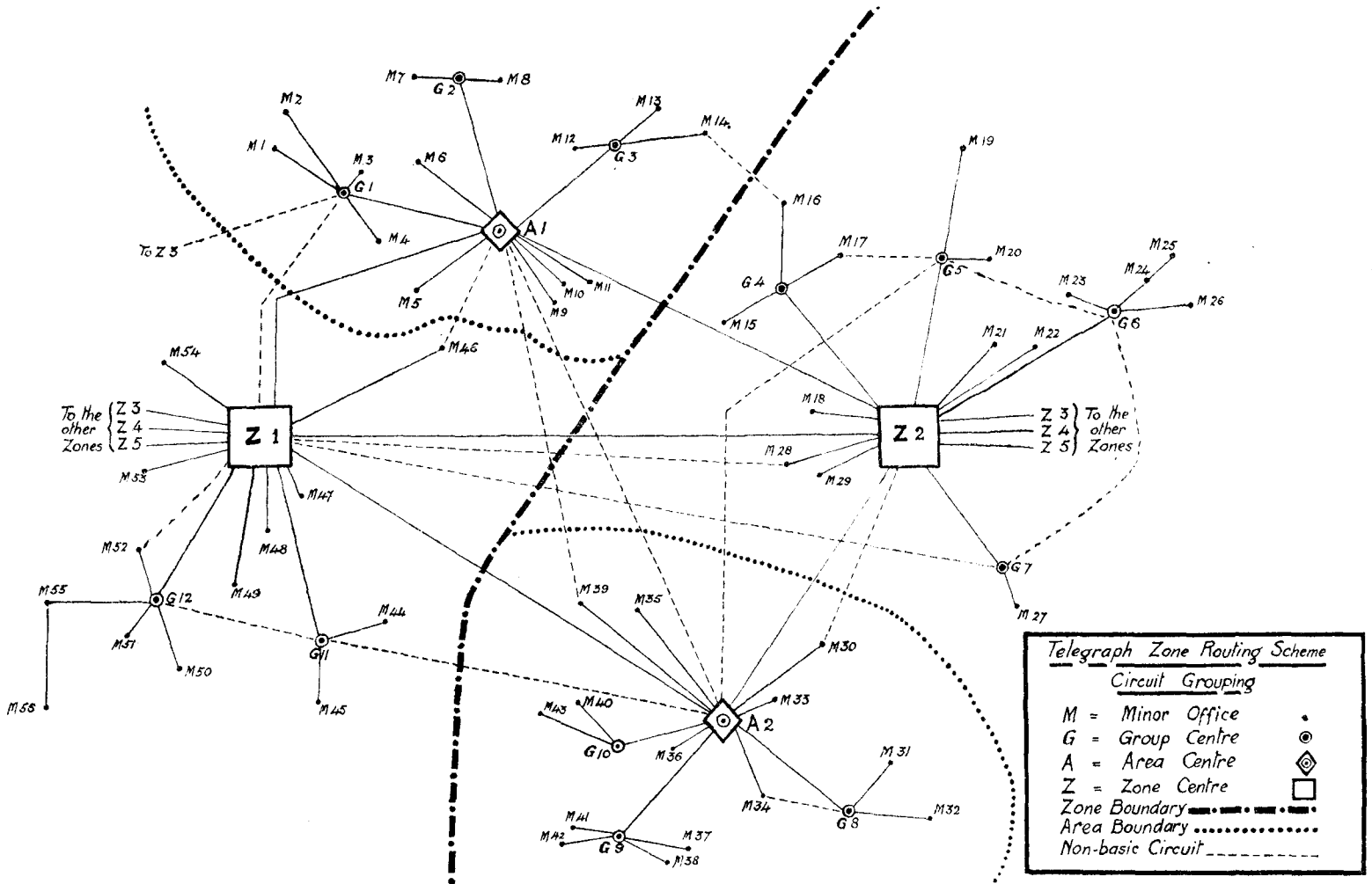


FIG. 6.

It will be clear that routing is now arranged on a scientific and orderly basis, and that the system in use represents a considerable advance on any previous scheme of telegraph circulation used by the British Post Office. It is necessary, however, in a number of cases to make provision for exceptional routing in order that traffic in both directions may follow the same route. Offices in direct communication with zone centres other than their own should normally circulate to such zone centres traffic for offices in the zones concerned. In certain cases this would lead to outward traffic taking a different route from that followed by inward traffic.

For example, Swansea which is in the Cardiff zone is in direct communication with Bristol, and would therefore, in ordinary course, circulate Gloucester telegrams to Bristol. In the reverse direction, Gloucester, which is in the Bristol zone, is in direct communication with Cardiff and would normally circulate a telegram for Gloucester via Cardiff. The routing would, therefore, be Swansea—Bristol—Gloucester in one direction and Gloucester—Cardiff—Swansea in the other direction. In order that traffic between two places shall follow the same route it has been arranged that centres concerned in cases similar to that quoted shall route their traffic to the centre which is lower in the table of precedence; the order being:—

- | | |
|-----------------------|-----------------|
| 1. London. | 12. Aberdeen. |
| 2. Manchester. | 13. Sheffield. |
| 3. Glasgow. | 14. Hull. |
| 4. Liverpool. | 15. Nottingham. |
| 5. Birmingham. | 16. Swansea. |
| 6. Leeds. | 17. Brighton. |
| 7. Edinburgh. | 18. Exeter. |
| 8. Bristol. | 19. Bradford. |
| 9. Newcastle-on-Tyne. | 20. Plymouth. |
| 10. Cardiff. | 21. Leicester. |
| 11. Southampton. | 22. Belfast. |

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| 23. Norwich. | 31. Gloucester. |
| 24. Dundee. | 32. Carlisle. |
| 25. Preston. | 33. Chester. |
| 26. Grimsby. | 34. Shrewsbury. |
| 27. Derby. | 35. Cambridge. |
| 28. Portsmouth. | 36. Inverness. |
| 29. Middlesbrough. | 37. Reading. |
| 30. Newport (Mon). | 38. Bournemouth. |

Other offices take precedence according to their distance from London.

Thus Swansea circulates telegrams for Gloucester via Cardiff and the traffic in both directions follows the same route.

Another example of exceptional routing is that of a group centre associated with an area centre which, in addition to the basic circuit to its area centre, is also in direct communication with its zone centre. Cheltenham, which is in the Gloucester area of the Bristol zone, is also in direct communication with Bristol. In this case telegrams between Cheltenham and Swansea circulate via Bristol.

Diversion of traffic from a primary route is made only when the route is interrupted or when it is anticipated that circuit transit time would otherwise exceed thirty minutes. Generally speaking, the traffic diverted under such circumstances is that which can be disposed of by the assisting office without additional transmissions "A" asks "C" to assist to "B" and to offices normally reached through "B."

As far as possible, in order to equalise transit time, the telegrams diverted to "C" are for places in direct communication with that office. To enable diversion to be carried out promptly each office is provided with a list of area and group centres which may be reached, without additional transmissions, by alternative routes.

Diversion is not put into operation without the consent of the alternative office and each office asked for the facility is expected to advise the requesting office of any abnormal circumstances affecting the circuit or circuits over which the additional traffic would be transmitted.

Although Belfast is recognised as the zone centre for Northern Ireland, it is not practicable to provide direct communication between that office and all other zone centres. Northern Ireland traffic for the Bristol and Cardiff zones is routed via Birmingham and that for the Newcastle-on-Tyne zone via Glasgow, but offices in the Bristol, Cardiff and Newcastle-on-Tyne zones which have direct communication with Birmingham and Glasgow circulate their Northern Ireland traffic via those offices.

Although not a zone centre, Dublin is regarded as the principal transmitting office for the Irish Free State, the government of the country having agreed to co-operate as far as possible with Great Britain. Dublin, like Belfast, is not in direct communication with every British zone centre; traffic to and from the Leeds and Newcastle-on-Tyne zones circulates via Liverpool, Edinburgh traffic circulates via Glasgow, and Bristol traffic via Cardiff.

Offices in the Leeds, Newcastle-on-Tyne, Edinburgh and Bristol zones in direct communication with zone centres working direct to Dublin route their traffic for the Irish Free State to those centres.

In the event of interruption or traffic pressure on the primary cross-channel routes, telegrams are diverted, by consent, to another office in direct communication with either Dublin or Belfast as the case may be.

An important integral part of the routing scheme is the provision made for the disposal of telegrams by telephone in order to save telegraph transmission. To this end it is arranged that provided ordinary telephone traffic is not prejudiced, telegrams may be sent over telephone circuits in order to save one or more telegraph transmissions within the following radii:—

- (i) Where switchings at two terminal telephone exchanges only are necessary—20 miles:
- (ii) Where switchings are necessary at an intermediate telephone exchange in addition to the two terminal exchanges—15 miles.

Telephone circuits are not used for this purpose in normal circumstances if switchings at four or more exchanges would be necessary.

Another arrangement involving the use of telephone circuits and one which expedites the disposal of telegrams is that telegrams bearing telephonic addresses are delivered by telephone from the first transmitting office which is within 20 miles, measured radially from the addressee's premises.

Telegrams bearing a postal address or a registered abbreviated address are picked out and delivered by telephone from the appointed office.

This scheme was put into operation in April, 1922. It was a pronounced success from the very first day and only a few minor changes in the original scheme have been found to be necessary. The scheme designed, as it was, to create arterial routes, resulted in the suspension of thirty-eight circuits of a total mileage of 4,500 miles. One or two offices suffered by the closing of circuits and diversion of traffic to the trunk lines, but on the whole, singularly few changes were made which proves, it may rightly be argued, that the earlier routing arrangements were planned on sound lines and were lacking merely in those refinements which must always be made before perfection is achieved.

It is not claimed that the present scheme is the last word in telegraph routing. Experience is bringing to light minor weaknesses which are now receiving consideration. Later too, it may be necessary to create a number of Sub-Zone Centres in order to relieve the larger offices, but no change of that character would be justifiable at present.

(To be continued.)

TELEGRAPHIC MEMORABILIA.

THE staff and supervision of the C.T.O. were deeply moved by the intimation of the executors of the late Sir Andrew Ogilvie, that Sir Andrew had bequeathed the sum of £500 to the use of the C.T.O. staff for benevolent purposes.

More than once or twice since this much respected member of the Secretariat quitted the Service, there have been gestures and tokens of his lasting interest in the art and craft of telegraphy, but truly our friend has now set the unique seal upon a life-long affection.

"When Arthur Avery leaves the Telegraph Service," said I, "I shall be able to write a chapter on his virtues." Now that the date of our Superintendent friend and colleague's retirement has been reached, somehow it becomes more difficult to frame sentences which shall be adequate to fit the occasion without giving an appearance of fulsome praise. To know Arthur was to live in the atmosphere of a live manhood, with which was interwoven a sympathy quick to realise and enter into the thoughts and needs of others. It was this latter vein which ran through his nature that rendered his supervision so thoroughly efficient, from a Departmental point of view, and so lacking in anything approaching the irksome from the view-point of those whose privilege it was to serve under him.

Of his work for the Telegraph Service, not least that performed in connection with the Imperial Cables, to mention this fact will suffice, for, who in the C.T.O. does not know that whatever Arthur Avery undertook, that task was always given the best of his efforts and power.

The writer ceases here simply for fear that enthusiasm for so affectionate a personality may miss its mark, which mark and aim is to place on record an honest appreciation of Arthur Avery, Superintendent, C.T.O.

It was just like Jack Munro, now Director of the Egyptian Telegraphs, formerly of the Cable Room and now on leave in England, that he should call in at the office to see his old colleagues, and the next day forward a handsome "pot" as a contribution to the Cable Room Sports Club.

St. Erkenwald's Chronicle again furnishes us with a curiosity in the way of memorials from one of the City of London Churches, which will no doubt specially interest a number of our London readers. To understand the point of this particular memorial it should be stated that the family of the Prestons kept the "Boar's Head" (of Falstaff and Prince Hal fame), and the back windows of this inn looked out on to the church of St. Michael, Crooked Lane, Eastcheap. The stone first erected in the churchyard of St. Michel was subsequently removed to the churchyard of St. Magnus-the-Martyr, and hereunder is the posthumous eulogy of one Robert Preston, who, though potman (*i.e. drauer*) at the famous hostelry in the Eighteenth Century, was nevertheless a total abstainer, and died—young!

"Here lieth the bodye of Robert Preston, late drawer at the "Boar's Head Tavern," Great Eastcheap, who departed this life March 16. Anno Domini 1730, aged 27 years.

Bacchus, to give the Topping World surprise,
Produced one Sober Son, and here he lies.
Tho' nurs'd among full hogsheds, he defy'd it
The charm of wine, and every vice beside.
O reader, if to Justice thou'rt inclined,
Keep honest Preston daily in thy mind.
He drew good wine, took care to fill his pots,
Had sundry virtues that outweighed his faults.
You that on Bacchus have the like dependence,
Pray copy Bob in measure and attendance.

Acquaintance with these and other points and places of ancient interest in dear old London town at times enables one to hold his own ground when meeting foreign or colonial delegates. On a recent occasion when three Dutch telegraph officials were on a visit to the London office they evinced considerable interest in Eighteenth Century architecture, and it was a most pleasurable amenity to be able to take them to Staple's Inn, and Lincoln's Inn.

Looking into one of the quaint houses of the latter, about A.D. 1745, with their turreted staircases, and wooden stairs 10 to 20 degrees out of the horizontal, one of our Dutch colleagues suddenly exclaimed, "Then your Dickens did not exaggerate. That is exactly how he describes it in *Pickwick Papers*."

According to the *Electrical Engineer* of Australia and New Zealand the number of broadcast licences granted in the various States are: New South Wales, 33,964; Victoria, 19,481; Queensland, 1,211; South Australia, 2,895; Western Australia, 3,427; and Tasmania, 540. A sum of £113,658 has been collected in licence fees, and the amounts paid to the various broadcasting companies are said to be as under: 2FC, £34,629; 2BL, £12,018; 3LO, £14,444; 3AR, £4,090; and 6 WF, £4,220.

A further interesting item on broadcasting showing the relative use of broadcasting by the various nations from a *per capita* point of view and according to a French source, viz. *Radio Electricité*, states that the United States has now 5.1 broadcasting stations for each million of the population. Sweden follows with 2.2 stations for a similar number, South Africa 1, Holland 0.78, Great Britain 0.49, Norway 0.45, Belgium 0.3, Roumania 0.17, Germany 0.14, Spain 0.087, and France 0.077, but, as the *Electrical Review* points out, it should be remembered that the figures do not form a true guide to the development of the broadcasting movement in the respective countries as the transmitting power of the stations, and consequently the number of listeners served, varies considerably.

It is also reported that steps are being taken to increase the power of the Manchester (2ZY) station so as to improve the service in Lancashire before next winter.

"Wireless," as we know, has by no means escaped litigation, and now there comes a combination of wireless and copyright in the recent case which came before Mr. Justice Finlay in the Vacation Court when a motion was made by Mr. Jenkins, K.C., on behalf of the British Broadcasting Co., Ltd., for an injunction to restrain the Wireless League Gazette Publishing Co., Ltd., from infringing the copyright in programmes printed in its weekly, *Radio Times*, by producing them in *The Wireless League Gazette*, the defendants' weekly organ. Mr. Jenkins explained that the programmes were prepared six weeks in advance, and submitted that they were compilations coming within the protection of the Copyright Act, 1911. Mr. Macgillivray, for the defendants, contended that there was no copyright in programmes which were simply records of arrangements made; alternatively, if there was copyright, it was of so flimsy a character that what the defendants had done did not amount to infringement. The amount of skill required in a compilation protected by copyright was absent. Counsel further argued that the partial reproduction of the programmes came within the exceptions to the operation of copyright law as being "fair dealing for the purposes of newspaper summary." His Lordship said 35% of the programmes in the *Radio Times* had been copied. He was satisfied that there was a real question to be argued at trial. He would make no order on the motion, and there would be liberty to apply for speedy trial of the action.

A season of international entertainment, says the *Electrical Review*, will be available to listeners this coming winter, for it is hoped to complete the new "central" receiving station which the B.B.C. is building at Hayes, near Bromley, in Kent, early next month. In October this plant will pick up American and Continental programmes and relay them to Daventry, whence they will be re-radiated. The B.B. Co. has been developing proposals for the exchange of programmes in this manner, and the new station will have a 300-500 metre receiver, and another for shorter bands for long distance reception. Direction finding apparatus will be provided for locating sources of interference and for assisting in calibrating B.B.C. stations.

