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TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XXIX.—MR. T. B. JOHNSON.

MR. T. B. JOHNSON, the Superintending Engineer of the North-Eastern District, was born in May, 1867, and was appointed as a Sorting Clerk and Telegraphist at Hull in February, 1885. Five years later he was transferred to the Engineering Department at Newcastle-on-Tyne, where he had the great advantage of being trained by that remarkable Superintending Engineer, Mr. A. W. Heaviside, who was one of the earliest pioneers of telephony in Great Britain. The Post Office in those days had a flourishing exchange at Newcastle-on-Tyne, with a multiple switchboard of a unique type designed by Mr. Heaviside, and Mr. Johnson was placed in charge of this exchange as a Second Class Engineer in January, 1894. He remained on that work until January, 1900, when he was promoted to First Class Engineer and transferred to London in connexion with the development by the Post Office of a telephone service in competition with that of the National Telephone Company. In September, 1907, he returned to his old district, Newcastle-on-Tyne, as Assistant Superintending Engineer, and remained until November, 1911, when he was promoted to be Superintend-



ing Engineer of his present district with Headquarters at Leeds.

Of recent years, telephone development in the North-Eastern district, as in other parts of the country, has been very great, and, in particular, Mr. Johnson has had much work in connexion with the conversion of open lines to underground and with the establishment of Automatic Exchanges, the Leeds Automatic Exchange being the largest in the country.

Mr. Johnson is a past Chairman of the North Midland Section of the Institution of Electrical Engineers, being the first Post Office Superintending Engineer to be appointed to the chairmanship of such a Section since the similar appointment of Mr. A. H. Heaviside in 1899.

Mr. Johnson's principal interest outside the service is in Church work. He is a Patron of the Leeds Parish Church, a member of the Diocesan Union of the Church of England Men's Society and a Churchwarden of Roundhay Parish Church.

Mr. Johnson's energy and high spirits have a fine tonic influence on all who come into contact with him, and we hope that he will long retain these invigorating characteristics.

THE GENERAL STRIKE.

HOW THE LONDON TELEPHONE SERVICE ANSWERED THE CALL.

It is regarded as a tribute to the London Telephone Service that throughout the duration of the General Strike the needs of the Government and of the public were met without the receipt of any serious complaint. It was no easy matter for the exchange staffs to achieve this result. The traffic was heavy, travelling was difficult, and in many cases long hours were unavoidable. The staff recognised, however, that their work was of great national importance. They were anxious to give all the help they could in a most trying time and they rose to the occasion in a way which makes everyone connected with the Telephone Service exceedingly proud.

The few days preceding the Strike were very trying. All were keyed up to a pitch of expectation which recalled the anxious moments just before the outbreak of war in 1914. Throughout the protracted negotiations on Sunday, May 2, the tension was marked. People were held in readiness in connexion with emergency schemes; but no moves could be made so long as a chance of settling the dispute remained. On Monday, the 3rd ult., the exchanges experienced phenomenal pressure. In the Trunk and Toll exchanges the volume of work handled was 50% higher than that of the previous Monday.

Then the morning of the Strike came, and the Telephone miracle happened. In spite of the absence of public means of conveyance, the exchange staffs arrived in sufficient numbers to cope with the traffic. Many walked great distances, many cycled; but thousands were carried by a fleet of motor coaches, which appeared at pre-arranged places and times, all duly labelled G.P.O. and exhibiting their route numbers. From north, south, east, and west, they came. Even the more remote places like Barnet, Epsom, Romford, Hounslow, &c., had their special conveyances, but the main fleet of vehicles commenced their work at intermediate points like Plumstead, Ilford, Palmers Green, Willesden, Ealing, Wimbledon, Thornton Heath. Complete time tables were available, and all the drivers and staff were aware of stopping places and times of arrival. The provision of accommodation in the heart of the City for 140 vehicles was no easy matter; but with the full co-operation of the Commissioner of Police, parking places were arranged and passengers were discharged without difficulty.

Before the Strike it was anticipated that a fleet of vehicles would be required to carry about 5,000 passengers each way. It was, however, found necessary to provide for a larger number, and on the days of maximum pressure the numbers actually carried amounted to well over 9,000. This heavy increase was met to a considerable extent by additional journeys, but in some instances overcrowding was unavoidable. Both passengers and drivers accepted such uncomfortable conditions in a splendid spirit, and although the vehicles were sorely tested, there were fortunately no casualties. At a rough estimate some 6,000 miles were covered per day.

The rapidly improvised Central Transport Office was provided with adequate telephone facilities, and regulators were detailed to control each route. The arrangements for requisitioning vehicles were in the hands of the Stores Department, and a liaison officer from that Department kept the Transport Officers in close touch with the Contractors.

It was decided that the Exchange Staff Transport Scheme should also cover the requirements of the manipulative staffs of

the Central Telegraph Office and the London Postal Service public offices, and those two Departments also provided liaison officers who ensured the fullest co-operation in the working of the scheme.

Even under the exceptional conditions of a General Strike human nature does not alter, and it was found necessary, in connexion with this scheme, to establish a Lost Property Office to deal with the miscellaneous articles left in the vehicles by passengers!

The regulators who saw to the loading and despatching of the vehicles at the terminal points had a difficult task, which called for the exercise of patience and tact to a marked degree. On some occasions the weather conditions were atrocious, and the regulators were on at least two evenings drenched to the skin. They surmounted all their difficulties in a most cheerful way, and won the high admiration of the staff.

The officers at Transport Headquarters found their task a nerve-racking one. The conditions altered from day to day—the evenings presenting the greatest problem—and vehicles had to be diverted and despatched at late hours in order to ensure the return of large numbers of the staff to their homes in reasonable comfort. The Headquarters men worked long hours, and never left until they were satisfied that the needs of the staff had been met. All worked well, and it is difficult to select anyone for special mention. The staff, however, will be interested to know that the arrangements were mainly in the hands of Mr. W. B. Benham as General Emergency Officer, and Mr. B. L. Beaumont as the Chief Transport Officer. Mr. F. B. Nichols specialised on routing matters; Mr. T. A. Beck and Mr. J. R. Jacob dealt with personnel and terminal control. Mr. Jacob did yeoman service up to a late hour every evening in collecting scattered groups of people in his own car, and bringing them to points at which some form of transport was available. Mr. P. J. Mantle also did valuable work in connexion with the scheme.

The Stores Department representative, Mr. W. R. Griffiths, was untiring in his insistence on the availability of all vehicles. Mr. L. Bartington dealt ably with the C.T.O. requirements and Mr. G. Hickman with those of the London Postal Service.

Very few cases occurred in which it was impossible to get members of the staff to their homes. In such cases sleeping accommodation was available in the exchanges. In addition many volunteered to use this accommodation in order to ensure that adequate staff was available for meeting the late evening and early morning requirements of the exchanges.

It is common knowledge that the journey through many parts of the London area in the earlier days of the Strike was a very trying experience. On many occasions a way had to be made through threatening crowds, but fortunately actual attempts to molest the vehicles and staff were very rare. The knowledge that the Telephone and Telegraph staffs were being regularly cared for inspired confidence among the public, and good-humoured chaff helped in many cases to relieve the tension. In one case, for example, a man jumped on one of the coaches and caused some concern among the girls, but he merely smiled and said "I am sorry you are troubled" (with a well-rolled "r") and jumped off. Another wag, noticing the heavy overload carried by one of the cars, yelled out "Wrong number, again!"

The smooth working of the Transport Scheme ensured the adequate staffing of the Exchanges. The staff were in time to cope with the rush from the general public, and there is no doubt that the traffic pressure was very high during the busiest hours of the day. The exchanges between the 5 and 10-mile circle experienced the largest overall increase in local traffic during the first week of the Strike. In some cases the week's traffic was 50% higher than that dealt with in the previous week. The traffic at the Trunk and Toll exchanges and particularly at the local exchanges serving residential areas, was maintained up to a late hour each evening, and in many cases it was necessary for the day staff to

remain on duty until 10 p.m. or later. In the Trunk exchange a considerable number of the day staff volunteered to remain in the exchange until midnight, and their work was of great value. The Government offices were naturally experiencing heavy loads, and in some cases it was necessary for the day staff to remain until 11 p.m. Every assistance with transport was provided by the Departments concerned, and the telephonists won high praise for their devotion and skill in handling the telephone demands throughout the crisis.

It was essential to arrange for the transport drivers to rest on the Sunday, and it was decided to ask for volunteers who could arrange their own transport and undertake to carry on the Sunday service in the exchanges. The response was splendid, and it was immediately apparent that a satisfactory week-end service was assured. Transport for the night staff, to ensure that they got home on Sunday morning and were able again to reach the exchanges in the evening, presented some difficulties, particularly in view of the large proportion of disabled ex-Service men concerned. Assistance was, however, obtained from the voluntary transport organisations, and a fleet of private cars rendered most valuable assistance.

As the Strike proceeded the daily totals of traffic in the exchanges were somewhat reduced. The day totals, however, do not give the whole story of the load conditions. The rise in the morning load was later than usual, the drop in the afternoon load took place earlier than usual. There was a very definite contraction of the time taken for lunch, and the morning and afternoon peak loads were well maintained.

Things were settling down on this basis up to the 12th instant, when it became known that negotiations between the T.U.C. and the Prime Minister for the settlement of the Strike were in progress. All the supervising officers had the feeling that a settlement was near, and were keeping a close watch on the staffing conditions. Many had wireless sets installed for the convenience of the staff who had been staying at the exchanges. None, however, quite expected the extraordinary effect which was produced in the exchanges by the simultaneous receipt at so many points of the information that the T.U.C. had called off the Strike. The first rush was experienced at the London Wall Exchange, where the flash of calling signals seemed to spread like a sheet of flame from one end of the exchange to the other. Within a minute or two all the City exchanges were similarly affected. Large numbers of calls were passed to the Trunk and Toll exchanges, to the residential exchanges such as Kensington and to the inner and outer residential suburbs. The loads placed upon the telephonists, who were soon in position on every board in the exchanges, were heavier than anything they had previously been called upon to handle. They were, however, overjoyed with the news, and they entered so fully and efficiently into the work of service that the whole rush was disposed of without any breakdown. At most exchanges the afternoon loads were heavier than any experienced since the day before the commencement of the General Strike.

The experience of the Trunk and Toll exchanges on May 12 calls for special comment. The subscribers appeared to be specially anxious to get their long-distance calls through rapidly. In anticipation of the action of the T.U.C. the number of Trunk recording operators had been doubled, but as the rush developed further recorders were necessary. By 1.30 p.m. there were 49 recording positions staffed instead of the standard number of 19. Still further increases were necessary, and at one stage the number of recorders reached 60. The foresight of the Trunk management enabled the rush to be handled in a satisfactory way. The Trunk lines were fairly clear, and were able to absorb the abnormal lunch-time load. Delays were inevitable during the afternoon but at no stage was the delay unreasonable when all the circumstances were taken into consideration. The nature of the rush in the Toll exchange will be appreciated from the fact that, during the half-hour from 1.30 to 2 p.m. a total of 1,295 effective calls was

handled, as compared with a normal busy-hour load of from 750 to 800.

In the hope that the public transport facilities would be in some measure restored on May 13, following the T.U.C. pronouncement, our transport facilities were cut down by one-third. In view, however, of the difficulties of the individual Unions, the public services were not restored, and it was necessary immediately to replace some portion of our transport scheme and also to arrange for the full service to be running on Friday the 14th. Late on that day, however, the information regarding the restoration of tube, tram, and bus services was so definite that it was safe to arrange for the withdrawal of our own vehicles on the majority of the routes serving those districts which relied to any considerable extent on the steam train services. As a result of this curtailment the staff suffered some inconvenience on Saturday morning the 15th. It was, however, possible for sufficient numbers to get to the exchanges in time to deal with the public demand.

Everyone connected with the Transport Scheme regretted the inability to comply with the many requests that were received from members of other Departments of the Post Office and of the Civil Service generally for travelling facilities in our vehicles. It had, however, to be recognised that our fundamental duty was to ensure the proper functioning of the services of communication in London. To achieve this we had to get our staffs in to time, and this necessitated return journeys to many points on the various routes, all of which had to work to a definite time-table. If, as a result of providing for stage journeys only or for general assistance to the public over portions of our routes, we had failed to work to our time tables, the effects on the communication services might have been very serious. I feel sure our many friends in other Departments will appreciate our position and will forgive us for the attitude which we had to maintain throughout.

Looking back over the General Strike period, I can only repeat that we are full of admiration for the way the staff of all grades met the demands made upon them, and all will feel that they owe much to the men who planned and carried through the transport arrangements at Headquarters, including those who at all hours and frequently under most trying weather conditions supervised the loading and despatching of the vehicles and saw to the comfort of our thousands of passengers.

We shall now look forward to a period of greater tranquility in the industrial world, and to the development of business which will undoubtedly bring with it a very marked growth in Telephone development. Throughout the General Strike period the Telephone Staff was always available to meet, in their usual helpful and good humoured way, the needs of all classes of the community. This same attitude will continue through the brighter years before us.

M. C. P.

ROYAL CORPS OF SIGNALS DINNER, 1926, AND FORMATION OF A ROYAL CORPS OF SIGNALS DINNER CLUB.

The above Dinner will be held in London on Monday, July 19.

Officers (Regular, Territorial, and Supplementary Reserve) have already been circularised, but owing to lack of recently authenticated addresses it has not been possible to give information either about the Dinner or the formation of the Dinner Club to more than a very small number of the ex-Officers who served in the Signal Service, Royal Engineers, or who were seconded to the Signal Service during the War.

The Honorary Secretary of the Royal Corps of Signals Dinner Club would be glad if any such ex-Officers would kindly communicate their addresses to him, c/o S.D.6., The War Office, S.W.1.

THE POST OFFICE AND ITS CONTACTS.*

BY A. F. WALDEGRAVE, M.B.E.

THE original business of the Post Office was the conveyance of letters, and this continues to be its chief function.

The second great function of the Post Office is the transmission of telegrams. Telegrams, of course, are a form of communication, and it is natural, therefore, that a telegraph service should be part and parcel of the Post Office administration; though this is not essential, and in some countries the telegraph service, although in the hands of the State, is not associated with the Post Office. In the United Kingdom the telegraph service was acquired from the Companies under the Telegraph Acts of 1868 and 1869, which conferred a monopoly of the business on the Postmaster-General and provided for liberal compensation of the dispossessed Companies. It is sometimes urged in excuse for the financial loss on the telegraph service that this loss is due to the excessive price paid by the State in 1870. But there is nothing in this explanation of the present position; the overloading of the capital account has long since been adjusted, and the present charges for interest and depreciation are based entirely on the value of the actual plant now in existence.

The men in the telegraph service point with justifiable pride to the ceaseless progress of improvements in machines and methods. Unfortunately, however, the development of facilities for the more and more rapid disposal of traffic is accompanied, so far as the inland service is concerned, by a steady diminution in the volume of traffic. This is the inevitable result of the growth of the telephone service, and it presents a problem in administration of no small difficulty. A growing business, supposing it is not growing too rapidly, tends to solve the problems of management almost automatically—the work clamours to be done and the necessary adaptations are made in order to dispose of it; but it is not so easy to get good results, and especially good financial results, from a declining business.