AUSTRALIA.—*The Melbourne Herald* gives the following as the result of the year's working of the Postmaster-General's department for the twelve months ended June 30, 1924, which shows a telegraph income of £1,481,455 and a telephone revenue of £3,601,023, while radio receipts amounted to £15,599. Many exchanges were placed in continuous day and night service, necessitating a considerable increase of staff. Last year 47,000 miles of new aerial wires were brought into service for 46,624 net telephone subscribers. The aerial mileage showed an increase of 20.8 per cent., making a total of 272,000 miles, and the percentage increase of new instruments was 14.6 on a total number of 318,000. The 46,624 new instruments cost an average of £60 each, including line costs. The capital expenditure from loan money on new telephone and telegraph works was £3,980,000. At the end of June, 1924, the outstanding number of applicants for telephone service was 12,341. By June this year this number had been reduced to 8,500, despite a progressive increasing demand of 5,000 a month. Amongst the causes of the financial balance being on the wrong side of the ledger were reductions of £80,000 through alteration of trunk call charges in the telephone section, and of £18,000 through reduced cable rates on the telegraph side.

CHINA.—Reuter's Tokio correspondent informs us that the Japanese Foreign Office states that the Peking Government has approached Mr. Yoshizawa, the Japanese Minister in Peking, regarding the settlement of the radio question. China, it appears, proposes the raising of a joint Japanese-American loan for the purpose of constructing a Chinese radio system in conjunction with the existing Japanese system. Owing, however, to the vagueness of the Chinese suggestions, Japan does not intend to take any action until further details are received from Peking.

According to a report recently issued by the Chinese Government Bureau of Economic Information, there are now 84,837 miles of telegraph lines in operation in China.

CZECHO-SLOVAKIA.—A statement in the annual report for 1924 of the Czecho-Slovakian Post and Telegraph Department says there are now 3,631 telegraph offices and 84,830 miles of telegraph wire in use in that country, the number of messages handled last year having been 15,800,000.

FAROE ISLANDS.—*The Electrical Review* states that new facilities for inter-communication between islands in the Faroe group have been provided by the installation of two small duplex wireless telephone sets on the islands of Thorshaven and Nolso. The apparatus, which is of the Marconi XP1a type, does not need the attention of a skilled operator, being used in the same way as an ordinary house telephone. The set comprises a small power valve transmitter and a valve receiver, worked entirely from batteries, and with the aerial supported by masts 70 ft. in height, communication over a distance of 20 miles can be maintained. The adaptability of this Marconi equipment to a variety of circumstances is shown by the fact that apparatus of the XP1 type has been supplied to the State railways of Siam for use in connection with that service.

GERMANY.—*The Financial Times* informs us that the submarine telegraph cable which the Deutsch Atlantische Telegraphengesellschaft is to lay from Emden to the Azores, to connect with the Commercial Cable Co.'s and the Western Union's systems, has been ordered from the Norddeutschen Seekabelwerken A.G. in Nordenham, and is to be ready in the autumn of 1926.

Herr Wagner and Cable loading.—The president of the Telegraph Institute of Berlin, in the course of a recent address on "Trans-Oceanic Telegraphy," referred to the Western Electric Co.'s method of overcoming the effect of

capacity by a self-induction device, surrounding the whole length of a cable with a thin band of "permalloy." He says that the technical laboratory of the German Telegraphs, in collaboration with a number of electrical concerns, had produced an alloy containing only 40% nickel which could be used in substitution for "permalloy." This new alloy is, states *Electrotechnik und Maschinenbau*, being used in the German-American cable which is being laid by the German Transatlantic Cable Co.

Last year's radio exhibition in Berlin showed the restrictions of the German postal authorities to have been somewhat severe. Government regulations were modified on Sept. 1, 1925, however, so as to permit the production of apparatus that will receive on any wave-length up to 3,000 metres, and the change was made known to manufacturers in time to allow them to prepare entirely new apparatus for the show which was in Berlin from Sept. 4 to 13. The granting of amateur transmitting licences is also under consideration.

GREAT BRITAIN.—It is generally understood in London that a site at Winthorpe, near Skegness, for the receiving station for the "Beam" wireless services with Australia and India has been placed by the Postmaster-General at the disposal of the contractors.

A site near Grimsby for the transmitting station has also been handed to the contractors. Both stations, under the contract, are due to be completed by May 8 next.

The control of the aeriels in Great Britain.—Last month the Public Health Act, 1925, came into operation. Section 26 of this Act empowers local authorities to make by-laws for the prevention of danger or obstruction in streets or public places by aeriels used in connection with radio-telephony and telegraphy.

British and European broadcasting stations are continuing their night tests of the efficiency of the newly-allotted wavelengths as a means of preventing interference between stations. So far as Great Britain is concerned, results are regarded as satisfactory, says *The Electrical Review*, notwithstanding the fact that some disturbance was experienced from unexpected sources. Equilibrium will doubtless be established by the time the test transmissions have ended, but wavelengths will probably have to be modified still further before an amicable understanding is arrived at. It is to be noted that the new wavelengths are not based on length, but on frequency, thus introducing fractions of a metre. The last test transmission took place on Sept. 14, at least for the present.

INDIA.—*The Bombay Evening News* was apparently the first to give the information that the Bombay Government had ordered the acquisition of land at Poona and at Dhond, 45 miles S.E. of Poona, with a view to the erection of two beam stations, and that a number of engineers of the Marconi Company had arrived to superintend the construction of the stations.

ITALY.—Shade of the ancient Doges and the lazy waters of the Bridge of Sighs! The Italian postal authorities are now using a number of electric launches fitted with Tudor batteries in connection with the postal service in Venice.

JAPAN.—*The Daily Telegraph*, London, reports that a Japanese wireless telegraph company, managed jointly by the private interests concerned and the Government, has come into being with Viscount Shibusawa and Baron K. Nakashima as members of the committee. The company is to be organised with the Government station at Iwaki as its principal asset. Supplementary subscriptions in shares will be made by prominent business interests in Japan.

JUGO-SLAVIA.—*Commerce Reports* says that apparatus for the new broadcasting station near Zagreb has been ordered from Germany on reparations account and will be installed by Jugoslavenski Siemens, the local representatives of the Siemens-Schuckert Werke. The station is to be used solely by the State, but it is hoped that later it will be released for general use. There are now 145 receiving sets in Zagreb.

MADAGASCAR.—*The Electrical Review* supplies the following interesting item:—Two radio-telegraph stations have recently been established by the French Colonial authorities—one at Bamako in French Africa and one at Tananarivo, Madagascar. The plant at the Bamako station, which has a capacity of 100 kw., comprises two Bethenod-Latour high-frequency alternators which are operated alternately. Messages can also be sent out by means of spark emitters, this being intended to meet the requirements of navigation and explorers. The necessary power is supplied by two Diesel engines and two steam engines. The power plant, which is adapted to use wood as fuel, is also being utilised to supply the town of Bamako with electricity for lighting purposes until this can be taken over by the hydro-electric station which is being established on the Niger. The plant at Tananarivo is similar to that at Bamako, except that it has a capacity of 150 kw., the distance from Paris being about 5,000 miles.

NEW ZEALAND.—New regulations governing the installation of radio apparatus on vessels registered in New Zealand have been gazetted by the Ministry of Marine. They are intended to minimise the danger of coastal voyages, and the date of their operation is Jan. 1, 1926. A full explanatory statement has been issued stating that every ship which carries more than 25 persons will be required to carry radio apparatus, although certain exemptions are provided for.

RUSSIA.—An engineering Soviet authority at Novoni—Kolaevsk announces that a new radio station is being constructed at Chuguchak in Western China for meeting, in the first place, the requirements of the Soviet trading organisations and the Consuls.

Whatever may be the differences of opinion held regarding the political system and opinions of the present Russian governing authorities, the electrical world is apparently well aware of the progress in electrical matters in that country. Apart from the item mentioned above there recently appeared in a London electrical journal of high repute, the following regarding wireless and other electrical developments:—

"The Weak Current Trust has delivered to the Radio Transmission Company the equipment for 12 radio stations which are to be erected in Kharkof, Sverdlovsk, Odessa and other towns. Next year a further 30 stations will be established in other towns for broadcasting purposes."

In the same issue, among other items of interest to the electrical and business world specially connected with the Russian people, may be mentioned:—

(1) The commencement of constructional works in connexion with the Sherthoff station in the coal basin of the Donetz with its five power sub-stations, the installation of the boilers and of one 10,000 kw. turbo-generator, of a second set shortly expected from England, for example. Also:

(2) The scheme of the Leningrad Port Administration for the construction of electrical approach railways to assist in the loading of timber with a handling capacity of 1,000 tons per hour.

(3) Moscow Electrical Planning and re-construction.

(4) The confirmation of a scheme for the electrical development of the Kizeloff regional station (Ural) to 26,000 kw. with the installation of transmission lines to Perm and Chusor, at an expenditure of 8,472,000 roubles, over five million of which will be spent next year.

This same reputable London journal also published the following paragraph showing the initiative of the new Russia. "The Soviet authorities evidently regard radio-broadcasting as an excellent means of propaganda, for the *Daily Mail* reports that over 6,000 workers' clubs have been fitted with receiving sets, and 12,000 reading rooms for the public have now been similarly equipped. When the British Broadcasting Co.'s experimental station at Hayes is ready, listeners in this country will have an opportunity of judging the quality of the Soviet broadcast programmes, as relayed by 5XX.

SIERRA LEONE.—The annual report for 1924 on the Sierra Leone (West Africa) railway, is to hand, and includes an account of the operation during the year of the telegraph system of the country and the telephone exchange in Freetown, both of which are under the management of the railway. The total mileage of telegraph, and telephone lines at the end of the year was 1,204, four miles less than in 1923, including 156 miles of telephonic lines in Freetown. The number of electric train-staff instruments was 78, the number of telegraph instruments was 40, and the number of telephone circuits on the Freetown exchange was 88, or six less than in 1923. The double military line from Port Lokko to Mabanta was bought from the Army and dismantled, and the best of the material was used for the construction of a new line from Port Lokko in a northerly direction through Mange to the trading centre of Kambia. There is now a through line from Songo to Kambia, while a branch line of about three miles was constructed from Loawa, in the Northern Province, to Matru. Since the departure in January, 1922, prior to retirement, of the European telegraph superintendent, the section has been in charge of an African telegraph instructor. Mr. Bennett, assistant engineer-in-chief of the Nigerian Posts and Telegraphs Department, following an inspection, reported that the section was in an unsatisfactory state. However, at the date of the report under review, May 1, 1925, Mr. G. Cresswell, of the Nigerian Posts and Telegraphs Department, had just arrived to take up the appointment with the title of assistant telegraph engineer. He is responsible to the chief engineer of the railway and has a very large amount of work in front of him. Excluding messages on railway service, the number of telegrams dispatched during the year by the public increased by 1,682 to 45,206, and Government messages increased by 5,852 to 18,299. The number of subscribers, excluding the railways, connected to the Freetown telephone exchange was 34 public and 15 Government. Telegraph revenue increased by £773 to £5,500, and telephone income increased by £71 to £1,334.

SOUTH AMERICA.—The Lima correspondent of the *London Times* says that following the arrival of Señor Francisco Becerra, a representative of the Marconi Company from Argentina, a fortnight ago, the company is eager to commence a series of improvements and extensions of the existing Peruvian postal, telegraph, and wireless services. The scheme, which involves an expenditure of approximately £500,000, includes the erection of a powerful beam station linking up Lima, Buenos Aires, Bogota, Rio de Janeiro, and the United States. A proposed 25-year concession to the company is under discussion by Congress, and it is thought that the necessary approval will soon be given.

U.S.A.—Reuter's New York agency reports that successful two-way radio telephone communication between aeroplanes and the ground was established in the anti-aircraft test manoeuvres just concluded at Fort Tilden, a device having been perfected at the radio laboratories of the signal corps at Camp Vail, New Jersey. A helmet is worn by the aviator, cutting off the noise of the aero-engine and the difficulties caused by the engine's spark system, which had previously prevented successful attempts at communication. The aviators using the radio telephone could hear the land station from a distance of eighty miles, while the airman could talk with the station from a distance of thirty miles.

Many accounts, more or less accurate, of the Revolving Short-Wave Beam System, and the experimental station at the South Foreland, have been

published in the Press, but naturally one turns to the technical journals for a clear and concise account of this interesting development.

In so doing the Sept. 11 issue of the *Electrical Review* gave its readers just that very concise description in four columns, with adequate illustrations, one would wish.

Supplemental to this was a leaderette which added one or two items of particular interest to telegraph readers generally, and of very special interest to some of "ours" who, during active service were not unaware of these and kindred developments.

Says, the *Review*: "The new short-wave direction-giving wireless installation which has been erected by Marconi's Wireless Telegraph Company at the South Foreland Lighthouse is a noteworthy development of the "beam" system of radiation, for which the credit attaches to Senatore Marconi and his expert staff. The idea arose out of the experiments which he commenced in Italy in 1916 for military purposes, using waves two or three metres in length, with parabolic wire reflectors; these investigations were continued at Carnarvon, and in 1920 an experimental revolving reflector was erected on the isle of Inchkeith, with a 4-metre wave, to act as a "wireless lighthouse." Two years later an improved reflector was installed, of which an illustrated description was given in the *Electrical Review* of Sept. 21, 1923, and the South Foreland installation embodies the improvements which experience has shown to be desirable. In particular, the method of reflection adopted is quite different from that employed at Inchkeith, and appears to be highly efficient in confining the bulk of the radiation to a narrow beam or sector. The use of Morse letters to identify the sector of the chart in which the receiver happens to be, is similar to the method adopted at Inchkeith."

Thus the 'Beam' has already quite a little history behind it.

Little more than a month ago, too, a decision was made by the United States Navy Department to supply all naval vessels, and shore stations with short-wave radio equipment, and although one recognises that short-wave need not necessarily be associated with the 'Beam' system yet one cannot at the moment think of one without turning one's mind to the other.

As an electrical authority recently put it: "The increasing number of tests which are being carried out with waves of a length below the limit of 100 metres points more and more to their superiority over the longer waves for long-distance communication, but there is more than this one merit of greater penetrative power that suggests the desirability of their being utilised. The frequency of the impulses received in the antenna of the receiver increases proportionately as the wavelength decreases, hence much sharper tuning is possible and a greater degree of selectivity is obtained."

The next step in practical working of the short-wave Beam system will probably be a *fait accompli* by the time these pages are in the hands of *T. and T. Journal* subscribers when these islands should be working with public traffic by this system, from London to Montreal direct.

The success of a number of amateurs (?) with short-wave working has no doubt led to so thorough and studied an investigation of this method that without the lead given by these enthusiastic neophytes, concentrated scientific investigation would probably have been along the lines of the higher valued waves of five figures instead of well below the three figures band. The writer would ask three questions here.

- (1) Was it very long ago when short waves were left to the amateur because they were thought to be useless for commercial purposes?
- (2) Is the long wave, say 20,000 metres and over, likely to become obsolete?
- (3) Was it a friend and champion of either 'long' or 'short' wave who stated that 5DH was "the worst note in the ether"?

Two Views of Science.—"We have found a strange footprint on the shores of the unknown. We have devised profound theories to account for its origin. At length we have constructed the creature that made the footprint, and lo! the footprint is our own."—*Eddington*.

"The province of Science is vast, but it has its limits. It could have no pretensions to improve human nature. It might alter the environment, multiply the resources, widen the intellectual prospect, but it could not fairly be asked to bear the responsibility for the use which was made of those gifts."—*Professor Lamb*.

J. J. T.

PRESENTATION TO TELEPHONE CONTRACT MANAGER.

Mr. F. Lucas, Contract Manager of Leicester and Coventry Telephone Districts, has been appointed to a similar post at Edinburgh. As a mark of esteem Mr. Lucas was presented with a gold watch chain by members of the Leicester and Coventry Contract and District Office Staffs.

After so long a period of 16 years close association with their chief, during which time the happiest of relations have existed, it is only natural that the departure of Mr. Lucas is keenly felt by the Contract Officers of Leicester and Derby. As a result, a personal presentation by these officers has taken place to record their appreciation of an official whose charm of character has made their official life a pleasurable duty.

AUTOMATICS AND THE SUBSCRIBER.

By C. W. MUIRHEAD, LONDON TELEPHONE SERVICE.

Like most other people, the telephone subscriber dislikes changes forced upon him. He does not object to any temporary inconvenience when the changes are suggested or initiated by himself. If he sees a way by which to improve his installation—a re-arrangement of the extensions, the substitution of a cordless board for a Plan 5 installation, the substitution of extensions with intercepting devices for simple extensions, the provision of an automatic Private Branch Exchange for one of the common variety—he cheerfully submits to any temporary inconvenience caused by the change. When, however, the re-arrangement, or substitution, or addition, is suggested by somebody else, he objects. It is in the natural order of things that he should do so. He is merely acting on the promptings of instinct.

A big change is on the eve of taking place in London's telephone system—the substitution of the Automatic for the Manual system. It is the biggest thing in changes since the telephone became a commercial proposition. It is a change which is going to affect the subscriber very materially. He will, therefore, want to know things. He will want information on a good many points. He is not going to look unmoved on a change which means in many cases an alteration of his telephone number, an interference with his installation, the setting up of a totally different manner of calling from the old-established method which he knows so well, a change in some cases of the name of the exchange.