There is some compensation in the fact that the foreign telegraph service is more alive than ever. Whether this field will ever be invaded to a serious extent by telephony is a matter for speculation. So far as communication with European countries is concerned there will no doubt be a big development of telephony, and an international committee of engineers and traffic experts, on which the British Post Office is represented, has been set up to facilitate communication between the different European countries. With places outside Europe, however, telegraphy continues to be the only practicable means of rapid communication, and interesting developments, in which the Post Office is intimately concerned, are taking place. It has not yet been decided whether the future of overseas telegraphy lies with cables or wireless or will consist in a division of the field between the two. There are some who think that the cable system will hold its own for direct communication from individual to individual owing to its lower working costs, once the cable is laid, and its greater reliability and secrecy. In the view of these cable optimists the main province of wireless will prove to be the transmission of messages, particularly of news, to a number of destinations simultaneously. But there are partisans of wireless who think that the Beam system, which will soon be in operation, will sound the death-knell of cables. In the meantime the Post Office is concerned in working both systems itself and also in acting as the trustee of the public in securing, as far as possible, that both cables and wireless, where they are owned by Companies, shall be worked in the public interest. It may be imagined that the technical and administrative problems raised by so complicated and indeterminate a situation are of the highest interest, and they go far to compensate for the comparative stagnation of affairs on the side of inland telegraphy.

The third great function of the Post Office is the administration of the Telephone service. In the early days of telephone development—to be precise, on Dec. 20, 1880—it was held by the courts that a telephone conversation is a telegram within the meaning of the Telegraph Acts and therefore comes within the scope of the Postmaster-General's monopoly. The final consequence of this judgment is that the whole telephone system of the country, with the exception of the services in Hull, and in Jersey and Guernsey, is now in the hands of the Post Office. There are special circumstances in the case of the Channel Islands, but why a town in Yorkshire should stand outside the general system I have never been able to understand.

It was the misfortune of the Post Office that the inevitable dislocation occasioned by the transfer of the telephone system from the National Telephone Company to the State on Jan. 1, 1912, was so soon followed by the difficulties arising from shortage of men and materials during the war and from the increase in costs after the war was over. It is not generally recognised by the public that every subscriber needs a separate line from his house or office to the exchange, and that the holding up of the laying of the necessary cables for several years necessarily had serious consequences. However, rapid progress is now being made, and if we confine our attention to the last three years we find that there has been a capital expenditure of £25,000,000, the mileage of wire has been increased by nearly a million miles, and the number of stations has grown by 300,000. Moreover, there has been a distinct improvement in the quality of the service. The average speed of answer has been

reduced to 5.3 seconds and the percentage of calls answered within ten seconds has been raised to 90.7.

These, then, are the three primary functions of the Post Office—the conveyance of mails, the transmission of telegrams, and the provision and operation of telephones.

* * * * *

A realisation of the scale on which the Post Office operates is of great importance in any consideration of the organisation and administration of the Department, and I hope I may be forgiven if I quote a few figures. In a year, the number of letters and other postal packets handled is 5½ thousand millions; there are 60 million registrations of letters and parcels; and 70 million telegrams are forwarded and delivered. The number of telephone subscribers is a million and a quarter and they originate nearly a thousand million effective calls per annum. Fourteen million Money Orders and 114 million Postal Orders are issued and paid; there are 24 million deposits made in the Savings Bank, and there are 14 million withdrawals; 3 million holders of Government Stock and Bonds have their accounts kept, to say nothing of the work in connexion with National Savings Certificates; over 4 million licences are issued; and 63 million war pensions and allowances are paid.

May I add, even at the risk of boring, one or two statistical facts with which my own particular Department—the Accountant-General's Department—is more intimately concerned? The amount of cash passing through the accounts of the Department, mostly of course in connexion with quite small transactions, such as buying a few stamps or sending a money order, is in the neighbourhood of £1,000,000,000 per annum. The transactions involve checking the accounts of 13,600 postmasters in England and Wales and Northern Ireland, 5,300 of whom render daily accounts and 8,300 weekly accounts. In addition, monthly accounts are rendered by the Engineers and Telephone District Managers. The balance of cash in the hands of Postmasters in England and Wales is normally about £2,000,000, and although every attempt is made to maintain the working balances at a proper level by setting off receipts against payments, the remittances from Postmasters to the Accountant-General's Department number on an average over 6,000 a day and amount to about £68,000,000 per annum, and the remittances to Postmasters average 4,700 a week and amount to about the same total sum per annum. I should mention that these remittances are made mainly through banks—there is little actual cash sent.

The expenditure of the Post Office, apart from Capital expenditure, is over £50,000,000 a year, and considerably more than a thousand payments a day are made from headquarters: local payments are much more numerous. The Engineering expenditure of the Post Office in 1924-25 was about £15,000,000, and the Engineering stores in stock are valued at about £3,000,000.

The staff of the Post Office numbers over 200,000, and constitutes something approaching two-thirds of the entire Civil Service.

The structure of organisation which has grown up to deal with these multifarious operations is conditioned by the fact that although the Post Office covers so wide a field there must be unity of control and uniformity of administration.

The Postmaster-General is the parliamentary head of the Department, and in him and the Assistant Postmaster-General the needs of the public on the one hand and the services of the Department on the other are brought into harmony—or as near harmony as may be! The permanent head of the Department is the Secretary. The Secretary is assisted by the Second Secretary and by two directors, the Director of Postal Services and the Director of Telegraphs and Telephones; and the Secretary's Office is organised under Assistant Secretaries into branches dealing respectively with Buildings and Supplies, Establishments, Staffs, Mails (inland and foreign), Inland Telegraphs, Overseas Telegraphs, and Telephones. Then there is a Postal Traffic Section and a Telegraph and Telephone Traffic Section. And there are several technical advisers. The general administration of the Post Office is carried on by the Secretary's Office, and all major questions of policy and administration pass through the Secretary's hands for final decision by the Postmaster-General, who, however, is always subject to the consideration of Cabinet responsibility and the necessities of the Chancellor of the Exchequer.

There is a common impression—not sedulously corrected perhaps by Postmasters-General, who have all heard of Splenlow and Jorkins—that the Post Office would do magnificent things if it were not for the Treasury. Well, I do not wish to initiate a discussion on the value of Treasury control of the financial arrangements of the various Departments—final control in big issues and some control of details is obviously necessary—but I have no hesitation in saying that the financial aspect of all Post Office questions is as fully considered inside the Post Office as if the Treasury did not exist.

The Post Office knows from top to bottom that it is a big business as well as a performer of public service, and that a consideration of the due relation between income and expenditure is a fundamental requirement in all its activities. This does not mean that it is bound to make every section of every service pay, but it does mean that nothing shall be done without counting the cost; and to assist in the maintenance of a spirit of economy throughout the organisation, besides keeping proper accounts, is the duty of the Accountant-General's Department.

The further organisation of the Post Office, subject throughout to control by the Secretary's Office, will perhaps be best explained by distinguishing between Departments exercising general functions and those exercising

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specific functions. The Departments with specific functions include the Money Order Department, the Savings Bank Department, and the Solicitor's Office, whose duties are indicated by their names, except that it must not be forgotten that the Money Order Department deals also with National Savings Certificates and the Savings Bank Department with War Loan, &c. The Stores Department makes contracts, very large contracts, for the supply of material and stores, and distributes supplies: it has depots in the provinces as well as in London. The London Postal Service, the Central Telegraph Office, and the London Telephone Service carry on the huge postal, telegraph, and telephone services in the Metropolis, and their Controllers act as advisers to the Secretary on the respective services. The Engineering Department is concerned with the construction and maintenance of telegraph and telephone plant all over the country, and it has a headquarters staff, at the head of whom is the Engineer-in-Chief, and also District Engineers, subordinate to whom are the Sectional Engineers.

Passing from specific to general functions, the general scheme is that the management outside London is vested in Surveyors, subordinate to whom are first the Postmasters, each of whom is responsible for his own office and also for the sub-offices in his town and in the surrounding country, and secondly the Telephone District Managers. In the biggest cities, Leeds for example, the Surveyor is also the Postmaster of the city, but he has other Postmasters in the surrounding district responsible to him.

The general principle is that there shall be a Surveyor's district coinciding with a Superintending Engineer's district, and that for Engineering purposes the district shall be divided into Sections which shall correspond with those of the Telephone District Managers. The Postmasters and District Managers are subordinate to the Surveyor, and the Sectional Engineers are subordinate to the Superintending Engineer; and the Surveyor and Superintending Engineer are both responsible to the Secretary, the former directly and the latter through the Engineer-in-Chief.

Such, then, in outline is the organisation which the Post Office has built up in its effort to provide a national service, or rather a combination of national services, with a due balance between central and local administration and a co-ordination of the functions of the different officers concerned. If you ask any Post Office servant whether the organisation is perfect the answer is bound to be "No." But if you asked the respective critics whether they could agree upon a different arrangement of functions and duties the answer, I am afraid, would still be "No." Meanwhile the organisation is accepted by all in a spirit of loyalty, and it works.

The subject of the relation of Government Departments and Public Authorities to the general public is one on which a great deal could be said. It is unnecessary in a meeting of those engaged in the work of public administration to attempt to conceal the fact that in carrying on a service of a monopolistic character, a department must be on its guard against any tendency to adopt an unsympathetic attitude towards the members of the public. In the case of the Post Office this tendency is the greater because of the mere size of the machine. It arises partly from the obligation to administer the service with strict impartiality. This spirit of equity leads to a sense of the duty of treating everybody alike (which is not necessarily equity) and the service tends to become somewhat impersonal in its outlook.

I will content myself by indicating one or two of the efforts which the Post Office has made to overcome this danger. It has drawn up, for the use of the staff, a volume of Rules for Correspondence with the Public in which the staff are shown how to deal with public inquiries with celerity, courtesy, and clearness. A volume of this kind, though it cannot work miracles, does help to inculcate a right method. Similarly the telephone operator is taught how to speak to subscribers, and her critics would do well to remember that, this being an imperfect world, occasional lapses from ideal standards of patience and courtesy are by no means confined to the official end of the telephone.

But the creation of an atmosphere of elasticity, of responsiveness, and of intelligent service is not to be achieved by official commands. The proper spirit can only be caught—it cannot be taught. Fortunately it is already there in a great degree—as members of the public we have all encountered it, among postmen for example—and we are only concerned with its further development.

A distinction (not very sharp, however) might perhaps be drawn between the relation of the Post Office to the general public and its relation to the business world. The efficiency of the postal, telegraph, and telephone services is a matter of the highest concern to the business man, and there is no failure on the part of the Post Office to recognise this general fact. A certain contact is always maintained, of course, through the medium of complaints, written or verbal, reasonable or unreasonable. But this is a very jerky sort of contact, calculated too often to set up something akin to what is known in wireless circles as oscillation. There is a feeling that something more steady and with greater breadth of outlook is required, and in recent years Postmasters and other officials have been encouraged to cultivate contact with the business world by becoming members of Chambers of Commerce, Rotary Clubs, and so forth, though I do not think the Department has so far undertaken to pay their subscriptions. The public are invited to visit telephone exchanges and to see the work of the department in actual operation. And recent Postmasters-General have appointed an Advisory Council of leading business men who are consulted on all the main developments of Post Office policy which affect the business world.

The Post Office, it should be mentioned, has large connexions with the business world as a spending department. Its contracts for the conveyance

of mails by road, rail, and sea, and for engineering works and for materials generally, are very large, and in one direction it is engaged in competitive enterprise, namely, in running the Imperial Cable, which is in direct competition with the Cable Companies. The Postmaster-General's monopoly does not extend to foreign telegrams.

The relations of the Post Office with Local Authorities are mainly occasioned by the handing over of the licence money which it has collected for them, by the opening of roads and the erection of poles, and in connexion with rates.

The Post Office is relieved of all questions of rates on its buildings because the payment of these rates, or rather of a contribution in lieu of them (which I am afraid Local Authorities may think is not at all the same thing), is attended to by a special department of the Treasury. As regards rates on wires, it continues to pay on the assessment which was in operation when it took over the wires erected by the telegraph companies and the National Telephone Company, but on wires erected by itself it pays nothing.

Arrangements for interference with public roads, over and under which the Postmaster-General has free wayleaves under Act of Parliament, afford a point of contact where mutual consideration of the public convenience is necessary.

The relations of the Post Office with other Government Departments are considerable in extent. There are those which arise in the performance of its normal functions in carrying on the postal, telegraph, telephone, and money order services, and there are those which arise from the ancillary services which the Post Office performs as Government maid-of-all-work. Moreover, a great deal of work is done on behalf of the Post Office by the Office of Works and the Stationery Office. To a great extent the relations thus set up are of a financial character and consist in making adjustments between the various Funds and Votes of the National Exchequer. With these operations I will not trouble you, but will content myself with calling attention to one feature of the relations between the Post Office and other Government Departments which is of particular interest to the student of public administration. I refer to the development of what I may call semi-officialism. There was a time when practically the only method of communication between Government Departments was by means of formal letters and minutes, taking endless time to compose and copy, and involving endless delays in waiting for replies. All that has been changed. Whenever a point arises which involves more than a formal reference to another department, an interview, or if necessary a conference, is arranged, and the matter is settled out of hand. Care is taken, however, that the agreement or decision is in the end committed to writing and communicated through the official channels, so that there may be no misunderstanding or dispute. The facilitation of public work by this means has been enormous, and it has probably been stimulated more by the introduction of the telephone than by anything else. The ability to ring a man up developed a habit of personal discussion, and led to more intimate acquaintance between official and official, and so the wholesome practice has grown of semi-official settlement, with official ratification. Indirectly, therefore, as provider of the telephone service, if not directly, the Post Office can claim to have made a humble contribution to the art of public administration.

REVIEW.

"Loud Speakers. Their Construction, Performance, and Maintenance." By C. M. R. Balbi, A.M.I.E.E., A.C.G.I. Published by Sir Isaac Pitman & Sons, Ltd. xv + 96 pp. Price 3s. 6d. nett.

The subject of loud speakers is one which has hitherto been somewhat neglected by the technical press. The small book under review is an attempt to fill this gap, and, as far as it is possible to deal with the subject in the space available, it is a successful attempt.

After some general considerations the construction and action of all the ordinary types of loud-speaker, and of some of the less known types as well, are described. The action of the diaphragm, and of the horn, in the reproduction and strengthening of the sound, are then dealt with. A chapter on testing follows, and then a chapter describing loud-speaker systems designed to enable an address to be conveyed to larger audiences than could be reached by an unaided speaker. The final chapter gives some useful advice to intending purchasers and concludes with a brief tabulated description of fifty loud-speakers and a table of the more usual faults with their appropriate remedies.

The book can be recommended to anyone who desires to know something of this important modern development of technical wireless telegraphy.

TELEGRAPHIC MEMORABILIA.

WHEN these notes are likely to be converted into printed matter there is small sign at the moment they are being scribbled. Nevertheless it is with a strong hope in one's heart that the industrial crisis will soon be a page of history that one takes up one's pen to inform, to instruct, and maybe at times even to amuse one's readers.