Public opinion is an important factor. It is desirable, imperative indeed, that in a change of such size and importance the Department should have the subscriber with it. Certainly the work of conversion will be appreciably lightened if we can pave the way by preliminary explanation or discussion. It is important, therefore, that those of the Department's staff who come into daily touch with subscribers and who are most likely to hear at the start their views and criticisms of the new order of things should be equipped with information to meet the points likely to be raised. The field is a wide one, but, in order to satisfy the doubts and difficulties of subscribers, it is not necessary for the man on the commercial side of the telephone service to possess a profound knowledge of the whole, or of a large portion, of the subject. He need not carry in his mind every step in the processes which carry a call from one point to another. He need not be able to draw diagrams showing the various principles of the Director system. He should, however, have a good working knowledge of the main features of the new system, and he should be able to convey that knowledge in language understandable to the non-technical mind.

The writer suggests the following features as those most likely to arise in discussion with subscribers, and he suggests that they will probably arise in the following order.

NOT A REVOLUTION.

The subscriber, when he first discusses with a Post Office representative the impending change to Automatics, will in all probability commence by reference to the drastic nature of the change. Has the time come for a revolution of such a sweeping character? Here the Department's representative will, of course, explain that there is nothing revolutionary in the change. We have been applying automatic devices to telephones practically since the beginning of things, and the substitution of machine switching for manual operating is merely another step in the process. In the early days of telephony a number of things were done by hand which are now done mechanically. Gradually mechanical methods were introduced to improve the service. Machine ringing devices, lamp signalling, automatic indications of the progress of calls—inevitably with the march of progress manual effort has been more and more displaced by mechanical operation. Step by step automatic devices have been introduced to relieve the exchange operator. Now we have come in the ordinary continuity of things to the time when another step has to be taken—the introduction of a mechanical method of setting up a connection between two circuits.

There is nothing revolutionary about the change, nothing in it to alarm the most timid or harrow the feelings of the most conservative of subscribers. It is really a misnomer to call the change a change to automatic working at all seeing that we have been changing bit by bit to such working for the last 20 years.

EXCHANGE NAME CHANGES.

The subscriber, satisfied as to the ordered inevitability of the change—that it is merely an evolution and in no sense a revolution, will then come to his own particular difficulties. If he happens to be a subscriber to an exchange whose name has been, or is being, altered, he will probably wish first of all to make some remarks on that subject.

It was necessary to contemplate and arrange for a seven figure number automatic system for London. The actual number of digits in each subscriber's number was reduced to four by the retention of the individual name of each exchange and the utilisation of the first three letters of the name as part of the subscriber's number. A glance at the dial will show that the letters of the alphabet are divided up into groups—ABC, DEF, and so on, and distributed over the finger holes of the dial, each group of three letters having the same

numerical significance as the digit associated with the same finger hole. It will be seen that it is possible for the names of two exchanges to conflict in all three initial letters, and this position actually arose in London with regard to a number of exchanges. In all, seven changes were required. Four—Ravensbourne, Riverside, Clissold, and Mountview, for Bromley, Hammer-smith, Dalston, and Hornsey—have already been made, and probably by the time this article is in print the names of Colindale, Buckhurst, and Grangewood will have displaced, in the directory and elsewhere, Kingsbury, Woodford, and East Ham.

EXCHANGE NUMBER CHANGES.

A change in the name of an exchange is one which affects the whole body of subscribers in the local area affected, and the individual subscriber, if he does not actually lose sight of his own particular grievance in contemplating the woes of others, will at least be disposed to view it with more philosophy. It is a difficult matter with the subscriber whose actual number is being altered to conform with the general arithmetical structure of the automatic system. This subscriber will look around and may find that none of his neighbours is being subjected to the annoyance. He will complain emphatically, and the duration of complaint will last longer than in the other case.

The fact that each subscriber's number must consist of four digits—no more and no less—means that subscribers with single digit numbers, subscribers with two or three figure numbers, and subscribers with five figure numbers will be subjected to change of number. The single digit subscriber comes off badly; his number will be obliterated entirely. It would be possible to prefix such numbers with three ciphers, but this would be a bad arrangement from both phonetic and signalling points of view. The two and three figure subscribers are not so summarily treated, their existing numbers will remain, prefixed with one cipher or two ciphers as the case may be, to make up the required four digits. Five figure numbers, except in certain cases where the lines are used for outgoing calls only, have already been changed.

DIALS AND DIALLING.

A dial will be the outward and visible sign to a subscriber that his exchange has been converted to automatic working. The ordinary type of dial used in automatic systems consists of a rotating plate pierced with ten finger holes, to each of which a digit is allotted. In the special type of dial to be employed in London a certain number of letters of the alphabet will, as already explained, be allotted to each finger hole in addition to a digit. At present a subscriber wishing to make a call lifts his receiver, a lamp lights at the exchange announcing his call, the operator takes the number required and sets up the connections. Under the new dispensation the subscriber will set up the connections himself, or perhaps it would be more correct to say that he will exercise control over the connecting switches located at the exchange. He will put certain selecting apparatus into play which will hunt for the particular line required, or for a disengaged line in a particular group of lines.

All this the calling subscriber will do by lifting his receiver and dialling. When he lifts his receiver he will listen for what is called the dialling or dial signal tone, a continuous burring sound which tells him that the first hunting or selecting apparatus has been put into play and the switching plant is ready to receive the impulses set up by the dialling operations. The subscriber then dials the first three letters of the name of the wanted exchange and the four digits of the wanted subscriber's number, at the end of which operation he will hear, if the required line is disengaged, the ringing signal, which will tell him that the final connection has been set up and that his correspondent is being rung. He may hear something which will sound less pleasant in his ear, namely, the busy tone, which announces that the required line is engaged, or that all outlets to that line are busy. In the case of a call for a Private Branch Exchange the busy signal will not be given until all the exchange lines in the group have been searched by the selecting switches and found to be engaged. A point to observe in the case of calls for Private Branch Exchanges is that the first number in the series must be dialled in order to secure the testing of all the lines in the group. If the calling subscriber dials any other number in the series the selecting apparatus will concern itself with that number only.

It is confidently anticipated in some quarters that, under a system where the subscriber himself is responsible for setting up connections, the Department will no longer be troubled with complaints about wrong numbers. Some benefit in this way might reasonably be expected, although experience of subscribers and their ways makes one hesitate to adopt an attitude of definite hope on the point. Whether, however, they are made the subject of complaint against the Department or not, there will, of course, be cases of wrong number. Mr. Stuart-Jones, in a recent article in the JOURNAL, stated, as a melancholy fact, that at one large automatic exchange the number of wrong numbers was larger than when the exchange was a manual one, a circumstance due, of course, to incorrect dialling by subscribers. The exchange was not mentioned—surely it was not Dundee—but it would be interesting to know in what percentage of these cases complaint was made against the Department about a trouble for which subscribers were themselves responsible.

CALLS BETWEEN AUTOMATIC AND MANUAL EXCHANGES.

Subscribers may next want to know something about automatic-manual working. A subscriber with lines to an exchange which is being converted, but whose house is connected with a manual exchange which is for the time being left undisturbed, or who has a number of correspondents with lines to manual exchanges, may be interested. It will be well, therefore, for the Department's representative to carry some ammunition on the subject.

The conversion of the London telephone system to an automatic system will extend over a long period—Colonel Purves, in his lecture at the Institute of Electrical Engineers (now being reprinted in the *JOURNAL*) estimated that from fifteen to twenty years would elapse before the system became fully automatic. It is necessary to make special arrangements during the interim period for dialling traffic from automatic to manual exchanges as well as traffic from manual to automatic exchanges. To pick up calls from automatic exchanges special positions, known as Coder Call Indicator positions, will be provided at each manual exchange, and to deal with calls from manual exchanges special junction positions, known as Cordless B positions, will be provided at each automatic exchange.

The non-engineering man who has to deal with telephone matters need not be conversant with the various switching operations which take place in connection with a call from an automatic to a manual exchange and vice versa—if he has a technical bent he may be referred to the authoritative paper mentioned, or to the third chapter of Mr. Harrison's text book on the Strowger System. He should, however, be sufficiently acquainted with the main features of the two special arrangements mentioned to enable him to explain their use and functions.

The Coder Call Indicator provided at manual exchanges consists of a field or screen fitted in front of the operator and divided into four sections. Each section contains the ten digits, fitted in front of ten lines. The number of the subscriber required by a subscriber to an automatic exchange is shewn by means of the illumination of one lamp in each of the four sections; that is, a four digit number is made visible to the operator at the manual exchange. The telephonist at the manual exchange inserts the plug of any disengaged cord into the multiple jack of the required subscriber's line, simultaneously a switch, known as a Finder Switch, operates and connects the cord to the calling line, the connection is established, the displayed digits disappear, and the next call of the queue appears on the screen. Although only one call can be displayed at a time four other calls may be stored waiting their turn for display. Altogether one of the most ingenious devices of the many ingenious features of automatic working!

The instruction to the telephonist at the manual exchange is, it will be seen, a silent one. There is speech neither from telephonist nor subscriber. Probably the subscriber will be chiefly interested in the fact that he dials calls for subscribers on manual exchanges just as he does calls for subscribers on automatic exchanges—he dials the three letters signifying the manual exchange and the four digits of the number required. Where there are no direct junctions between the automatic and the manual exchanges calls will be circulated via the Tandem Exchange, a junction switching centre which will pick up calls and pass them on to the manual exchange, where the numbers wanted will appear on Coder Call Indicator positions exactly as in the case of direct calls.

To deal with calls in the other direction—calls from manual to automatic—special manual positions will be provided at each automatic exchange. At each such position—known as a Cordless "B" position, the telephonist will be provided with what is called a Key Sender, a piece of apparatus fitted with ten keys similar to typewriting keys and numbered from left to right. The telephonist receives the call from the manual exchange by order wire in the usual way, allots a junction, depresses a key, called an Assignment Key, which will connect up the junction with her keyboard, and proceeds to tap out the number of the required subscriber on the Key Sender, which at the close of this operation is automatically released for other calls. Where there are no direct junctions between the manual and the automatic exchange calls will be passed by the manual exchange telephonist to the Tandem Exchange, the switching centre already referred to, where they will be dealt with in precisely the same way, that is to say, they will be received by a Cordless "B" operator, who will allot the junction to be used between "Tandem" and the manual exchange and connect direct, by means of her Key Sender, to the subscriber to the automatic exchange.

PRIVATE BRANCH EXCHANGES.

The Private Branch Exchange subscriber will not have the outward and visible sign of a dial at his extension points to signify automatic working at the exchange. A dial will be fitted at the Private Branch Exchange switch-board and all exchange calls from the extension points, whether to subscribers to automatic exchanges or subscribers to manual exchanges, will be dialled by the Private Branch Exchange operator.

The writer, when on a northern holiday recently, had the privilege of going over the automatic systems at Edinburgh and Dundee. The Edinburgh system was not completed, but that at Dundee was in full swing. A visit was paid to a Private Branch Exchange. A dial was fitted on the keyboard and the dialling of outward calls from the extension points was proceeding briskly. The conclusion arrived at was that the Private Branch Exchange operator found the work of dialling somewhat greater than that involved under the old plug and cord system, but she got the wanted subscriber more quickly. The automatic system at Dundee being a four figure one, the Private Branch Exchange operator has four dialling operations only in connection with each outward call. In London there will, of course, be seven.

Some of the features of the Dundee system which appealed more particularly to the writer may perhaps be mentioned at this point. Two automatic exchanges have been established in the Dundee telephone area—one at Dundee and one at Broughty Ferry. The system, as already indicated, is a four figure one, and each of the exchanges converted, or ultimately to be converted, to automatic working is in the same numbering scheme, or, in other words, one series or stretch of four figure numbers will cover all the subscribers to all the exchanges in the Dundee telephone area. A Dundee

subscriber calls a Broughty Ferry subscriber automatically. When he wants a subscriber on one of the exchanges not yet converted he dials a special number, when his line is connected to an operator's position at the manual exchange required. This arrangement, which is now commonly referred to as "dialling out," only applies to calls for subscribers to exchanges in the local area. It removes the supervision from the telephonist at the originating exchange, and is not, therefore, suitable for extra fee traffic. If the Dundee subscriber wants to make a call for a subscriber on an exchange outside the local area he dials a number which obtains the Dundee manual exchange, situated, with the automatic exchange, in the Dundee Post Office.

As regards inward traffic, at each of the unconverted exchanges in the Dundee area dials have been provided, and Dundee subscribers are dialled direct by the telephonists at these exchanges over the junctions into the switches at the automatic exchange. The same arrangement applies to exchanges outside the Dundee area which work to Dundee on a junction basis. This method, known as "dialling in," allows the connection to be effected without the aid of a telephonist at the called exchange. Call offices and subscribers' lines with coin boxes are not fitted with dials. These lines terminate in the manual exchange, are worked manually for originating traffic, but called automatically for inward traffic. Three of the signals to the dialling subscriber are the same as they will be in London—the dialling tone, heard when the receiver is lifted and the subscriber's line is through to a first Selector; the ringing signal, heard when connection has been effected; and the engaged signal, heard when the required circuit is engaged or all outlets to it are busy. The fourth signal, the number unobtainable signal, given when a spare number, or a line faulty or out of service, is dialled, will not be given in such circumstances in London, where such calls will be routed to an operator.

As in London, the terminals on the selector levels of the automatic plant are in groups of ten, the numbers beginning with 1 and ending with 0; that is, 5000 comes at the end of the level beginning with 5001. In the case of a Private Branch Exchange subscriber whose group of numbers was, say, 5000-5009, the number to be dialled and, of course, the number which would be shewn in the directory, would be 5001.

PRIVATE AUTOMATIC BRANCH EXCHANGES.

In London the advance of Automatics has been heralded to some extent by the provision of Private Automatic Branch Exchanges in connection with the existing manual system. The Department commenced to provide such installations shortly after the close of the war, and each year since has shewn a significant increase in their number. In the case of installations with a large proportion of internal traffic an appreciable saving in the cost of operating is obtained by the substitution of a Private Automatic Branch Exchange for an ordinary Private Branch Exchange.

Automatic working is, of course, confined to communication between the extension points, but such communication can be given night and day and is in no way dependent on the attendance of an operator. An operator is required for all calls coming from other subscribers to the public exchange system and the operator also deals with outward exchange calls from the extensions. If the subscriber does not wish to throw outward exchange traffic on his operator direct dialling is provided, each extension point dialling the public exchange direct. This arrangement has the disadvantage that there is no check on the calls made from the extension points, and also that extension users have themselves to make all attempts to complete calls which are ineffective in the first instance.

It has been stated as another objection to direct dialling from the extensions that, when the public exchange becomes automatic, the extension point, when making an exchange call, will have to dial eight digits; that is, once to obtain a junction to the automatic exchange, and then, of course, the customary seven digits to obtain the subscriber with his 3 letter—4 figure number. There is not, perhaps, much to this objection seeing that if the extension point passed all outward calls to the Branch Exchange operator the total number of combined dialling operations would be the same as before—the extension would dial once to obtain the operator and the operator would dial seven digits to obtain the wanted subscriber. In other words, when the public exchange becomes automatic, the energy expended in dialling outward calls will be the same whether the calls are dialled by the Branch Exchange operator or direct from the extension points.

A good deal of the discussions with subscribers on the change from manual to automatic working in London will fall on Contract men. The Contract man must, therefore, possess information on the main features of the change in such a way that he can use it readily and confidently. It is hardly necessary to say this to men who are in daily touch with the public and who know the impression created by prompt and confidently-given information. It is probable that the points on which emphasis has been laid—inevitability of the change, necessity for change of exchange name and number, working between automatic and manual exchanges during the transition period, dials and dialling tones, and the position of the P.B.X. and P.A.B.X. subscriber—will come up most frequently in the course of discussion. On these points the Department's representative will meet enquiries, discuss difficulties, and settle points in that ready, confident manner necessary to carry conviction to the most doubting and difficult of subscribers.

The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

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NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. XII.

OCTOBER, 1925.

No. 127.

PRAISE FOR THE TELEPHONE SERVICE.

AMONGST those who in the opinion of the late W. S. Gilbert "never would be missed" is he

who praises in exaggerated tone

Every century but this and every country but his own.

This species of critic is probably as rife now as in the 'eighties, but Mr. Hilaire Belloc, although we believe he sometimes turns a wistful gaze on the catholic culture of the Middle Ages, is certainly not one of those who consider that everything done abroad is done better than in England. In a recent essay in the *New Statesman*, "The Two Sides of the Sea," he records the favourable impression he usually receives on his return home from a journey on the Continent. After an appreciation of the superiority of English railway work (and we may remark in passing that in the Press people can still be found to sing the praises of the cushionless Continental third-class carriage), he goes on to say:—

What is true of the English railway system is true of the English Post Office, and, I should add (to the surprise of many), the English Telephone. It is not fair to compare the English telephone system with that of the small countries, for the difficulty of managing a telephone system increases—after a certain point—with the number of subscribers, the area they occupy, and the complexity of inter-communication; nor does it increase in arithmetic progression, but in geometric. I may be wrong, and men with large commercial experience can correct me if I am; but I certainly know of no other great country in which this particular department works as well as it does here. You can be absolutely certain, nine times out of ten, of picking

up your telephone at any hour of the day or night and getting your communication anywhere, at any distance, within reasonable delay. In France over short distances, in Germany over somewhat longer ones, I can depend upon securing a room or sending a message, by setting up a plan for which several messages in a short time to many separate points are necessary. But in England it is a matter of course to communicate *anywhere* and at any time, with almost as much facility as one can do it in the Scandinavian countries, where the burden upon the system must be very much less. When I was at Narbonne, for instance, the other day, I should have liked to telephone to Chalons upon a matter I had in hand, but it never occurred to me even to attempt it, so certain was I of interruptions and delay. I would have laid a bet that I should not have been able to get a communication at all, or at least not in what the French call "useful time." But I would ring up, say, Chester from Dover or Canterbury at any time with the secure feeling of getting my communication—on the average—well within the hour, and of getting it clear and good.

On so long a text we propose to base the briefest of sermons. It is an oft-repeated and always needed one, and it is to the effect that before a public service is judged, some attempt should be made to understand and appreciate the difficulties it has to contend with and how far it is successful in overcoming them; that before we compare *A* with *B* we should endeavour to learn whether and, if so, how far they are comparable. We are happy to note that instances of public appreciation of the service in the Press and elsewhere are more common than formerly, but the nice discrimination displayed by Mr. Belloc is unusual. His understanding of the increased difficulties attendant upon greater complexity of intercommunication, his reference to the good average quickness of our long-distance service, and his qualification of Scandinavian perfections will appeal to all British telephone men. Only those who have had experience of it can properly appreciate the delights of a trunk service so tardy that it is necessary to employ an "urgent" call at triple rates in order to obtain communication within a reasonable period of time, and no one in this country knows, as do so many on the Continent, what it is to be connected with an exchange which functions only between 8 a.m. and 12 noon, and between 2 and 8 p.m. Even those who clamour for the introduction of a "person to person" call in this country forget that, however convenient to them it may be to have the telephonist track down the wished-for person (when absent from his address in a distant town) to his club, his mother-in-law's, his favourite restaurant, his barber's shop, or the bower of some fair friend, the process is a costly one and difficult to justify from the point of view of economics. Such feats seem to us to smack rather of *réclame* than of general perfection of the usefulness of the service.

Any device or arrangement which claims to enhance the value and accessibility of the telephone is not lightly to be rejected, but those improvements are most to be sought after which increase the average utility of the whole service. We should, of course, be loth to suggest that all refinements and improvements of the facilities at present available are comparable with the gilding of refined gold, or that the British telephone service is perfect. Those, however, who are good enough to give it a meed of praise may be assured that it has no intention of resting on its laurels.

HIC ET UBIQUE.

The *Bristol Times & Mirror* (referring to the invitation extended to members of the general public to pay a visit to the chief Telephone Exchange and see for themselves how the system is worked, and what precautions are taken to prevent errors, and to the fact many who accepted the invitation were heard to declare that they would never complain again—much less swear about the service) makes the following comment :

We are often tempted to issue a similar invitation to sections of our readers to pay a visit, say at the time of highest pressure in getting out the *Evening Times and Echo* or the *Times and Mirror*, in the hope that they might be convinced of the effort which is made to produce a paper as free from typographical blunders, as, say, are the University Press Bibles—the result by the way, of years of correction.

Unfortunately such visits would have to be timed just when our friends are either very busy with their own affairs or are (or should be) sound asleep in bed. There is also the fact that conducting parties over newspaper offices to show them what care is taken to ensure accuracy is just one of those disturbing things that make for inaccuracy.

According to *The Times* the Belgian Government intends to ask for a revision of telephone and telegraph tariffs between Belgium and Great Britain and to calculate the fees for telephone calls obtained in Belgium in gold francs, as is already the practice in France.

At the present time it costs 8s. to telephone from London to Brussels, and only 25f., approximately 5s., from Brussels to London. Of the latter sum, 23f. goes to the British Post Office and 2f. only to Belgium. The Belgian authorities consider their proportion too small, and are apprehensive of what might happen if the pound were ever worth 115f.—it is now worth 108—as their country would then have to bear a loss on each call. The fee of 25f. would not be sufficient to indemnify British claims. The tariffs will probably be raised every month so that charges levied in Belgium may be equivalent to the gold value of the British call-fees as from Jan. 1, 1926.

It is not to be wondered at that there is a considerably greater proportion of incoming than outgoing calls in the Anglo-Belgian service.

The Librarian of the Coventry Public Libraries has sent us the "Readers' Bulletin" for September-October. It appears from this that recent additions to the library occupy some 17 pages of print; those relating to Telephony and Telegraphy (including wireless) account for three. All the latest text books are included, and afford evidence of the up-to-date nature of the Public Library.

The contract for the new 3,000 line automatic telephone exchange for Fontainebleau has been given to the French licencees of the Relay Automatic Telephone Company.

The apparatus will be of the same type as that supplied to the British Post Office and Colonial Governments for Public Exchange Service, and will be engineered by Relay House engineers.

We learn from the *Electrical Review*, that the Bollwerk central telephone exchange in Berne is to be converted into an automatic station. The installation will provide for 4,400 connexions, with an eventual capacity of 9,000; extensions are also to be made at the various sub-exchanges. The contract for the work has been placed with the Siemens & Halske Co., of Berlin.

THE POST OFFICE AND AUTOMATIC TELEPHONES.*

BY COLONEL T. F. PURVES, O.B.E., M.I.E.E.

(Continued from page 237.)

When, however, the present or probable future requirements of a PBX exceed 10 lines, and therefore exceed the accommodation of a normal switch level, it is necessary to take special steps to ensure the availability of all the lines when a switch is hunting to complete a call for the PBX number. Line-hunting over groups up to 20 in number can be provided by utilizing rotary final switches having 10 double levels of 20 contacts. Each such level absorbs only 10-line numbers in the subscribers' multiple series, the remaining 10 having auxiliary numbers. This scheme is therefore economical from an exchange plant standpoint as the line capacity of the exchange is not reduced by the existence of lines 11 to 20 in the group, or by the retention of some of these auxiliary positions as spare for the future requirements of the PBX in question.

The private branch exchanges serving some of the large London stores have 150 exchange lines or more, but it is generally possible to divide the lines so that a group not exceeding 100 is available for outgoing traffic at the public exchange. In such cases additional switches of the pre-selector type are connected to the normal outlets of special third numerical selectors which act as final switches. The 10 outlets of the level appropriated to the PBX in question on each switch are multiplied on a graded basis to "home" pre-selectors having access to all the PBX lines in a common group of approximately 50 or 100, according to requirements. Each pre-selector is associated with a set of repeater equipment which provides facilities for battery feed, busy test, ringing and registration.

In this way all the requirements of very large private branch exchanges can be met in a perfectly satisfactory way, although with a certain sacrifice of uniformity as compared with systems deliberately designed for searching over large groups of lines.

(11) THE SUBSCRIBER'S AUTOMATIC TELEPHONE SET.

The earliest Post Office automatic exchange areas were equipped with subscribers' apparatus supplied by the contractor whose exchange system was in use in each particular area. This led to the introduction of various types of instrument circuits and calling dials developed to suit the characteristics of the various systems. The first circuit employed was that of the Automatic Electric Co. in which the talking current from the exchange circulated directly through the transmitter and receiver in simple series; the receiver was of the electromagnetic type, i.e. it had no permanent magnet but was magnetized by the exchange current. This is an admirably simple circuit, but investigation showed its grade of speech transmission to be somewhat inferior to that of the standard common battery circuit, which was utilized in connexion with the automatic systems supplied by the Western Electric Co. and Messrs. Siemens Brothers. Another consideration in favour of the latter is that its adoption greatly facilitates conversion of standard common battery manual exchange telephones to automatic working. When the question of standardization of subscribers' automatic telephones arose, the electromagnetic system was therefore discarded and the standard common-battery telephone circuit was adhered to.

Standard Impulse.—After consultation with the contractors responsible for the principal systems, a standard impulse for all types of exchange equipment was agreed upon. This was defined as a "break" period followed by a "make" period in the ratio of 2:1, i.e. the break occupies two-thirds of the total impulse period. In practice, dials are accepted if the "break" period comes within a range of 63% to 70% of the total. The standard rate of delivery of impulses is fixed at 10 impulse periods per second. All subscribers' dials are carefully maintained to function at this speed, but in order to reduce dialling time and to speed up operating, the dials used by operators on manual switchboards are specially adjusted to deliver impulses at the rate of 10.5 to 12 per second. The impulsing mechanism is only in operation during the return journey of the finger-hole disc after its release by the finger, so that the rate of impulsing is independent of any human factor.

Standard Dial.—Following on the standardization of the impulse the provision of a standard dial for universal use was taken in hand and developed in association with all the Post Office exchange contractors. The dial produced as a result of these efforts is illustrated in Fig. 22. At the rear of the dial a circular disc with 10 recessed gaps rotates in unison with the front finger plate. A spring, riding on the periphery of this disc, actuates a pair of contact springs which break and make a normally closed circuit as the spring rides in and out of the gaps when the disc rotates. These are the impulsing springs proper and it might here be noted that this device, which secures the springs being pushed into contact for the "make" portion of the impulse and allows them to fall apart for the "break," eliminates "contact

* Paper read before the Post Office Telephone and Telegraph Society of London.

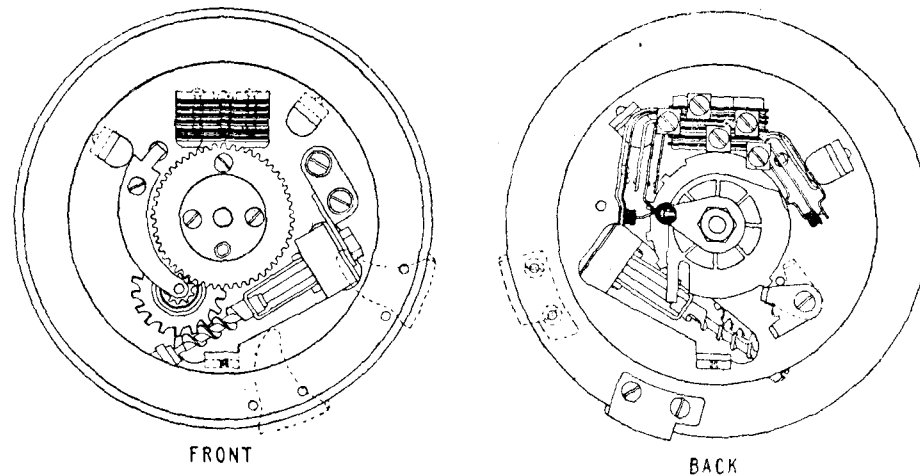


FIG. 22.—P.O. Standard Automatic Dial.

bounce" and gives a much cleaner impulse than the earlier device in which two contact springs normally held together by their own resilience were forced apart to give the break portion of the impulse, and allowed to fall together for the make portion.

During the forward rotation of the dial the riding spring is prevented from falling into the gaps in the circular disc by means of a friction sliding-cover plate, so that the impulsing springs are unaffected. The gaps in the disc are so placed that they do not come into action until a certain portion of the return journey has been traversed. This provides an interval between the receipt of successive trains of impulses which gives the switching mechanism at the exchange ample time to perform its "trunk-hunting" operation after each train. Systems in which the call is first stored at the exchange on quick-acting registers, and subsequently released through the mechanism, do not require this hunting interval, and provision is therefore made on the dial for placing the finger-stop in an alternative position which reduces the length of pull for each digit and so speeds up the action of the dial.

In addition to the impulsing springs the dial also includes a set of auxiliary contact springs which make certain desired local changes in the circuit of the telephone while the dial is being operated. These springs are held in their normal position by an insulated stud attached to the circular disc. They assume the "operated" position as soon as the rotation of the disc begins, and maintain it until the disc has again come to rest in its normal position. The speed at which a dial returns to normal under the influence of its restoring spring, and consequently the rate at which its impulses are delivered, is "governed" by means of a geared centrifugal friction break whose retarding effect increases proportionately with its speed.

Complete Instrument Circuit.—The inclusion of the dial in the circuit of a subscriber's telephone can be effected in several ways, and the selection of the most suitable circuit arrangement has been by no means easy. The operation of the dial effects a rapid succession of interruptions in a circuit which includes exchange relays having considerable inductance. In the absence of special precautions these interruptions are accompanied by inductive surges or "kicks" which may run up to peaks of 500 or 600 volts and impose destructive strain on the insulation of instrument or exchange circuit wiring.

Other possible troubles arise from the alternate charging and discharging of the condenser in the bell circuit, which will cause the bell to tinkle in response to each train of impulses, and from the series of disconcerting clicks which may be heard in a subscriber's receiver while the impulses are passing.

The high dialling voltage can be materially reduced if the wiring be so arranged as to connect the condenser of the telephone across the break contacts of the dial during its operation.

The irregular tinkling of bells is always a nuisance and becomes a serious defect in the working of extension circuits, since the tinkling of the main station bell, when an extension station dials a number, is liable to be mistaken for an ordinary ring. For this reason it has hitherto been necessary to "bias" all bells used on automatic telephone sets, in the endeavour to obtain adequate security against tinkling under all conditions. The bell is "biased" by fixing an adjustable spring to the armature in such a way as to hold it normally over to one side, with the bell hammer resting against one gong. This gong must be the one which the hammer would strike when responding to tinkling impulses, in order that the impulses—which are always in the same direction—will have no audible effect on the bell. The addition of the "bias" spring not only represents an additional item of expense, in regard both to first cost and maintenance cost, but materially reduces the reliability of the bell. Any accidental reversal of the line connexions renders it ineffective, and this remedy for tinkling can only be regarded as the lesser of two evils. The latest circuit arrangement overcomes the need for biasing and is greatly to be preferred.

Clicks in subscribers' receivers are obviated in all modern circuits by arranging for the auxiliary contact springs on the dial to short-circuit or disconnect the receiver during the operation of dialling.

Fig. 23 shows several circuits which have already been employed in order to reduce the undesirable local effects of dialling, and illustrates the successive stages in the development of the present standard circuit, in which they are all successfully overcome. It will be remembered that dialling takes place when the receiver is off the hook.

"A" shows the Automatic Electric Co.'s original circuit employing the electromagnetic receiver without induction coil. The bell is cut out of circuit during the process of dialling, and is therefore not subject to tinkling in so far as the action of its own dial is concerned. If, however, more than two telephones are connected to the same line, the main station bell is subject to tinkling when an extension station dials. No attempt is made in this circuit to suppress the high inductive dialling "kick," and high-grade insulation is therefore needed in all wiring. The auxiliary springs on the dial automatically short-circuit the transmitter and receiver during the period the dial is in motion, so that no clicks are heard.

"B" shows the earliest circuit of the Western Electric Co. which was applied to a standard common-battery instrument with induction coil and utilised a dial without auxiliary springs. It affords standard transmission, dials through the transmitter, and allows the subscriber to hear loud dialling clicks in the receiver. The dial is placed in series with the line circuit. The condenser is alternately charged and discharged as the dial springs make and break, but the presence of the induction coil and transmitter and receiver in bridge across the condenser reduces the magnitude of the charge and provides a discharge path clear of the bell, which is consequently immune from tinkling. It also involves the use of a 4-conductor cord between the table telephone and the bell box, in place of the standard 3-conductor cord.

"C" shows a more recent circuit provided for the Post Office by the Western Electric Co. It is identical with the circuit shown in "B" but includes two auxiliary springs, which short-circuit the receiver whilst dialling is in progress and prevent the subscriber from hearing dialling clicks. A 4-conductor cord is required.

"D" shows a circuit provided by Messrs. Siemens Brothers. It is very similar to that of "B" and "C," but the auxiliary springs short-circuit the transmitter and disconnect the receiver. The condenser is alternately charged and discharged as the dial springs make and break, but the magnitude of the charge is small because the condenser is charged through the high impedance of the 1,000-ohm bell and is shunted, at the moment of charge, by the primary (17-ohm) winding of the induction coil. The whole of the discharge current flows through the bell but is insufficient to cause tinkling. A 4-conductor cord is required.

"E" shows an arrangement which is used in some of the more recent installations in this country and is, I think, still the standard circuit of the American Telephone and Telegraph Co. Its chief advantage lies in the fact that it introduces a dial into the standard common-battery telephone without the need for more than three conductors in the cord to the desk set. The bell and condenser are connected permanently across the line, and the condenser serves to absorb high-voltage kicks during the dial operation, but its efficiency in that respect is reduced by the high impedance of the bell in series with it. The voltage across the condenser is alternately increased and decreased, as the dial springs break and make, and the bell is subjected to the full force of its charge and discharge. The bell therefore requires to be effectively biased in order to suppress tinkling.