For telegraph and telephone men and women it is (one writes in the present tense), a strenuous and anxious time, for the amount of traffic that is being dealt with day by day, will surely produce phenomenal figures when the whole tale is told, more especially as regards the Telephone service.

Our Job's comforters do not depress, but rather amuse us by their half humorous, half serious assurance that the trouble is not likely to last as long as the War, so, literally by the thousands, we sail home in our charrs-a-bances, be it fair or foul weather, duly labelled "Telegraph and Telephone Staff," to the wonder here in London of gaping, and let it be said not always friendly crowds. Some of these for the first time probably have at last conceived some clearer idea of the numbers of their fellow citizens employed in these two most important State Services. Whatever may be our shade of opinion or our individual political conviction, once within the walls of office or exchange our duty is clear cut. Here a message or call from a Cabinet Minister, a large employer of labour, or of a union leader, it matters not. The same promptness, the same accuracy, and the same secrecy are due and are given.

Since our last issue, Mr. W. H. Beechy, formerly of the Submarine Telegraph Company, retired on pension upon reaching the age limit, having transferred to the Post Office Service in 1889.

One is pleased to read the report for the past year of the Indo-European Telegraph Co., Ltd., which re-emerged into the public service after the ravages of the Great War, showing that the revenue increased from £294,371 in 1924 to £310,345. After providing for taxation and adding £18,779 brought forward there remained a balance of £133,838, which it was proposed to distribute as follows:—Writing down cost of reconstruction of the line in Russia and Poland, £5,000; a final dividend of £1 2s. 6d. per share, making 7 per cent. for the year, and a bonus of 15s. per share, both free of tax; £5,000 to dividend-equalisation fund; and £15,000 to retirement trust fund, leaving £16,339 to be carried forward.

The following description of part of the equipment of the mail vessel *Asturias* of the Royal Mail Steam Packet Company, now in the regular service between Southampton and South America, is reproduced as an example of the extent to which radio communication has become an essential part of the every day need not only for the safety of a ship's passengers but for their enjoyment, information and edification. Fitted out by the Marconi International Marine Communication Coy., the main telegraph installation consists of a 1½-kW quenched-spark transmitter, with emergency apparatus, and also a long-range valve transmitter. The receiving equipment consists of the standard long-range receiver embodying a four-electrode valve amplifier, with the addition of an extra high-frequency amplifier, which makes the tuning extremely sensitive and very selective. Direction-finding equipment is carried as an aid to navigation. The aerials of this installation are mounted in an open teak framework 8½ ft. in height fixed rigidly to the deck, which method dispenses with the large aerial system hitherto employed. In addition, two of the lifeboats also carry Marconi ¼-kW transmitters of the quenched-spark type, the power supply being obtained from petrol-driven generators. Valve receivers, which also incorporate alternative crystal reception, are used in the lifeboats. A Marconi band repeater has been installed in the *Asturias*, and six loud-speakers can be used in any of a dozen selected places in various parts of the vessel in order that music played by either the ship's orchestra, reproduced from a gramophone, or received by wireless, may be reproduced in any part of the vessel. The apparatus includes an amplifier, a generator with the necessary controlling apparatus, a control unit to change from microphone to gramophone, and a gramophone without sound box and horn. The amplifier station also includes a small loud-speaker to act as a pilot to the operator, thus keeping him informed as to what is going on at the various reproducing positions. The introduction of a small motor generator has made it unnecessary to include accumulator batteries with their attendant maintenance difficulties. The generator is driven by power from the ship's electric mains, and supplies the energy required both for the filament and anodes of the valves in the amplifier. In reproducing gramophone music, the scratching of the needle has been eliminated by the replacement of the sound box by an electrical device of the Marconi Co., by which the indentations of the gramophone record are converted directly into a varying electric current, which is amplified and passed on to the loud-speaker. In this way distortionless reproduction of the original music, or speech, on the gramophone record is claimed to be obtained, and the volume of music produced can be controlled through wide limits.

Though not exactly relevant to these columns one cannot abstain from recording also that another of the interesting features of this the world's largest motor ship is the Progress Indicator. This indicator is a realistic and accurate moving model which gives the ship's location on the ocean at any part of the journey. The indicator was designed and constructed by Messrs. Gent & Co., Ltd., and consists of a large coloured relief map embracing both hemispheres and the sea route of the *Asturias*. A small model ship, representing the liner, is moved along the route by concealed, electrically-controlled clockwork, the rate of travel of the model being in proportion to the actual speed of the vessel. Coloured lighting effects are provided to illuminate and give life to the map and simulate sunrise and sunset effects on the model.

A simple switch control enables the model to be automatically reversed at the commencement of the return journey. The clock is controlled by a "Pul-Syn-Etici" marine transmitter installed in the chart room, and 40 clocks provided throughout the ship are arranged in the same circuit. The clock system and the model-ship mechanism are driven off the ship's lighting supply.

Yet a very aged friend of the writer tells me that the tang of the sea-spray is still best to be found from the deck of an old wind-jammer, or a rusty tanker, "without your new-fangled wireless that takes away your independence as a master mariner, so that you are never out of touch with Leadenhall Street!"

Thus Captain P. P. Eckersley before an Informal Meeting of the I.E.E., upon opening a discussion on "The Linking of Wireless and Wire Communication Systems." The Captain, reviewing some of the applications of linked wire and wireless systems, and explaining the difficulties of the intermittent methods by simplex working and the first attempts at duplex transmission made by Captain Round, said that great difficulties arose from having large transmitting apparatus near the receiver. He described the handicaps in using land lines that had been designed for other purposes, drew diagrams of the unique semi-automatic board at 2LO, which insured a continuous broadcast programme by rapid transfer to other lines, in the event of failure of a transmitting station, but concluded that the linking of wire and wireless systems was unavoidable, *however indispensable the wireless system must inevitably be, in its present stage of development he would never use wireless where a wire would serve.*

Electrical signalling *in excelsis* according to the *American Electrical World*, is to be found along a stretch of 226 miles of double track on the Union Pacific Railroad from Cheyenne, Wyo., to North Platte, Neb. This route has been equipped with a new inductive type of signalling equipment, which is considered a marked improvement over the complete block system. A total of 131 locomotives have been fitted to operate in conjunction with the new system, the locomotive equipment including a 32/350 V, d.c. motor generator, the current of which is cut down and changed by amplifiers. A transmission line parallel with the track is employed, and energy is transmitted at 2,300 V, a.c., from the plant of the Cheyenne Light, Fuel & Power Company and the central stations at Kimball, Sidney and North Platte, Neb. Two sets of transformers are employed, the first reducing the pressure to 110 V and the other to 1½ and 3½ V at the rails. The combination of the track current with the current generated on the locomotive operates the control lights in the engine cab—green for "clear" and red for "slow down." When the green is showing, the engine progresses at schedule speed; when red shows, it indicates a train or car on the track in the block ahead. A limited time is permitted for the reduction of speed to 20 miles an hour, and if this is not accomplished by the engineer, an automatic application of air to the brakes will result. Since the new system was first started eight months ago more than 11,000 engine movements have been recorded in the division mentioned without any difficulties being experienced.

AUSTRALIA.—The Telegraph and Telephone Services. The annual report of the Postmaster-General shows that the telephone service working cost for the 12 months ended June 30, 1925, was £3,128,913, and the total revenue was £3,661,110, leaving a gross surplus of £532,196. Interest charges, however, exceeded that amount by £258,619, which represented a loss on the year's working. Capital expenditure, says the *Australian Electrical Times*, was approximately £4,000,000. Arbitration awards imposed an extra burden of £144,000 in wages during the year, in which 14,379 new telephone subscribers were connected in the metropolitan areas, and 20,301 in country districts.