"F" illustrates the arrangement and connexions of the auxiliary contact springs in the new Post Office standard circuit—with 3-conductor cord. This circuit secures immunity from tinkling without resorting to biasing, and suppresses—or at any rate reduces to a negligible quantity—the high inductive dialling kick. When dialling is proceeding the condenser is bridged in series with the secondary 26-ohm winding of the induction coil across the "break" springs of the dial, in which position it momentarily prolongs the current after "break" and effectually prevents the high-voltage surge from the exchange apparatus from reaching a dangerous peak, while at the same time

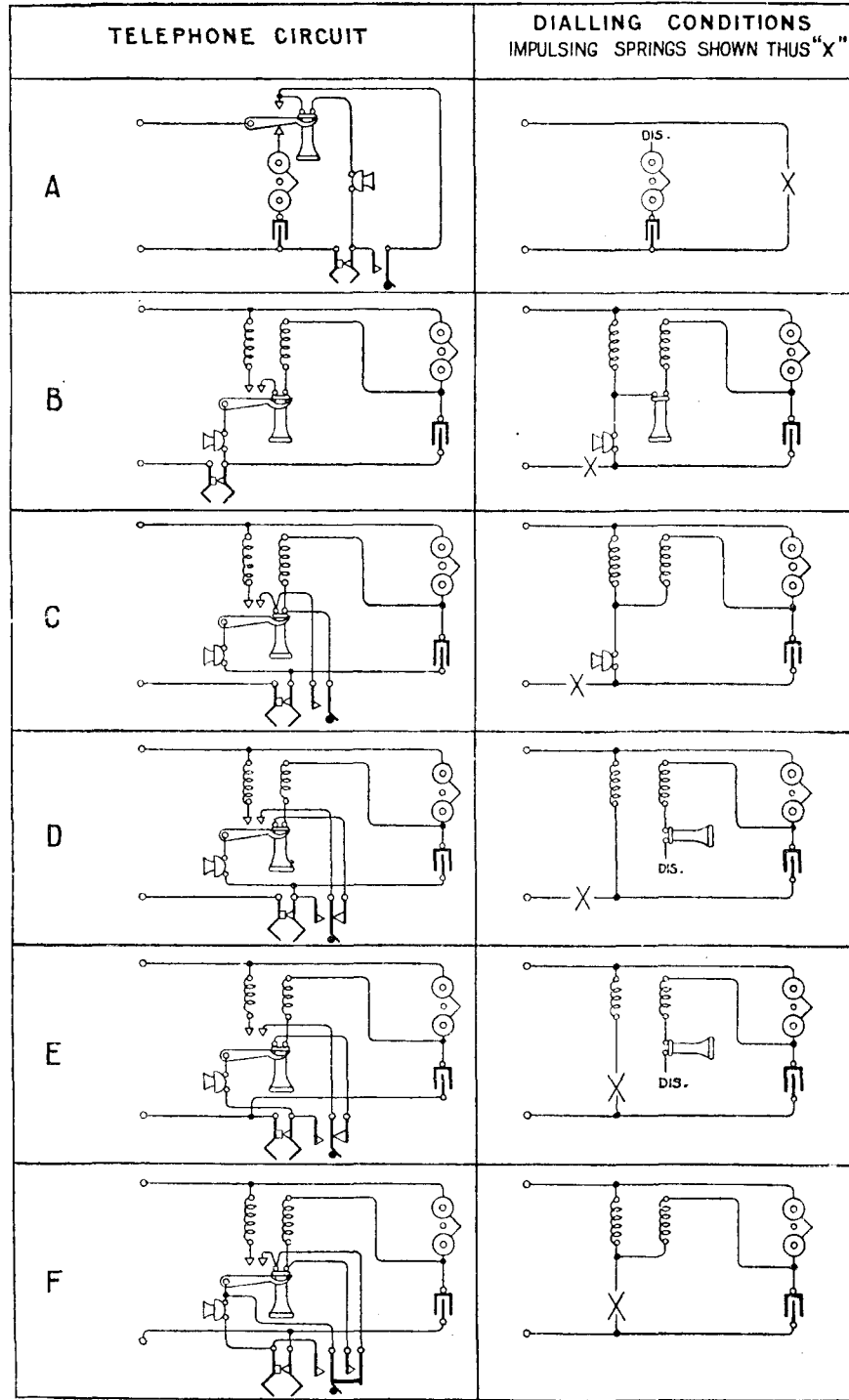


FIG. 23.—Development of Subscribers' Automatic Telephone Circuit.

its action—as it is in series with only the low impedance of the induction-coil windings—is so rapid that no troublesome amount of impulse distortion is introduced. Immunity from tinkling is secured, as in the foregoing arrangement "C," by providing for the condenser to discharge mainly through the windings of the induction coil, which act as a shut upon the bell. Dialling clicks are eliminated by short-circuiting the receiver. A separate pair of auxiliary contact springs is used to short-circuit the transmitter also, in order that constant dialling conditions may be maintained notwithstanding any alterations which it may in future be found desirable to make in the mean resistance of the standard transmitter.

The adoption of this very satisfactory instrument circuit was made possible by the fact that the new standard dial provides a robust and positive method of actuating the auxiliary contact springs. Springs which would short-circuit both the transmitter and receiver would undoubtedly have been employed several years ago but for the fact that one hesitated to attach to the earlier types of dial a spring set with more than one moving member. The spring set now used includes two separate moving members, and they are actuated in a manner which is, I think, safe and certain. Unfortunately

this possible feature of the standard dial was not at once noticed, and those first obtained were fitted with spring sets of the then standard type, as shown at "E." It has, however, been possible to arrange that all on order for the London automatic service shall be converted to the new type in the course of their manufacture. The economy which will be effected in London alone, by obviating the need for fitting biased bells, is estimated to approach £100,000.

It will generally be admitted that the modern automatic calling dial is a remarkably simple little piece of apparatus, as compared with the immense complexity of the machine which it controls. This simplicity is the result of a long period of evolution since someone in the Automatic Electric Co. first had the happy thought of making a rotating disc with finger-holes for the purpose of sending the trains of impulses required for the Strowger automatic system. The master patent which secured a monopoly for this device ran from 1898 to 1912, and during that period a great deal of ingenuity was extended in inventing competing forms of dials and other signalling devices for other automatic systems which would not infringe the patent. It may be of interest to state that throughout this period an old and forgotten telegraph transmitting device was in existence which in all essential respects

anticipated the terms of the master patent. This was one of the earliest forms, if not the earliest form of transmitter used in connexion with the Wheatstone ABC telegraph system. A "clear-up" in one of the old store-rooms of the General Post Office in 1913 unearthed a specimen of this apparatus marked "Cooke and Wheatstone 1839" (see Fig. 24). It includes a disc provided with pivotally arranged finger-holds, which can be rotated from any position to a fixed finger-stop, for the purpose of transmitting, by means of a current making and breaking device, a predetermined number of impulses of electric current, in harmony with the finger-holds—all of which terms represent the explicit claims of the master patent, so long considered unassailable. When it was discovered and brought to me as an interesting telegraph relic the patent had just expired.

(12) TARIFFS FOR AUTOMATIC SYSTEMS.

The "message rate" tariff now in force in the British Post Office telephone service represents the only strictly equitable basis of general charge for such a service. It has the advantage of placing the small and large user on precisely the same footing, inasmuch as each will pay for his service in proportion to the broadly averaged overall cost of providing it and the use he makes of it. Under this method a fixed sum known as the installation rental is paid annually by the subscriber in respect of the plant provided for his individual use, and a uniform fee for each effective local call is collected to cover the cost of the plant provided for the common use of all subscribers, and the cost of operating. Additional charges are levied on a radial mileage basis for the use of long junction and trunk plant, affording connexion with places outside the local fee area.

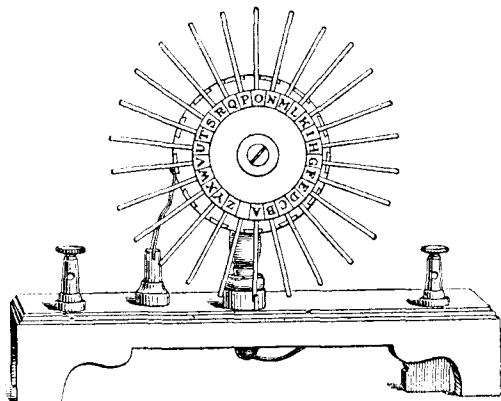


FIG. 24.—ABC Dial Sender.

It is sometimes argued that the general introduction of the automatic system, and the elimination of the cost of operators to handle local calls, will bring in new conditions which would justify the restoration of the "flat rate," which connotes a uniform charge to all subscribers of a particular class, independent of the number of calls originated by each of them. This argument shows an entire misconception of the facts of the case. The introduction of the flat rate in connexion with an automatic system would, of course, simplify the mechanical plant by making it unnecessary to provide metering arrangements for the registration of local calls, and would save a large part of the cost of collecting revenue from subscribers, but these points apply with at least equal force to the manual system, and in both cases they have to be subordinated to much more important considerations. In the automatic system, as in the manual system, part of the plant is provided for the individual equipment of each subscriber's line and part for the common service of all subscribers. The second part, which in all busy exchanges is much the larger of the two, depends entirely upon the amount of traffic to be carried; it has therefore no association with the annual installation rental, and a due proportion of its cost can only be properly charged against each subscriber in accordance with the traffic he originates. In a typical city manual exchange the ratio of individual to common service plant is about 1 to 2½, in an automatic exchange carrying equal traffic it is about 1 to 5. The actual cost per line of automatic plant in a busy city exchange is two or three times as much as in a suburban exchange forming part of the same system but having an average calling rate proportionately lower. At present only the local unit fee per message is registered electrically on the subscribers' meters in automatic exchanges, and all charges for calls beyond the local fee area are manually recorded on tickets by operators. It is, however, probable that in the near future it may be convenient to extend automatic metering to calls for which double or treble the unit fee is chargeable, and so enlarge the effective areas to which a purely automatic system of working can be applied. Schemes which provide, more or less satisfactorily, for such differential metering have already been devised, and the Post Office has been careful to keep the way open for future development in this direction by clearing all odd calculations out of its message tariff. All mileage fees are now so graded that the charge for any distance is an even multiple of the local unit fee, and could therefore be registered by adding a corresponding number of units to the record on the subscriber's meter.

One important respect in which the tariff considerations applying to the automatic and manual systems differ is that in the former the duration, or

"holding time," of a call has a much more important effect upon the cost of providing the service.

In both systems switching and junction plant has to be provided on the basis of "traffic units," representing number of calls multiplied by holding time, but in the manual system the plant cost is rather overshadowed by the cost of operating the calls. The overall cost of providing service depends therefore to a much greater extent upon the number of calls than upon their duration, and no great error is made by assuming that all subscribers make calls of the same average duration. With the automatic system, on the other hand, the plant cost factor is of paramount importance. The various selecting switches through which a call passes may be looked upon as operators who have not only to make the connexion in the first instance, but are each required to give it their exclusive attention as long as it lasts. An exception to this is the "director" which will be used in London merely for the purpose of setting up calls, but the cost of directors is a very small fraction of that of the total traffic handling plant.

It results, therefore, that the cost of providing service to any subscriber depends upon the aggregate duration of his calls in the busy hour, and not upon their number. One call of an hour's duration will cost the system practically as much as 60 consecutive calls of 1 minute. Under automatic conditions there is much to be said for the introduction of a method of charging for all telephone service on a time-and-distance basis, and the development of time-measuring methods applicable to local exchange working has received a good deal of attention from telephone engineers. Several patents already cover the application of this principle in such a manner that, immediately on the reply of the called subscriber, the meter of the originating subscriber will register one or more units in accordance with the distance between the parties, and repeat the registration at the end of each period of, say 3 minutes. This does not fit in very well with the adoption of varying charges at different periods of the day and night, which is also a reasonable thing in telephony from the standpoint of keeping the plant occupied and revenue-earning outside the normally busy hours. A preferable system would appear to be to record normal time units by metering impulses at short intervals of, say, 12 seconds throughout the period of connexion, counting 10 or 12 units as the equivalent of a penny call. For calls to points outside the local area the record might be made at double, triple, or quadruple speed, by drawing impulses from different cams in the controlling clock. Reduced tariffs during normally slack periods could be introduced by variable driving gear which would slow down the whole impulse system in as many stages as might be desired.

(To be continued.)

RUSSIAN TELEPHONE DEVELOPMENT.

We learn from *Telephony* that the Telephone service in Russia is to be brought up to American standards, according to recent cable dispatches from Moscow. Plans have been completed by the Soviet government for the expenditure, ultimately, of more than \$100,000,000 for this purpose. Large American electrical companies are to be asked by the government to co-operate in the project.

During the first three years, when the work begins, \$35,000,000 will be spent in the construction of new automatic telephone stations and replacement of the present obsolete equipment. Swedish, German and American telephone companies are to be invited to discuss contracts for technical aid and financial participation in carrying out the plans.

The Western Electric Co. already has informed the Soviet government that it is prepared to re-enter Russia, but only on condition that it receives compensation for the confiscation of its plant which was nationalized by the government after the revolution. It is learned that, while the government cannot make definite guarantees in this respect in advance, it is willing to discuss terms for a reasonable adjustment of the claim.

The government proposes to organize a mixed company, in which Americans and the government shall have an equal share.

Russia has now 1,388 telephone exchanges, 251,000 kilometers (about 155,970 miles) of copper wire, and 1,132,249 kilometers (703,559 miles) of iron wire. The government plans to increase the number of telephones from 120,000 to 1,000,000, and to link up the widely scattered areas and administrative village centres with district towns all over the federation. Also it is eager to communicate by long distance telephone with Berlin, Warsaw, Paris and London, which is impossible at the present time owing to the inadequacy of equipment.

Although the International Western Electric Co. has no plans for Russian telephone development, it was said at the company's offices that it had been approached several times by the Soviet in regard to taking over the plant seized by the Soviet authorities in the revolution. This plant is located in Leningrad, and, since its seizure, has been operated by the Soviet government. Whether this plant, in which Western Electric's interest is described as small, is returned to the original owner is believed to depend on the future of the company's business relations with the government.

TRAFFIC HANDLED OVER MULTIPLEX CIRCUITS IN NEW ZEALAND ON 24/12/24.

CIRCUIT.	FORWARDED TRAFFIC.			RECEIVED TRAFFIC.			REMARKS.
	No. of messages forwarded.	Perforator average.	Total operator hours.	No. of messages received.	Receiver average.	Total operator hours.	
Wellington—Auckland	6,184	62	99½	6,302	70	90	—
Wellington—Christchurch	6,055	74.5	81½	5,369	75.3	71	—
Wellington—Dunedin	1,307	56	23	1,384	62	22½	Through channel repeaters at Christchurch.
Christchurch—Dunedin	1,806	63	28½	1,741	60	29½	—
Christchurch—Auckland	2,472	63	39	2,453	57	43	Through channel repeaters at Wellington.
Auckland—Dunedin	1,340	63	21½	1,180	76	15½	Through channel repeaters at Wellington and Christchurch.
	19,164	65.5	292½	18,429	—	271	

Total number of messages handled over multiplex circuits = 37,593.

NOTE.—In the above totals press telegrams are treated as ordinary messages, irrespective of their length.

MULTIPLEX TELEGRAPH CIRCUITS IN NEW ZEALAND.

FOR the past two or three years the writer has been in communication with one of the chief technical officers at the Wellington N.Z. Central Telegraph Office, in connexion with the interesting developments of five-unit Multiplex in New Zealand, and the following letter from the Engineer-in-Chief there to a friend of the writer's in this country should prove of very special interest to all concerned in high-speed telegraph developments:—

“For the last twelve months Dunedin has been in communication with Auckland over multiplex circuits operating through channel repeaters at Christchurch and Wellington. In this connexion the accompanying statement showing the traffic handled on Christmas Eve, 1924, is illuminating. In addition Dunedin is in communication with Wellington on two channels through repeaters at Christchurch, and the latter station is in communication with Auckland through repeaters at Wellington. The silent-type re-transmitters are being used on our channel repeating circuits.

“Successful trials have recently been made of transmitting press telegrams from Wellington to Auckland, Christchurch and Dunedin simultaneously by one transmission, and on the principle adopted it would be possible to link up all our multiplex circuits and send to all stations simultaneously. The necessity for this will be apparent when it is considered that Wellington is the main press distribution centre for New Zealand, and that a large section of the press traffic handled by this station is intended for distribution to more than one station. A local distributor, operating on a leak circuit on the outgoing signals of a sending channel on a multiplex circuit, is made to actuate a re-transmitter, which in turn forms the outgoing signals of a sending channel on another multiplex circuit. Stable working is obtained, and, as soon as New Plymouth and Wanganui are linked up, it will be possible for Wellington to send press traffic to Auckland, Hamilton, Napier, Christchurch, Dunedin, Wanganui and New Plymouth simultaneously in one transmission.”

Although our old telegraph colleague, Mr. Donald Murray, has now retired from active service in the telegraph world—at least apparently—he will no doubt be one of the keenest readers of this column, and yet one is hardly able to visualise conditions which would permit that worthy ex-journalist being forestalled by information on a subject in which, retired or not, he will ever take anything but the liveliest interest.

J. J. T.

REVIEWS.

“Wireless Valve Transmitters: The Design and Operation of Small Power Apparatus.” By W. James. (Iliffe & Sons, Ltd.—Price 9s.)

The wireless amateur who wishes to construct his own sets has two courses open to him. He may either follow the instructions given in the popular literature devoted to the subject, and so produce a set which will probably give satisfactory results, but about the *modus operandi* of which he need not necessarily know anything at all; or he may set himself to learn something of the theory of wireless and then proceed to make a set from his own design. This second method is of course, by far the more satisfying to the man who is really interested in the subject, especially where transmitting apparatus is concerned, but it involves the difficulty that, apart from the popular literature mentioned above, books on wireless are written for the professional man, and assume that the reader possesses a knowledge of mathematics and electrical theory beyond that of the average amateur.

The book under review has been written to fill the gap so left between the purely popular and the deeply theoretical books. It has been produced to enable the reader, starting with practically no acquaintance with the subject, to design and operate transmitting gear with a real knowledge of the action of the various portions of the set, and to make adjustments and alterations with intelligence, instead of blindly making changes to see what results will follow.

The first chapter is devoted to an explanation of electrical principles. Then follow chapters on inductance coils and condensers, the elementary theory of alternating current, methods of power supply, microphones, and the theory of the three electrode valve.

After this preliminary portion a chapter is devoted to the valve as an oscillator, and then follows a chapter dealing with the various methods of modulating the emitted radiation for morse signalling and for telephony. A final chapter contains useful information on measuring instruments, and their use, the erection of aerials, the construction of dummy aerials, oscillating crystals, and other miscellaneous matters.

The book is well printed on good paper, and the diagrams are excellent. We can thoroughly recommend it to anyone who intends taking up the transmitting side of wireless telegraphy.

THE PRAYING-WHEEL FOR LONDON.

(The New Telephone System.)

BY W. AITKEN, M.I.E.E.

MECHANICAL apparatus for the offering of prayers has been long known in Tibet and other parts of the East. Papers bearing petitions were attached to a wheel, and, as the wheel revolved, these were unwound, when the prayers were considered as offered—but there is no evidence that answers were immediately forthcoming. In many other parts of the world today praying wheels have been installed in homes and business offices, so that friend may communicate with friend, be he near or far distant. Such an arrangement is now being introduced into London, and it may be interesting to consider its manipulation and uses.

The papers of the Eastern praying-wheel bore a brief uniform or stereotyped form of prayer—"The Jewel of the Lotus, Amen" (Ency. Brit.), but the prayer to be used with the new wheel will be briefer and even more cryptic, consisting of only three letters and four numerals, each set of symbols being varied, and used in different combinations of seven symbols. The wheel, near its outer edge, will be engraved with these symbols, and a reference book will be provided bearing combinations of symbols, necessary to obtain converse with people with whom it may be desired to communicate. The wheel will be turned as many times as there are symbols in the coded prayer, and pulled from each symbol, in order specified, to a finger-stop. The wheel, in its return movements, will send out the prayer to a central receiver. If the prayer can be granted the petitioner will converse, almost instantly, with his or her friend confidently and secretly, as if face to face. If the prayer cannot immediately be granted, a suitable answer will still be received, of such a nature that the caller will be encouraged to renew his petition after a brief interval.

Many petitioners will mutter the prayer, symbol by symbol, as they turn the wheel, and a listener might hear—"A. V. E."—and jump to the conclusion that an invocation was about to be made to the Virgin. But no! this is a materialistic system from which the virgins, who up to this time endeavoured to give service, have been banished (save for exceptional occasions); the caller is merely repeating the first three letters of the name of a centre, or group, with which his friend is associated (Avenue being one of the great sub-divisions of the London Area). The wheel is then rotated for the four numerals in a particular sequence, when the party desired, if in his usual place of resort, will immediately reply. In from two to three seconds after turning the wheel for the last symbol the prayer will be answered, or the caller advised that his friend is not available at the moment. AVE is only given as typical, there may be one hundred, or more, different combinations of three letters—the beginnings of place names with which groups of people are associated.

The reason for the use of letters in this way is to make the prayer more easily remembered than if there were seven numerals, and the place names are already familiar to many. The use of three letters is interesting—it is because the caller cannot know the correct form into which to put his prayer to attain the end he desires; to trace, or direct over a devious way to a particular individual, in a million or several millions, located in one of many places with which a few people, or ten thousand, may be associated. The prayer sent by the caller is always uniform as regards the number of symbols, while fewer or more paths or links, corresponding to symbols, may require to be joined together to reach a desired destination. Therefore, suitable emanations from the wheel are received by, if a machine may be so described, a higher intelligence. No human skill can approximate the work done by this, so-called, Director—its wonderful exactness, flexibility, discrimination, reliability and patience is uncanny. It receives the trains of impulses or emanations

from the prayer-wheel, which only indicate a certain desire, and, as these are not suitable for attaining the wished-for end, this more than human machine proceeds to translate the first three symbols of the letter code into from two to six series of emanations, as the need demands. These differ in character from those sent in, and are sent out by ways and means the caller could not know, and, thereby, the chain is extended link by link to the group with which the called one is associated, after which the four final numerals are sent out unaltered to call the particular abode of the one desired.

By this wonderful means, so simply operated in a few seconds by means of code prayers specified in a suitable reference book, anyone may have the power, have at hand, the magic "open sesame," to cause a door to be opened that will give access to, roughly, one million other people, one at a time, and indirectly to another million; who are thus placed at his service for a brief period, to supply his needs, to bring relief in distress, help in trouble, or heart may speak with heart, and the living word bring comfort and satisfaction.

PRESENTATION TO MR. A. M. KIDD.

On his transfer to the Canterbury District, Mr. A. M. Kidd, District Manager, Nottingham, was the recipient of a handsome clock, the gift of the Staff. The presentation was made on behalf of the Staff by Mr. Sawyer, Chief Clerk, who expressed regret that Mr. Kidd was leaving Nottingham, and voiced the wishes of the Staff for his future welfare.

Tributes to the cordial relations which had existed between the District Manager and the Staff were also forthcoming from Messrs. Maskrey and Gray, Traffic, and Mr. Magrath, Contract.

Mr. Kidd, thanking the Staff in reply, said his stay in the district had been comparatively brief. During the past eighteen months, three sections of the Staff had been housed in separate buildings, and this had perhaps prevented him from becoming personally well acquainted with each member of the Staff. He advocated the promotion of Staff Social Functions occasionally, at which all ranks were brought into more intimate relationship. Probably the circumstances of the past 18 months were responsible for the absence of these ameliorating influences. In conclusion, he hoped the Staff would find the new premises now nearing completion very comfortable, and that they would work happily in the new conditions consequent on the amalgamation.

PROMOTION OF MR. J. L. MAGRATH, CONTRACT MANAGER, EDINBURGH.

Mr. J. L. Magrath, Contract Manager, Edinburgh, has been promoted to the Contract Managership of the combined Nottingham, Leicester, and Coventry district, one of the largest districts in the country. Mr. Magrath has been Contract Manager at Edinburgh for twenty-three years, and during that long period he has done splendid work for the public. All who have worked with him have been full of admiration of his excellent qualities. He has business capacity of a high order, and personal qualities which would make him an ornament to any position in life. His education and general culture are on a high plane, and, blended with his other gifts, make him an exceptional man in every way. If he is so fortunate as to catch the official eye it may be safely predicted that he will yet occupy a very important position in the Telephone Service. His colleagues in Edinburgh were sorry to part with him, and before he left Edinburgh they showed their admiration of his striking qualities in a tangible way.

GLOUCESTER.

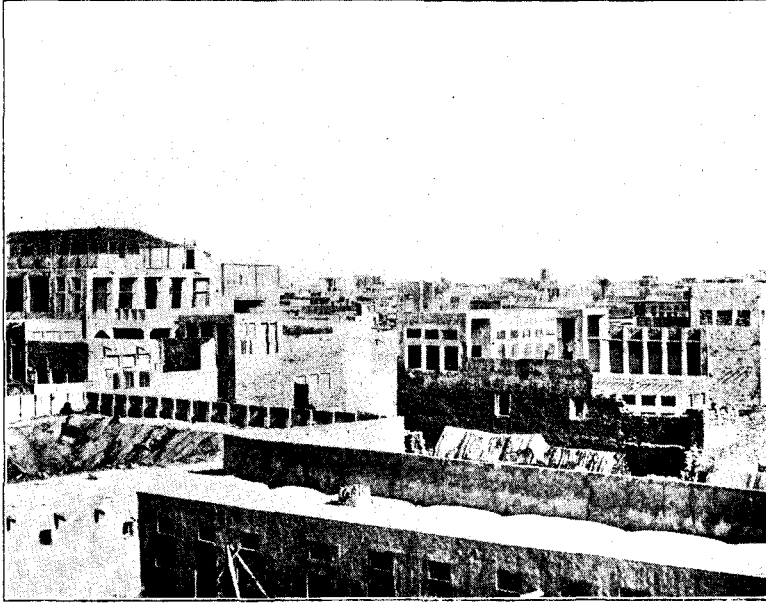
A large number of the Gloucester telephone staff met at Botherway's Cafe to bid farewell to Mr. J. W. Dean, the contract manager for the district, who is retiring from the service on superannuation, having reached the age limit. After a short whist drive, the district manager (Mr. John H. Storrie) presented to Mr. Dean on behalf of the staff an 18-carat gold watch, and in felicitous terms referred to Mr. Dean's history in the telephone service and the records he established during the recent years. Mr. May (traffic superintendent), Mr. S. H. Simmons, and Mr. W. G. Jack echoed the kindly sentiments of the chairman. Miss Mathews took advantage of the occasion to present Mrs. Dean (who won first prize in the ladies' section of the whist drive) with a special gift, and referred to the retirement from the ladies' point of view.

Mr. Dean entered the service of the late Telephone Company at Hull in 1905, and saw service in Warrington prior to taking up the contract managership at Gloucester in 1911. He leaves for New Zealand on the 25th inst. to join his son and daughter, and the best wishes of his many friends accompany him.

EARLY INDO-EUROPEAN TELEGRAPH STATIONS.

THE illustrations shown below are those of stations on the early Indian Government Cable, between Fao and Karachi. They are from photographs taken in 1868, shortly after the cable was laid. The headquarters were at the latter place, and the former was the junction with the land lines of the Turkish Government. Bushire, Mussendom Island and Gwadur were intermediate stations.

Life was very monotonous at these stations, as, except at Karachi, European society was virtually limited to one's own



INDO-EUROPEAN TELEGRAPH STATION, BUSHIRE, PERSIAN GULF, 1866.

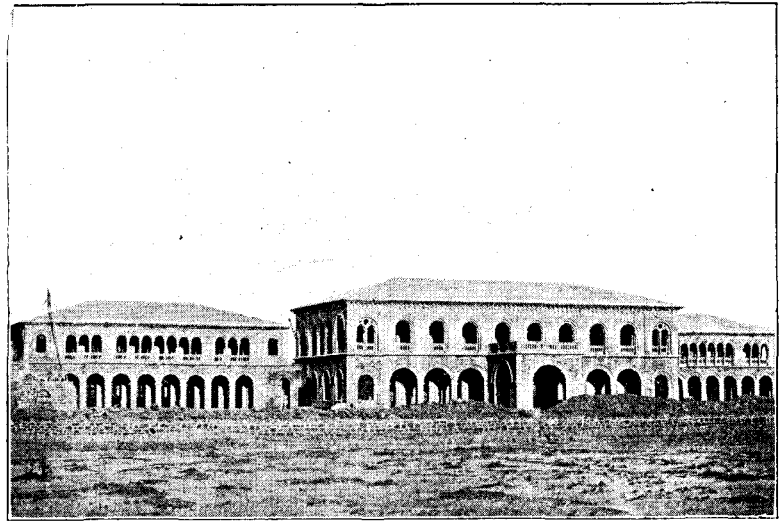
colleagues. Consequently, the occasional visits of the cable-repairing ship—the "Amberwitch"—were very welcome, and when, as was usually the case, the visits meant a transfer for one or other member of the staff, they were doubly welcome to the individuals concerned. For a transfer meant a few days sea-trip—a very pleasant change, even if only in the Persian Gulf.

The office—if not the station—at Mussendom Island was dismantled towards the end of 1868 or the beginning of 1869.

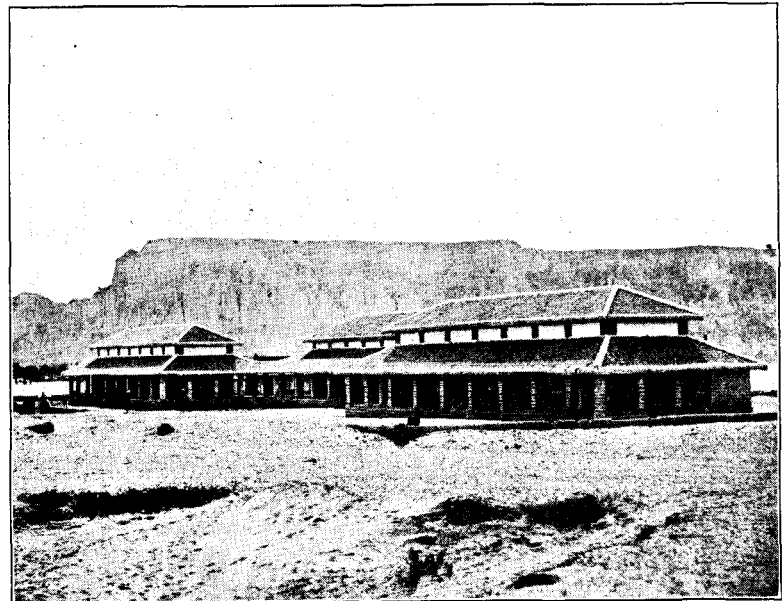
W. F. T



INDO-EUROPEAN TELEGRAPH STATION, FAO, MESOPOTAMIA, 1866.



TELEGRAPH STATION, KARACHI, 1866.



INDO-EUROPEAN TELEGRAPH STATION, GWADUR, BALUCHISTAN, 1866.

Mr. S. J. SMITH'S RETIREMENT.

Mr. S. J. Smith, manager of the Canterbury district of the Post Office telephone service, retired last month after 39 years' service. Mr. Smith, who succeeded Mr. MacFarlane in 1921, came to the Canterbury district (which includes practically the whole of Kent) from Bournemouth, after being in charge successively of the old Maidstone district and of the Portsmouth district.

Of a retiring and lovable disposition, Mr. Smith has won the manifest esteem of everyone at the district office, and of the many members of the general public with whom he has been brought into contact. He is uniformly courteous and kind, and his resignation will be genuinely regretted.

Mr. Smith's interests outside his work are largely confined to his books, for he is a great reader, while he spends a considerable portion of his leisure time tramping through the charming countryside around Canterbury.

Mr. Smith will be succeeded at Canterbury by Mr. A. M. Kidd, of Nottingham.

A "SPECIAL EVENT."

By G. E. LANE, *Asst. Traffic Supt., Glasgow.*

At Glasgow, during the week ending July 18, 1925, the Highland and Agricultural Society held their Annual Cattle and Agricultural Show, and it is thought that the arrangements made to cope with the telephone traffic from the show-ground, together with a few statistics, may be of interest.

During the preliminary negotiations for the rental of circuits &c., an impression was gained that the telephone facilities for the show in previous years had not been altogether satisfactory, therefore Glasgow set itself out to create a better impression and to make this year's show—from at least a telephone point of view—an unqualified success.

The arrangements consisted of eight circuits and one order wire, which were connected to an "A" position at the nearest Exchange (Ibrox). At the subscribers' end each of the eight ordinary lines terminated in a cabinet, while the order wire was connected to a C.B. Table Telephone installed behind a temporary counter, the whole equipment being housed in a hut specially erected for Post Office services generally.

All the circuits were rented by the Society on an Exchange Line basis, and not as call offices. There were no coin collecting boxes, the requisite fee being collected by an attendant, who took particulars of the calls required on forms P. 1020 and passed same forward to the Exchange via the order wire. The Exchange then effected the calls in the usual way, except that the operator named the cabinets and the attendant advised the callers accordingly. In this way a constant flow of traffic was maintained throughout. At the Exchange the circuits were marked with the relative cabinet numbers both at the home position and on the multiple. In the case of calls controlled at the Trunk Exchange the name of the caller was passed forward with the other particulars, indicating to trunks that 30 seconds grace be allowed in the timing, such as obtains in connexion with Stock Exchange Traffic. This was necessary, as such calls maturing back to the order wire number would ordinarily have been timed from that point, whereas the caller had still to get to the cabinet assigned. To expedite such calls the "B" telephonist (when this class of call was offered) informed the supervisor, who in turn had the attendant quickly advised of the number of the cabinet in which the connexion was to be established.

Heavy traffic had to be met as will be seen by the subjoined details. The circuits worked without a hitch and the staffs concerned gave of their best. The society's officials and all types of callers expressed appreciation of the arrangements and the quality of the service provided, and this was confirmed by complimentary references in the local press. There can be no doubt that the Service has received one of its best recent advertisements so far as this part of the country is concerned.