The telegraph services made a working loss of £53,886 for the 12 months, or, with interest added, a total loss of £227,174.

Transmission tests from the new station at Brisbane, Queensland, have been heard 1,400 miles away at Samarai, New Guinea. The station was using 5,000 watts.

Recent figures taken in the Commonwealth show that the number of licenses now held per cent. of the population is New South Wales 1.4, Victoria 2.7, and for the whole of Australia 1.6.

BOLIVIA.—*Commerce Reports* announces that the Government has thrown open for public use the 13 Marconi stations throughout the Republic in order to facilitate general communication. Heretofore the Government has prohibited the popular use of its system, the theory being that the Government service for administrative and military matters would be interfered with. The general tariff is 2.50 bolivars over and above the rate which is paid over the State telegraph line for radiograms in Spanish. For messages in a foreign language, code, or cipher, double tariff is charged.

FRANCE.—The Parisian office of Reuter's agency states that a new telegraph apparatus has been installed on the Brest-Casablanca submarine cable, 1,600 miles long, which increases the working of the cable by 80%. Double Baudot-Picard apparatus serves simultaneously two transmitting and receiving sectors at a speed of 140 revolutions per minute. This improvement is due to the work of M. Carrat, Inspector of Telegraphs in Paris.

INDIA.—The Karachi Radio Club has secured a transmitting set which has been loaned to it by the International Trading Co. The municipality having granted permission, this set has been erected in Frere Hall, from which point broadcasting will take place. Experiments so far have given good results.

KOREA.—*Eastern Engineering*, writing of wireless in Korea, states that the Seoul Radio Broadcasting Station Establishment Committee hopes to open a station in July and establish a service with a capital of 200,000 yen. 48 of the promoters of the scheme are in Seoul and 51 in the provinces. Monthly reception charges are estimated at y. 2, the number of possible

subscribers being expected to reach 5,000. The undertaking is to be a corporate juridical body, and it is expected that the projected station will be powerful enough to serve the whole of Korea. Broadcasting will be in both Korean and Japanese.

LONDON.—The first case of Radio Slander in the British Isles was recently tried here in the King's Bench Division, but was satisfactorily settled between plaintiff and defendant. As will be seen below the U.S.A. has apparently tied with this country for first place in this matter.

It is also announced here that proceedings had been taken against 135 people for installing radio sets without licenses. 134 cases were proved and convictions secured.

POLAND.—A new Polish Broadcasting Station was opened at Warsaw on April 19. The speakers included the Prime Minister and the Minister for Education.

SPAIN.—Reuter's Trade Service of Madrid notifies that the Radio Club of Alicante recently discussed the constitution of a club and the opening of a broadcasting station. The committee is of the opinion that a monthly subscription of two pesetas will cover the cost of the broadcasting.

U.S.A.—The first conviction in America for "slander" by wireless has been recorded. *The Times* (London) explains that recently a wireless news "bulletin" was broadcast from Chicago's "Moulin Rouge" cabaret, which contained a statement regarding the State Attorney, Mr. Crowe. The Attorney issued a writ for libel, but this was later reduced to a slander charge, and the proprietor of the establishment has been ordered by the courts to pay a fine of £5 and costs for "disorderly conduct."

It is also reported that the Government has lost the "air piracy" case against the Zenith radio station, charged with broadcasting at illegal hours and on illegal wave lengths. The decision denies that Secretary Hoover has the power to regulate the air, and may result in chaos unless legislation by Congress is enacted.

The Wireless Trader, itself quoting from an American trade paper, says that the radio industry of the United States is in a chaotic condition owing to over-production. One of the leading firms of radio manufacturers produced 300,000 multi-valve receiving sets during 1925 which remain unsold, and other firms find themselves in a similar position. As a result of this the prices of sets have been cut to ridiculous figures; multi-valve sets have been sold at as low as \$10. In one liquidation it is estimated that the liabilities must have been well over a million dollars. The valve industry is also in difficulties through excessive production, and there again the prices have fallen to very low levels in many instances. Our contemporary thinks that there may be an endeavour to unload a large amount of apparatus upon the British market.

YAP.—It is stated here that the Allied Governments contemplate the assignment of the Yap-Menado cable, which belonged to the German-Netherlands Telegraph Co. and was seized during the time of the war, to the Dutch Government. When the negotiations on the matter have been concluded it will be possible for the financial situation of the Company to be cleared up in connexion with the claims made by the Company on the German Government for compensation.

A desire.—"Teach us delight in simple things,
And mirth that has no bitter springs;
Forgiveness free of evil done,
And love to all men 'neath the Sun!"—*Kipling.* J.J.T.

DEATH OF MR. ELLIS JOHN HIDDEN.

WE regret to announce the death on Monday, May 10, at the comparatively early age of 56 years, of Mr. E. J. Hidden, for over a quarter of a century District Manager of Telephones at Liverpool. He had not been in good health for some time. Mrs. Hidden and the family have the whole-hearted sympathy of the staff in their sad bereavement.

The loss of Mr. Hidden will be keenly felt by the whole of the Telephone Staff of the Liverpool District, and by his many friends in the Service generally. He was of a kindly and sympathetic disposition, taking a keen interest in the Service and in the official and social welfare of the staff.

Among his many outside activities he did excellent work for the Wallasey Victoria Central Hospital, for which Institution he was secretary for a number of years.

The funeral took place on May 13, and was attended by the Postmaster-Surveyor and representatives from all branches of the Service and the surrounding Telephone districts, as well as by a host of personal friends. Mr. Hidden had been over forty years in the telephone service, and there were few people in Liverpool and the Wirral peninsula who were better known figures than he.

[A portrait of Mr. Hidden and a biographical sketch of his career appeared in the April, 1924, *Journal*.]

NOTES ON TELEGRAPH PRACTICE.

BY G. T. ARCHIBALD.

(Continued from page 168.)

XVI.—Concerning the Order of Signalling the constituent parts of a Telegram and the Treatment of Telegrams at the Receiving Office.

THE order of signalling the constituent parts of a telegram is not perhaps a matter of vital importance, but it is an inherent part of telegraph practice which it would probably be unwise to neglect in this review of the British telegraph system.

It is almost needless to say that changes have been made since 1870 in the order of signalling; the only alteration of importance was, however, that necessitated by the introduction in 1886 of the sixpenny telegram, and the consequent abolition of the free addresses.

Originally the preamble, i.e. the official particulars, consisted of the prefix, handing in code, and the number of words to be signalled (in which was included the Service instructions). Then followed the name and address of the sender of the telegram, the name and address of the addressee, the break signal DQ, the text of the telegram, the Service instructions and the final signal PQ. The receiving operator was required to write down the telegram, to make a stroke — after the text, and a double stroke = after the Service instructions.

Two copies were made, by means of carbon paper, of each telegram for delivery, but the prefix, handing in code and the number of words were not duplicated on the carbon copy of telegrams for delivery. Japanned zinc plates were provided for insertion beneath the under copy in order to ensure a good carbon impression. These plates were in use for many years, but were gradually withdrawn after 1870. The received tape at Hughes circuits was gummed to the under form of the double "C" form and the message was copied in manuscript on the upper form which was retained for official purposes. On completion of the telegram the receiving operator was required to signal "RT" followed by the name of the addressee, to record on the upper form the time of receipt and the name of the office from which the telegram was received.

Following the abolition in 1876 of Telegram Abstracts, which will be dealt with in a later chapter, new forms were introduced; it then became the practice to signal the name of the office of origin, and this, together with the Service instructions, followed the handing in code time. Coincidentally the practice was introduced of signalling the word "To" before the name and address of the addressee and the signal PQ was abolished. All service instructions other than those indicating multiple address telegrams were duplicated on the carbon copy of the "C" form. In every other respect the treatment of telegrams was not altered.