Incoming traffic, which was small, was mostly for the purpose of gaining the attendance of stall-holders. In such cases a messenger—provided by the society—was despatched to the person required, with the telephone number of the calling subscriber, when the wanted person responded he passed forward a call in the usual way, a charge in each direction being made in due course. The cabinets—owing to their constant use—had a tropical atmosphere at times and disinfectant was freely applied so far as the microphones were concerned. No one seemed to mind, however, it was an urgent "service" that callers wanted and they got it!

Appended are details of traffic from which it will be gathered that "full pressure" was the order of the day.

I cannot foreclose without commenting on the enthusiasm which the Department's staffs "face up" to special events of this kind. Does it arise from a desire for the Department's activities to be better understood, or is it the outcome of that feeling for a

"good splash," inherent possibly in the constitutions of everybody? The happy state of affairs existing in the "wee" temporary premises in this case was so manifest on occasions that it attracted the attention of the Highland cattle-men as being a place for refreshment!

STATISTICS.

	Local and Second Fee Area Calls.	Trunk Calls.	Telegrams and Express Letters.	Grand Total.
Total calls originated	2,611	453	5	3,069
Maximum originated traffic on any one day	701	136	—	837
Maximum originated traffic in any hour	115	17	—	132

Departmental Revenue as represented by the foregoing was:—

Trunks £24 12s. 6d. Local and Second Fee Area, £10 17s. 7d.
Telegrams, 5s. 3d. Total £35 15s. 4d.

The Society, in addition, paid the usual tariff charges for the circuits, cabinets, and the loan of a departmental officer as call office attendant. It may be mentioned also that, in addition to the nine circuits provided for the Society, six others were provided for various exhibitors.

THE POST OFFICE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

THE FOLLOWING PROGRAMME HAS BEEN ARRANGED FOR THE 1925-26 SESSION

Date 1925	Subject.	Paper to be read by:—
Oct. 19	"London Telephone Service."	M. C. Pink, Esq., Assistant Controller, London Tele- phone Service.
Nov. 16	"Wireless Telegraphy and its application to Ship and Shore Work."	Comdr. F. G. Loring, R.N. Inspector of Wireless Telegraphy, G.P.O.
Dec. 21	"Fifty Years of Telephone Progress."	W. Day, Esq., M.I.E.E., Engineer-in-Chief's Office, G.P.O.
1926		
Jan. 18	"Recent Developments in the Inland Telegraph Service."	L. Simon, Esq., Assistant Secretary, G.P.O.
Feb. 15	"Some Sidelights on the Inter- national Telegraph Confer- ence."	J. Lee, Esq., C.B.E. Controller, Central Telegraph Office.
Mar. 15	(a) Internal Circulation in the Central Telegraph Office. (b) Phonograms	Miss M. Tynan, Assistant Supervisor Central Tele- graph Office.
April 19	"Wireless."	E. H. Shaughnessy, Esq., O.B.E., M.I.E.E., M.I.R.E., Assistant Engineer-in- Chief, G.P.O.

The meetings will be held at the Institution of Electrical Engineers, Victoria Embankment, W.C.2. at 5.30 p.m.

Members' tickets may be obtained from the local agent, or from the Hon. Secretary, Post Office Telephone and Telegraph Society of London, Secretary's Office, G.P.O. North, E.C.1. Telephone: Official 382.

PRESENTATION TO MR. WHEELER.

A PRESENTATION was made to Mr. B. A. Wheeler by his colleagues and friends on the occasion of his retirement on March 2nd, 1925. The present took the form of a handsome clock on which was inscribed:—

"Presented to B. A. Wheeler, Esq., by his colleagues of the London Telephone Service as a token of esteem, on the occasion of his retirement. With good wishes for his future."

A very apt and facetious address was made by the District Contract Manager, Mr. W. Glenny, in making the presentation, to the effect that—"Although we much regretted the 'loss' of Mr. Wheeler's service he was only 'going before' to a well earned retirement. In no sense, however, could he be termed a 'four (fore) Wheeler' although it could not be denied that he was 'hansom,' in fact, it 'taxi' our mind somewhat to express our good wishes regarding him."

Mr. Wheeler has had 18 years service in the Contract Section and has done good work in his capacity of Contract Officer.

TELEPHONE NOTES.

An Independent Bell.

An outside telephone student can be excused if he finds it difficult to define the exact relationship between the American Bell (parent or holding) Company, and the various State (subsidiary) Bell Companies. In a recent rate case it was stated that $4\frac{1}{2}\%$ per annum was levied by the holding company on "all its subsidiaries for the use of telephone instruments hired from the parent company, and rented to subscribers, for participation in the employer's benefit plan, for advertising and publicity service, for engineering and research work, for financial assistance, accounting, and the rights of the subsidiary company to connect its wires with those of another." That is the financial tie, a toll about twice as heavy as it should be, according to the witness quoted. No doubt there are also executive ties, but apparently these are not as well defined. It appears that an arrangement was arrived at some time ago between the (parent) Bell and the Independents, under which the latter were to be given the chance of buying up any telephone company which came into the market if they could finance it. Says *Telephony*, "this policy was advantageous to the Bell organisation, as it relieved it of the perilous charge of seeking a monopoly—which, admittedly, has always been the most vulnerable part of the Bell situation." The action of the Southern Bell recently has raised a storm about this placid pooling arrangement. A property was offered for sale, to wit, the Consolidated Telephone & Telegraph Company at Moultrie, Georgia, and an "independent" bid \$70,000 for it. Then the Southern Bell offered \$80,000. Next the "independents" increased the offer, and so on. Finally the independents' bid of \$85,000 as against the Bell's \$96,000 was accepted by the public utility commission. We are promised more interesting developments.

An A.C. Valve.

When the D.E. type of wireless valve was introduced in England less than 2 years ago, it was regarded by many as the death knell of the accumulator for filament heating. About a year ago much was heard of a wireless circuit which dispensed with the high tension battery. This war against both high and low tension batteries by radio research engineers has been not less actively pursued in America, but on different lines. With electricity in such general use there for lighting and heating purposes it was natural that the aim should be in the direction of "running" the radio from the mains, and last month appears to have seen an appreciable advance made towards that end by the marketing of a valve which operates in connexion with alternating current. F. S. McCullough of Wilkingsburg, Pennsylvania, is the inventor. "The McCullough tube operates on four volts, 60 cycle alternating current, and each tube draws one ampere" says *Scientific American*. The tubes will work on direct current, with slight modification, they are a trifle larger than the ordinary ones, but fit standard sockets, and there is no perceptible hum when they are used. "The appearance of this tube does not mean that present battery operated sets will be obsolete within a year or even five." It is destined to improvement and refinement or eclipse. Moreover, of "3,000,000 American homes equipped with radio receivers, only one million homes are wired for electric lights, and it is calculated that 900,000 radio fans use dry batteries and 100,000 still use crystal sets." Until the broadcasting station supplies all the energy used in a receiving set, as in the crystal receiver, and not merely enough to control the immensely greater energy inherent in it, as in the case of present day valve sets, the accumulator's position is impregnable. Commutations or alternations, however choked, and voltage variations be they never so small, ruin the whole entertainment.

Ourselves.

Since this column was introduced as a regular feature in the *Journal*, a number of its paragraphs have from time to time been reproduced by periodicals covering other parts of the field. In one such case, *Telephony* commented on the paragraph as follows:—"While admitting the general superiority of American telephone procedure, the British Telephone Administration is naturally glad to take notice of instances wherein, possibly, we can learn something from their experience." Without ourselves speaking for the "British Telephone Administration," it might be pertinent to this question of "admitted superiority" to repeat what Mr. Selfridge, an American business man says. In the *Times* (London) Mr. Selfridge's editorial agent "Callisthenes," writes—"We have been accustomed to saying that the business of retailing is the most complicated business in the world. But we should for ever make an exception—that of conducting a telephone system. . . . We have had experience of systems both in America and on the Continent, of systems controlled both privately and by the State, and without the slightest hesitation do we award the palm for all-round satisfactoriness to the telephones of London. . . . In their own typically British manner, without paying too much attention to newspaper stories of inefficiency, certainly without any public boasting of the difficulties they have overcome and the enterprise they have shown, those in control at the General Post Office have produced a telephone system that for general efficiency is second to none."

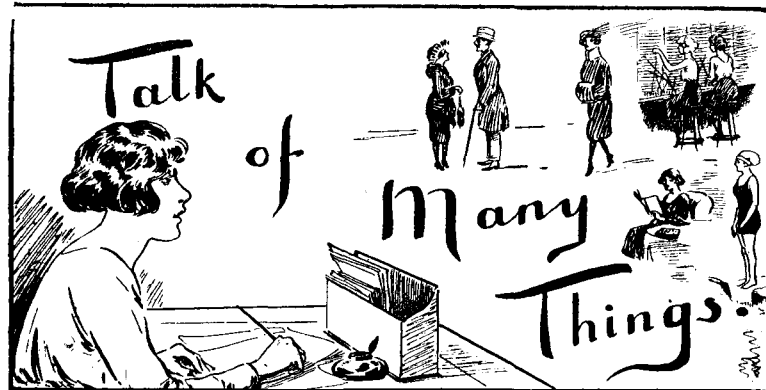
"Flittings," a "Bug-a-Boo" in America.

The statistics given from time to time in another column in order to record the progress of the development of the British telephone system, no doubt reflect a certain amount of office to office and house to house removing on the part of subscribers. But the main cause of the "recoveries" is far removed from that of "people hurrying and hustling, hither and yon, bent on May moving," which is said to be a veritable "bug-a-boo" in America. "Years ago," says *Telephone Review*, "it was decreed that May should be the month of moving, and ever after that, landlords and tenants have followed the custom by shaking each other around and about at that time of the year" . . . "The tremendous amount of work to be done would be appalling, were it not for the fact that preparations for handling it have been constantly systematised and improved in all departments for the purpose of forestalling any mad scramble," it continues. Renting agents and superintendents of buildings are canvassed and "given forms which they are asked to fill out with the room number and firm names of subscribers moving out of their buildings." "More than 15,000 telephones change homes on moving days," reads the sub heading of the article, which makes one pine for the good old pre-war days, when the frolics of a "fitting" were not unknown in our own country.

Exchanges on Tour.

"One item (in the Post Office Commercial Accounts) shows a sum of £55,000 which has been received by the Post Office for advertising, while on the other hand, a large number of incidental items, which total £10,000, shows that not more than about £2,000 a year is spent by this great service on advertising, and most of that is spent on urging people at Christmas time to post early," said Captain Garro Jones, in the House of Commons. Notwithstanding the strictures passed on the doubtful accuracy of these accounts, both inside the Service and out, they do at least show that whatever merits the practice of advertising may possess as a means of promoting business, the Post Office has not indulged unduly in it. Of course an immense amount of publicity is obtained by other means, the cost of which does not appear in these accounts under that item—as, for instance, the activities of our admirable telephone canvassing staff, our District Managers and Postmasters, yes, and the telephonists and traffic staff generally. In fact it is in the direction of the irresistible appeal to the smaller number rather than the promiscuous shouting to the multitude that our thoughts are ever turning. We have, for example, the efforts now being made to perfect a scheme under which the model C.B. No. 1 exchange displayed at the 1924 Wembley Exhibition can be sent on a tour of the various literary, scientific, rotary and other societies in the country, fully equipped and staffed. Miss Hobdell and her 4 trained telephonist assistant are to be congratulated on the admirable start they made recently with a dress rehearsal of their "show" in the Post Office factory. Also arrangements are taking shape for putting "on the road" three complete automatic exchanges of the 4 digit type. These, it is hoped, will be independent of any main power supply, and can be used anywhere, although they will at first probably be used in places about to be cut over to automatic working.

WE TELEPHONISTS



Urgent Domestic Distress.

SOMETIMES my wife leaves me. No! probably you don't blame her, but she is not a "poor thing," and she doesn't need your sympathy. It is I who should have sympathy on such occasions, for she goes away on visits and leaves me to fend for myself. No! it doesn't do me good or serve me right. Of course I am a capable, adaptable, intelligent fellow, and I can manage quite well on my own, but the small details of domestic routine are liable to upset the greatest intellects. For a few days before her departure I am compelled to listen to all sorts of instructions and injunctions—to water the parrot, give seeds to the aspidistra, buy the bread at Joneses, and to send my collars on Tuesday—but I usually listen with an airy indifference, fully

confident of my own domesticity. After her departure, I find the most important and difficult tasks are to wake in the morning in time to reach the office, and to bring myself a cup of tea before rising—but of these I will say nothing, except to wish that I were a somnambulist. Then there is the task of locating the position of the various eatables—eggs, bacon, cheese and so on—usually accomplished after a few days by a sense of smell. Just as things are settling down and the household is beginning to run like a machine, supplies give out, and it is then that I wish I'd taken more notice of what I was told. How does one stew plums: how much cheese ought one to buy at a time: do the shops close early to-morrow, and if so, why? Why can't I find my collars or socks, and is this wreck the only shirt I've got? Fortunately, at these critical stages a sister will drop in, but the treatment I get depends upon whether she is the single or the married sister. The former usually regards my condition as a joke. She enters into the picnic spirit of the affair and acts accordingly. The crisis passes with laughter, and between us we restore order. But if the married sister should call things are different. With a wisdom born of marriage she knows me for what I am—a hopeless, helpless babe who is positively incapable of any domestic virtue or sense. I meekly watch her methodical and marvellous attack on chaos, and blush guiltily at the pile of unwashed crockery and the litter of matches and cigarette ends. I find it difficult, too, to give a convincing explanation as to why there should be mud on the mantelpiece.

No! I think This Freedom is no good, and in my eagerness I always find myself on the arrival platform an hour before my wife's train is due.

PERCY FLAGE.

Wake Up, Sydenham!

Well, colleagues, we at Sydenham possess many advantages not enjoyed by telephonists at other exchanges, and it is our duty to show our appreciation by making the best use of them. We should aim at becoming the leading exchange in the London Telephone Service in all things appertaining to our profession.

The interest displayed in the Tennis Club this year is very encouraging, but how much nicer it would be if we could erect a tent in the garden next year.

Cannot we make the long winter evenings shorter with a definite Social programme of dances, concerts, whist drives, &c., and incidentally provide funds to improve the tennis court, aid the Swimming Club in their fight for supremacy, and organise new clubs next summer?

Congratulations, swimmers. Your enthusiasm does you credit! You have elected a committee well qualified to lead you to victory. Remember! the cup and the shield were primarily made for the Sydenham Exchange, but others have kindly preserved them for you until you were able to form a club of your own. Come along, non-swimmers! there's no need to be disinterested because you don't swim; it's up to everyone in the exchange to do their part. We must all be members of the Swimming Club, and even if we are only "dry" members, we can attend the baths occasionally, to look on and shout "Bravo!" These brave swimmers are making a bold bid for the glory of the exchange, and they must have the support of us all.

Then there are other fields we might enter, other laurels we might gain. Let us make a name for ourselves as the centre of literature for the south district. What shall prevent us from competing in the forthcoming competitions for the London Telephonists Society? It wouldn't hurt the judges to have fifty essays from Sydenham to judge. I always believe in keeping the committee of any society well occupied. To establish ourselves as the exchange of poets and journalists, three prizes at least must be won by Sydenham.

Last, but not least, we ought to let the Editress of the *Telegraph and Telephone Journal* know that we exist. I suggest that we make a practice of sending six contributions to her every month. We could assist each other with our efforts before submitting them. Now, come along, Hettie! What about that poem you said you were going to send to the Editress? That one about the subscriber who fell asleep immediately upon removing his receiver, and when he awoke found that he was connected to the right number which he hadn't even asked for. Why! good gracious! a subscriber won't be able to do that when all the service is automatic! I rather liked that poem. Send it along, Hettie; I'm sure telephonists at other exchanges would like to know how that wonderful performance was accomplished. The "Talk of Many Things" column should consist of at least six contributions from Sydenham each month, and later on we can inform the Editress that we require half the *Journal* to ourselves.

Finally, let us win a reputation of comradeship, of honour, of goodwill towards each other, pursuing those things which are loyal and true, that we, departing, may "Leave behind us footprints on the sands of time."

Come! awake Sydenham!

"Trust in thine own untried capacity
As thou wouldst trust in God Himself.

Thy Soul,

Is but an emanation from the whole,
Thou dost not dream what forces lie in thee."

GERTRUDE M. TURNER.

We thank Miss Turner for her inspiring article, and are looking forward to the six contributions each month. Other exchanges, please copy. Ed.

The Use and Abuse of Imagination.

According to the dictionary the definition of "imagination" runs thus—"the faculty of making a mental image of anything; to fancy or conceive." One would be inclined to think that imagination would be out of place in an office, but further investigation proves the contrary. I have come to the conclusion that a good imagination is an asset in business life, regardless of the fact that it is sometimes a cause of trouble. Sometimes I indulge in flights of fancy, but always I am rudely brought back to earth by the question "How much work have you done?" A mental image of what will happen if I cannot give a satisfactory answer moves me to use my imagination a little, thus very much surprising and disappointing the questioner. This sort of thing is usually termed day-dreaming, and is not really allowed unless you can manage it better than I do. Another form of fancy indulged in by W.A.'s (and doubtless the complaint is not peculiar to them alone) is that for things we cannot have. For instance, on a fine day, it is no uncommon thing for some of us to express a wish to be in the country or at the seaside. Strangely enough, no one as yet ever seems to have asked for that wish to be indulged. At least I have never heard of it, and I reckon to keep myself posted with all the latest concessions. I should be grieved if I had missed anything. But imagination is at its best always on T/18 forms. It is not always advisable to put the truth down in connexion with late attendance, for various reasons. Very often the truth is stranger than fiction, as in the case of a W.A. who wrote as her excuse for lateness one morning that she had to take the cat home. It had followed her to the car. She repented the truth afterwards and was indignant that no one showed sympathy over the affair.

The winter provides many excuses for lateness, with its fogs and snowstorms and slippery pavements waiting for the unwary. But what are we to do in July?

The only fault about a good imagination is that it is apt to let one down, unless one has a good memory also. Here I'm faced with a T/18 form for late attendance, and I can't remember my last excuse. On thinking it over, it would be unique to have a stray cow on the line for once. I'm sure no one has ever thought of that before.

E. A.

(Yes, unique—but "verra bad for the coo," as George Stephenson said. Ed.)

A Queen of Hearts.

Before her departure for France on Aug. 8 last, the Queen of Roumania sent a gift of flowers to the telephonists at the Esher Exchange—as graceful an expression of appreciation as could well be imagined. An incident of this kind comes as a ray of sunlight to the daily routine; and we can assure Her Majesty that the kindly sympathy which underlies her gift found an instant response in the hearts of its recipients.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," *Telegraph and Telephone Journal*, Secretary's Office, G.P.O. (North), London, E.C.



[Drawing by M.C.]

THE PRISONER, YOU NEXT MUST KNOW,
INSISTS ON SAYING "NAUGHT" FOR "O."

PROGRESS OF THE TELEPHONE SYSTEM.

The number of telephones working at the end of July was 1,309,562, a net increase of 6,084 over the June total. The increase is relatively small, due to the number of recoveries normally included in the first month of each quarter, and also to the heavy cessation of electrophone instruments. All London agreements for electrophones terminated on June 30.

The analysis of Telephone Statistics as at the end of July is given below :—

	London.	Provinces.
Telephone Stations—		
Total at July 31	459,754	849,808
Net increase	835	5,249
Residence Rate Installations—		
Total	86,831	146,918
Net increase	879	1,740
Exchanges—		
Total	106	3,763
Net increase	1	17
Call Office Stations—		
Total	4,314	15,046
Net increase	31	111
Kiosks—		
Total	149	1,174
Net increase	12	64
New exchanges opened under Rural Development Scheme of 1922—		
Total	—	738
Net increase	—	17
Rural Party Line Stations—		
Total	—	9,610
Net increase	—	41
Rural Railway Stations connected with Exchange System—		
Total	—	634
Net increase	—	4

Out of a total of 757,209 subscribers connected with the exchange system at July 31, 233,749 or 31% are rented at the special rate for private householders. The proportion in London is 38%, and in the Provinces 28%. These percentages have grown consistently month by month since the special rate was introduced.

The marked development in the Trunk service is reflected in the unusually heavy traffic recorded for the month of May, the latest record available. Altogether 7,203,712 calls were dealt with the first month that the traffic has reached the seven million level. The May, 1925, total was 632,531 calls (or 10%) in advance of that for May last year, which had an additional working day.

The international traffic, on the other hand, was not so heavy as in March or April. 17,889 calls were recorded, or 1,920 more than in May last year, the increase being all in the Dutch traffic.

Further progress was made during the month of August with the development of the local exchange system. New exchanges opened included the following :—

LONDON—Albert Dock,
PROVINCES—Whitley Bay,

and among the more important exchanges extended were :—

LONDON—East Ham, Grosvenor.
PROVINCES—Beaconsfield, Colchester, Didsbury, Eastbourne, Haslemere, Leigh-on-Sea, Letchworth, Manchester (City), Morecambe, St Ann's-on-Sea, Sevenoaks, Whitchurch (Glam.), Worksop.

During the month the following additions to the main underground system were completed and brought into use :—

Stockton-on-Tees—West Hartlepool cable.
London—Clapham cable.
Swansea—Port Talbot cable.
Dumbarton—Helensburgh cable.
Guildford—Godalming cable,

while 68 new overhead trunk circuits were completed, and 71 additional circuits were provided by means of spare wires in underground cables.

"WIRELESS" ANNIVERSARY.

THIRTIETH BIRTHDAY OF SPEECH THROUGH SPACE. CELEBRATIONS AT THE ALBERT HALL.

The thirtieth anniversary of the birth of wireless was celebrated at the Royal Albert Hall from September 12th to 23rd by a representative exhibition under the auspices of the National Association of Radio Manufacturers and Traders.

It is just thirty summers since Guglielmo Marconi, then a youth of twenty-one, made the first wireless signal in his father's villa at Pontecchio, near Bologna, across a distance of a few yards from room to room. The apparatus was simple. In the transmitter, the young inventor used an induction coil to produce a spark between two balls, one of which was connected to a metal can hoisted on a mast and the other to a metal plate in the "earth"; in the receiver he used an "electric eye," a small tube containing metal filings which allows a current of electricity to pass through them only when they are under the influence of an electric wave. The "electric eye" was also connected to an "aerial" and an "earth" and the passage of a current through it constituted a signal because it could be used to make any recording instrument "click."

Marconi found that this quite novel arrangement of conductors gave the maximum of reliable effect with the minimum of energy. For the first time wireless telegraphy was a working reality. The youthful Marconi removed his apparatus to the garden outside in order to test it on longer distances. After many an attempt he conquered the garden's entire length. It was these simple garden experiments at Pontecchio which, in twelve years' time, were to grow to "wireless" across the Atlantic.

Next year the inventor came to England, took out the first "wireless" patent and introduced himself to the General Post Office. For twelve months a series of successful experiments were conducted under the supervision of the G.P.O., the Admiralty and the War Office. They began with the despatch of the first wireless message to be transmitted in this country—from St. Martin's-le-Grand to the Thames Embankment. Then a distance of four miles was covered on Salisbury Plain. Next a nine-mile link was made between Penarth and Brean Down across the Bristol Channel. Continuing his experiments in Italy, Marconi sent messages between a couple of warships at Spezia, twelve miles apart, and soon afterwards he put up the stations at Alum Bay in the Isle of Wight and at Bournemouth, fourteen miles away, between which were made many important experiments that aroused the interest of several notable folk, including Lord Tennyson and Lord Kelvin.

In July, 1897, there was formed, with a nominal capital of £100,000, the company which afterwards became Marconi's Wireless Telegraph Company, Limited. Lloyd's Corporation had Marconi apparatus installed the following May at Bally-castle and Rathlin Island in the north of Ireland, where it was worked for a part of the time by the lighthouse keepers who soon learned how to use the instruments. The first ship to be so equipped was a steamer, the "Flying Huntress," which reported the progress of Kingstown Regatta to a Dublin newspaper from the high seas. In August, 1898, wireless telegraphic communication was established between the Royal yacht "Osborne" and Osborne House, Isle of Wight, in order that Queen Victoria might communicate with the Prince of Wales (afterwards Edward VII), who was suffering from the results of an accident to his knee. One hundred and fifty messages were sent, chiefly private communications between the Queen and the Prince; many of them were over 150 words long, and the average speed of transmission was about fifteen words a minute.

Perhaps the most dramatic moment in the history of wireless was the achievement of cross-Channel communication between the South Foreland and Boulogne, a distance of thirty-two miles, in 1899. The first attempt to use the new method of signalling during naval manoeuvres was made in August of that year, and a distance of eighty-five land miles was successfully covered. From that time dates the beginning of the conquest by wireless of the world's mercantile marine; and, incidentally, the appearance of ocean newspapers.

The War, which witnessed so great a development in wireless telegraphy, held up in large measure the experiments in wireless telephony which had already begun to yield valuable results round about the year 1913. Peace saw a vigorous renewal of efforts to transmit speech by wireless, and in March, 1919, Captain Round, of the Marconi Company, succeeded in speaking clearly from Ballyunion in Ireland to Cape Breton Island, 1,800 miles distant. Later in the same year a small station built at Chelmsford got in touch with Madrid, and in 1920 a daily programme of music and news was broadcast from a bigger station there. Mme. Melba was amongst the first to assist. The stations at Poldhu and St. John's, Newfoundland, followed, with a third on board the steamship "Victorian," where they laid in a store of gramophone records from which Harry Lauder, singing "I Love a Lassie," Alma Gluck's rendering of "O Sleep, Why Dost Thou Leave Me?" and violin selections by Kreisler, were picked up by listeners-in aboard other ships ploughing the Atlantic.

After much negotiation, Writtle (near Chelmsford) was allowed to begin transmitting next year. Then, modestly, from the top floor of Marconi House came the station known as 2LO. By the end of 1922 2LO had thousands of licensed listeners-in. In the short three years since then the number of stations has leapt up to twenty-one (nine main stations, eleven relay and one high

power), and the number of licence-holders is now close upon one and a half million, representing a total audience of habitual and occasional listeners-in which is estimated at 10,000,000 souls.

Meanwhile wireless telegraphy has been evolving with a like swiftness. To-day wireless telegrams are sent from Carnarvon to the United States; from Ongar (with a receiving station at Brentford) to France, Spain, Switzerland, Australia and Canada; from Oxford to Cairo and so to Karachi in India, each station sending out its signals in all directions, irrespective of destinations. But important new developments are foreshadowed in the immediate future. Marconi has now perfected a system whereby a message will be thrown, like a searchlight's beam, in one direction only, and the Marconi Company are at present erecting these "beam" stations for the Post Office to serve South Africa, Australia, India and Canada and for a service of their own to the United States and South America, with reciprocal stations in all these countries. The transmitting and receiving stations for the United States and South America are at Dorchester. The transmitting station for India and Australia is at Grimsby and the receiving station at Skegness; these are expected to be ready by May next year. The station for Canada is furthest advanced, and that station and the station for South Africa, at Bodmin in Cornwall (with two receiving stations at Bridgwater in Somerset) should be ready towards the end of the present year.

The story of the amazing development indicated by these facts was well illustrated at the Royal Albert Hall, when wireless devices of every sort were assembled by some sixty manufacturers in all parts of the country.

LONDON TELEPHONE SERVICE NOTES.

Telephonists' Society.

The Society's Session will open on Friday, Oct. 9, when Mr. W. J. White will read his Presidential address. He has chosen for his subject "The New Era," and members will doubtless enjoy an informative and prophetic discourse. Following the custom of past years, there will be a programme of musical items from 6 to 6.30 p.m., whilst the meeting is assembling.

The November meeting, arranged for Nov. 6, will be devoted to two debates. Firstly, "Are we Over-Standardised?" the leaders being Miss C. K. Hooper for, and Miss A. E. Knapman against. Secondly, "Will Automatic Exchanges prove a Blessing to Telephonists?" will be debated, Miss E. Cane leading for the Ayes and Miss E. M. McAllister for the Noes.

The meeting place will be the comfortable Drawing Room at the Central Y.M.C.A., Tottenham Court Road.

A large number of members will wish to keep Dec. 11 free, as on that evening Miss McMillan's musical play, "Yesterday, To-day, and Tomorrow," will be given. More of this anon.

"Rana" Ladies S.C.

This Swimming Club, which caters for the Controller's Office Staff, announces a Gala to be held at the Holborn Baths at 7 p.m. on Oct. 6. A varied programme has been arranged, the chief items being the Breast-Stroke Championship of the Civil Service, the Club Championship for the "Liddiard Cup," and an Invitation Team Race.

Winter Entertainments.

Now that the return to Standard Time is in sight, entertainment committees are becoming active in arranging dances, whist drives, and the like. The Telephonists' Society announces their hardy annual New Year's Dance, to be held as usual in the first Saturday in January. City Exchange have arranged a series of these dances at the Bishopsgate Institute, the first being fixed for Saturday, Nov. 7. These functions serve a very useful purpose in enabling the staff to take their pleasures together, and they always assume the form of jolly re-unions. The more the merrier.

Trunk and Toll Gala.

These exchanges held their combined Swimming Gala at the Holborn Baths.

The chief event was the contest for the Individual Championship of the L.T.S. The distance was 100 yards and resulted in a win for the holder, Miss E. Williams, of Regent Exchange, in 1 min. 33½-secs., Miss D. House of the same exchange being second, and Miss Amos, of Victoria, third.

An Invitation Team Race was won by Trunks by a foot from Gerrard, Regent being third, two yards behind.

The Toll Individual Race (90 yards) was won by Miss Sutton.

The Diving Championships were won by Miss McBirney (Trunks) and Miss Cowper (Toll).

The two Handicap Races resulted as follows:—

Trunks—		Toll—	
Miss Knight	... 1	Miss Ellis	... 1
Miss Brown	... 2	Miss Meiklejohn	... 2
Miss Riches	... 3	Miss Sutton	... 3

The Supervisors' Race was won by Miss M. L. Davies, with Miss L. K. Davies second, and Miss E. H. Mason third.

PERSONALIA.

LONDON TELEPHONE SERVICE.

The following promotions have been made:—

- MOODY, A. R., Acting Executive to Executive Officer.
- MARTIN, F. P., Executive to Higher Clerical Officer.
- POOR, R. V., Clerical to Acting Executive Officer.
- BERRY, H. A., Assistant Superintendent of Traffic, Class II. to Assistant Superintendent of Traffic, Class I.
- NICHOLS, F. B., Assistant Superintendent of Traffic, Class II. to Assistant Superintendent of Traffic, Class I.
- KELLOND, A. W., Higher Clerical Officer to District Contract Manager. (Higher Clerical Officer with allowance).

Resignations on account of marriage:—

- Miss F. G. JONES, Assistant Supervisor, Class II., of Museum Exchange.
- Miss M. TAYLOR, Telephonist, of Museum Exchange.
- Miss O. D. STANBRIDGE, Telephonist, of Museum Exchange.
- Miss O. P. P. SHAW, Telephonist, of Purley Exchange.
- Miss B. R. BEST, Telephonist, of Purley Exchange.
- Miss E. GILES, Telephonist, of New Cross Exchange.
- Miss E. R. BUCKLAND, Telephonist, of Victoria Exchange.
- Miss M. A. HILLARD, Telephonist, of Victoria Exchange.
- Miss M. B. ROBERTS, Telephonist, of Victoria Exchange.
- Miss W. A. SHORTELL, Telephonist, of Victoria Exchange.
- Miss L. E. SPRATLEY, Telephonist, of Victoria Exchange.
- Miss L. E. WATTS, Telephonist, of Victoria Exchange.
- Miss E. M. WILLIAMS, Telephonist, of Paddington Exchange.
- Miss E. HEATHER, Telephonist, of Central Exchange.
- Miss L. IZZARD, Telephonist, of Central Exchange.
- Miss E. M. C. HAYES, Telephonist, of North Exchange.
- Miss B. B. GOLLOP, Telephonist, of North Exchange.
- Miss I. D. WOOD, Telephonist, of Woolwich Exchange.
- Miss L. G. DARKE, Telephonist, of Woolwich Exchange.
- Miss A. M. QUINLIVAN, Telephonist, of Museum Exchange.
- Miss B. M. FRIEND, Telephonist, of London Wall Exchange.
- Miss M. H. MORRISON, Telephonist, of Central Exchange.
- Miss M. WASKETT, Telephonist, of Central Exchange.
- Miss D. B. MITCHELL, Telephonist, of Central Exchange.
- Miss K. E. M. MORONEY, Telephonist, of Holborn Exchange.
- Miss E. M. GREEN, of Holborn Exchange.
- Miss E. A. WOODMAN, Telephonist, of Trunk Exchange.
- Miss A. L. TAYLOR, of Trunk Exchange.
- Miss M. L. SMITH, Telephonist, of Trunk Exchange.
- Miss G. M. WALTER, Telephonist, of Trunk Exchange.

CENTRAL TELEGRAPH OFFICE.

The following promotions have been made:—

- MAY, R. E. V., promoted to Superintendent (Lower Grade).
- SAMUEL, W. D. B., promoted to Assistant Superintendent.
- CLIFTON, J. H. G., promoted to Assistant Superintendent.
- COLE, L., promoted to Overseer.
- HARVEY, H. R., promoted to Overseer.
- SMITH, W. H. P., promoted to Overseer.

PRESENTATION TO MR. H. MARSHALL.

Mr. Marshall, chief clerk, District Manager's Office, Leicester, on the eve of his departure to the Scotland West District, was presented by the Staff with a barometer and wireless set. The presentation was made by the District Manager, who expressed the regret of the whole staff at Mr. Marshall's departure and wished him every success over the border.