In 1877 it was arranged that in the case of telegrams received by post, the words "Handed in at" should be struck out and substituted by the words "Received by post from ———." Since 1913, however, it has been the practice to record the name of the town at which a telegram is posted in the Service instructions.

A further change was made in the order of signalling on the introduction in 1886 of the sixpenny telegram, and also in the forms upon which the delivery copy was written. From that time onward the order of signalling has been:—

- Prefix.
- Handing in Code.
- Office of origin.
- Service instructions.
- Number of words.
- Name and address of addressee.
- Break signal.
- Text of the telegram.
- Break Signal.
- Name of the sender (if any).
- Completion signal.

On telegraph printing circuits the serial number of the telegram precedes the prefix.

Many battles have been fought around the "C" or delivery form. As long ago as 1876 a letter appeared in the *Telegraphist*, a journal which rejoiced in the dignified sub-title of "A Literary and Scientific Journal"; supported by members of the telegraph profession at home and abroad—advocating the abolition of "top copies" of received telegrams. The writer of the letter pointed out that the principle had been adopted in the United States of America, and suggested that its adoption in this country would facilitate the treatment of telegrams and enable the Post Office to effect a saving of paper, carbonics and pencils. The proposal did not at that time appeal to the administration, and there is no evidence that it received any serious consideration before 1885. In that year it was proposed to introduce a single form with counterfoil upon which it was intended to record the name of the office of origin and the name of the addressee of telegrams for delivery. It was claimed that the use of the form would result in a saving of labour and of stationery, but the idea was abandoned when the Comptroller and Accountant General expressed the opinion that it might be difficult to maintain a check on revenue if only such meagre information appeared on the counterfoil.

In 1899 the question was reopened by a committee appointed to consider the organisation of the Central Telegraph Office, London. This committee recommended the adoption of a similar form to be used for transmitted and received telegrams, and to avoid the need for preparation they recommended the provision at each circuit of a flat piece of metal for detaching the counterfoil. The committee submitted that, in addition to the advantages claimed for the earlier proposal, telegrams sent out for delivery would be more distinct and presentable than carbon copies, and that there would be less weight and smaller bulk in sending counterfoils instead of complete copies to the Clearing Branch of the Comptroller and Accountant General's Department. On the other hand the committee realised that the proposed form had certain disadvantages, amongst them being its unsuitability for multiple address telegrams, greater risk of losing counterfoils, and inability to provide certified copies of telegrams as actually delivered—all points which, at that time, were regarded as of supreme importance.

The committee's recommendation was not adopted, but within a short time such a form as they had suggested was introduced at Hughes circuits, and in 1910, following the introduction on a fairly large scale of typewriter reception at Morse circuits, another form known as the "C or B" form, without counterfoil, was tried experimentally. This latter form was used for transmitted and received telegrams, a second copy, produced by means of carbon paper, being prepared in the case of telegrams for delivery.

The experience gained at Hughes circuits shewed that the early objections to counterfoil forms were trivial. Similar forms had been in use for many years in America and in Germany, and in 1912 a further and successful effort was made to convince the Postmaster-General that the counterfoil form was suitable for general adoption.

There can be little doubt that the growing use of printing telegraph apparatus, which produced only one copy of a telegram, accelerated the extension of the use of the form. Another important point in its favour was that the carrying capacity of street tubes was almost doubled by the elimination of the complete office copy; considerable weight was attached to this factor, particularly in London and at the larger provincial offices.

The public were not, however, satisfied. Complaint was made that the change was a measure of false economy, and that the form facilitated fraudulent alterations in the text of a telegram. It is clear that convenience and simplicity and not economy were the governing factors. Experience had shewn that the carbon copy was not proof against fraud, indeed there was reason to believe that

it would be more difficult to alter a telegram written in pencil than the familiar carbon copy. It must, however, be admitted that the early counterfoil forms conveyed an impression of cheapness and insignificance when detached from the counterfoil. Steps were taken to obtain a more suitable design printed on paper of better quality; ultimately the form became standard for received telegrams at all large offices.

The receiving telegraphist was required to enter on the counterfoil the handing in code time, the name of the office of origin, the number of words, and the name of the addressee, and to complete it by recording the time at which the telegram was received, together with particulars of the circuit over which it was signalled, and his own name or initials.

It was realised that the counterfoil form could not be regarded as the last word on the subject. New types of printing telegraph apparatus were influencing the question: the "C or B" form used in connexion with the typing experiment had directed attention to the convenience of the use of a common form for transmitted and received telegrams, and it might have been expected that the next step would be an enquiry into the possibility of the extension or the use of forms of this description.

So far there had been no inclination to abolish the office copy in its entirety, and singularly enough the next experiment in 1915 provided for the preparation of a complete copy of each received telegram, the medium used being a duplicating machine. The Manchester Office was selected for the experiment. "C or B" forms were brought into general use at that office; copying ink pencils were issued to the operators, copying ink ribbons were fitted to typewriters, Creed printers and numbering machines, and copying ink was supplied for use at Hughes and Multiplex circuits. Each received telegram was passed through the copier before reaching the addressing table, the copies being wound round a reel and cut off at intervals.

From one point of view the experiment was successful, but the arrangement was not economical. The cost was heavy, and when in 1917, owing to the war, it became necessary to economise in the use of paper, the question of abolishing office copies of received telegrams, and of using one kind of form for transmitted and received telegrams became a matter of some importance.

A departmental committee was set up to study the whole question, and within a short time an entirely new practice had been evolved and brought into operation. The scheme was first applied at Birmingham in 1917, the result was so satisfactory that steps were at once taken to extend the scope of the trial to all the larger provincial offices. The Central Telegraph Office, London, presented its own special problem and the inclusion in the scheme of that office was deferred until 1919. The basis of the scheme was the "C or B" referred to, suitably amended to meet the requirements of form already all types of apparatus. This form is used at practically every head office and at branch offices in the country. The older double "C" form is still used for received telegrams at sub-offices and railway station offices.

At offices where the "C or B" form is used an office copy is not made except in respect of

- (1) received telegrams originating at certain small offices having direct communication with the delivery office.
- (ii) received telegrams upon which a charge has to be collected, irrespective of the office of origin, or upon which it may be necessary to refund excess sums deposited by the sender for portage, &c., or repetition fees to the addressee and
- (iii) Government telegrams delivered beyond three miles or on which special payment for delivery is incurred.

These office copies are prepared either at the check or the enveloping stage and not at the telegraph circuits. They contain the handing in code time, the office of origin and service instructions, the number of words and the surname of the addressee.

Particulars of all telegrams upon which a charge has to be collected are recorded in a diary at the delivery stage, and a responsible officer is deputed to see that all such monies are duly collected and brought to account.

Naturally the scheme did not at first commend itself to every telegraph officer, but its early and complete success convinced the most sceptical. It enabled the Post Office to effect substantial economies in paper, percils, carbon paper and storage accommodation, and many telegraph officials have since wondered why it needed a great European war to convince the Administration that such a radical change was not only practicable but desirable.

In 1922 the designation of the form was changed from "C or B" to "B or C."

The completed telegrams are placed in special racks at the circuits for transfer by collectors to the circulation point for disposal. Those for delivery are passed either to the addressing table or to the phonogram room: those for onward transmission are circulated in accordance with the Zone Circulation Scheme.

The question of adopting a system of folding telegrams for delivery in such a manner that the use of envelopes may be dispensed with has been considered at frequent intervals for over fifty years. A vast number of specimen forms of this type have been received from members of the public, from visitors to this country from abroad, and from Post Office servants, and it is safe to say that no proposal placed before the Administration has received more patient and more sympathetic consideration. Fifty years ago the adoption of a combined form and envelope might have been welcomed by the public by reason of its novelty. Within a few years of the transfer of the telegraphs to the State, however, it had become one of our national boasts that a telegram was a highly confidential as well as an urgent communication, and any attempt to break away from the traditional distinctive form and cover would then have given rise to serious public complaint.

The combined form and envelope is largely used on the Continent of Europe, and in the Commonwealth of Australia; a form of this description was tried in New Zealand and abandoned owing to public complaint. It is a point worthy of mention that whereas no two administrations using this type of form are agreed upon the method of folding and sealing, the British Administration, the American Telegraph Companies and the Cable Companies are at one in their use of the separate form and envelope.

The principle advantages claimed for the combined form and envelope are (1) that it reduces the cost of stationery and (2) that there may be economy in addressing staff. So far as this country is concerned both conditions are subject to qualification.

As has already been indicated only one form is now used for transmitted and received telegrams, an arrangement which possesses great practical advantages from a working point of view. When distinctive forms were used it was frequently necessary, particularly at the larger offices, to copy telegrams for delivery which had been erroneously offered as transmitted telegrams and written on transmitted forms. This entailed not only a serious waste of stationery, but also involved the use of telegraphists in the work of copying the messages on to received forms. Another point in favour of the separate form and cover is that forms protected by envelopes may be printed on medium grade paper, whereas the combined form and envelope must be printed on a high quality paper and must also be very much larger than the British form in order that it may be folded into a convenient size for delivery. It seems probable,

therefore, that the cost of a larger form of better quality paper for telegrams for delivery and the re-introduction of a separate form for transmitted telegrams would not be less costly than the present system.

Nor is it certain that the system would now be economical from a staffing point of view. At the larger offices from 50 to 80% of the telegrams for delivery bear registered abbreviated addresses and these must be transcribed after receipt. Printed or stencilled covers are provided for all such telegrams and the work of enveloping for delivery is, therefore, performed with ease and rapidity. The alternative would be the use of printed address labels to be gummed to the address space of the form, and it would probably be necessary to employ experienced telegraphists at every stage of the work, some of which is now performed by boy messengers and girl probationers.

Recent experiments foreshadow considerable development in the direction of column printing telegraph apparatus which prints telegrams on a continuous roll of paper. It is obvious that the combined form and envelope cannot be used with this type of telegraph apparatus: moreover the tape printed telegram is not entirely suitable for the form owing to the danger of damage, during opening, by extraneous gum, &c., and in all the circumstances it is now practically certain that the present system of using one type of form for transmitted and received telegrams and a distinctive envelope for telegrams for delivery will not be departed from.

(To be continued.)

THE CENTRAL TELEGRAPH OFFICE AND THE STRIKE.

THE experience in the Central Telegraph Office during the industrial crisis was not different from the experience in the London Telephone Service, described elsewhere. The increase of traffic was almost exactly parallel, and precisely the same difficulties were overcome in bringing the Staff to the Office and in getting them home again. At every point there was ready self-sacrifice, and the abnormal pressure in the evening and at night added to the difficulties inasmuch as extended hours were necessary, in many cases going beyond the ordinary times of the transport arrangements. The Central Telegraph Office was called upon to fulfil other functions outside its normal range, but it would not be possible to describe them in this place. Most telegraph people know that very often at times of emergencies difficulties arise with plant and line failures, but during the industrial crisis all the plant behaved itself admirably, and the proportion of faults on the multiplexes was strikingly small. Altogether, without being able to speak in great detail of what was done, everybody concerned have every reason to be proud of the co-operative spirit which was manifested at every point and those Officers, in particular, who were responsible for the various arrangements which were made in the interests of the Staff, both as regards transport and as regards other facilities, have the satisfaction of knowing that their services were fully appreciated.

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.

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JUNE, 1926.

No. 135.

THE GREAT STRIKE.

WITH the shadow of the Coal Strike still lying upon the country, it would be premature to exult unduly in the settlement of our industrial difficulties. Nevertheless, the relief experienced by the cessation of the General Strike is naturally widespread and heartfelt, and it will perhaps not be unseasonable to advert to the splendid work performed by our telegraph and telephone colleagues during the anxious and exacting days of its duration. We have not at the time of going to press full particulars of the incidence of traffic loads in the large provincial centres, but we know by the testimony of newspaper reports that the staff there played a similar part during the strike to that played in London, of which we are able to publish some particulars in another column. The same "spirit of service," so much vaunted by our American friends on all occasions, was everywhere predominant, the same determination to reach their place of work at all hazards, the same cheerfulness, and the same eagerness to afford as rapidly as possible those means of communication which had become doubly valuable in the critical conditions existing.

The London Telephone Service carried, it will be seen from the article referred to, an increased load of 50% on the day preceeding

the General Strike: this increase was maintained during many days of the first week, although it tended to decrease as the Strike continued, but the rush of calls on the Wednesday, when the T.U.C. negotiated with Mr. Baldwin for a settlement, surpassed all previous loads, and the fact that they were disposed of without breakdown is extremely creditable to a staff which had been working for 9 days under abnormal and somewhat harassing conditions. The Central Telegraph Office had an equally strenuous time, but with less evenly maintained periods of high pressure. On Monday, the eve of the General Strike, 170,215 telegrams were dealt with (about 50% above the normal traffic). The load then lapsed roughly to the normal during the ensuing week, rising to 136,155 on the Wednesday when the Strike was called off, and totalling 145,309 (an increase of 26% above the normal) on the day when the railway workers resumed.

The experiences of the staff reflected pretty faithfully those of the members of other services who strove so successfully to maintain communications in the face of much difficulty and discomfort. Hostile crowds had sometimes to be braved, but misgivings were often lightened by the sense of humour exhibited on both sides. This, indeed, was characteristic of the strike as a whole, and little short of wonderful in view of the serious issues involved. A typical example is that quoted by our contributor of a man who jumped on one of the coaches conveying telephonists to work, and caused some alarm until he jumped off with a mocking "Sorry you are troubled," rolling the "r" in accordance with official instructions. We echo our contributor's hopes of a period of greater industrial tranquillity and development of business, and add a hope of our own that a good spirit may prevail on both sides in the great dispute still to be adjusted.

HIC ET UBIQUE.

MR. WILSON MIDGLEY, the New York correspondent of the *Daily News*, in an article entitled "Back to England," refers to his native land as the "country where public telephoning has all the appearance of a crime to be committed in dirty boxes in out-of-the-way corners." But, on the other hand, as our old friends the Greeks were so fond of saying, other people complain of the transparency of the new call-boxes. The glass-work comes down so low that their knees are exposed to the public gaze. Which to an essentially modern maid must be hard to bear.

Ye who on public Telephones embark
 On shallow Rivers of inane Remark.

Whilst others wait, is this not Theft of Time?
 'Tis well it is committed in the Dark.

And ye, O gentler sex, who make your Moan,
 That when in Public you must telephone,
 Too much there is of Window, ye yourselves
 Live in glass houses. Shall you throw the stone?

How can you blame the unoffending Box,
 Which is not as transparent as your frocks?
 If that your Calls were brief as are your Skirts,
 Fewer despairing Eyes would gaze on Clocks.

(*The Fruit Garden of Learning for the Nourishment of the Discerning.*)

Call boxes are, in fact, much in evidence in recent press cuttings. A Newcastle paper reports a "Flappers' Find. Telephone Boxes as Beauty Parlours."

The modern flapper is ingenious, and a notable little instance of her cuteness is forthcoming in this little cameo from the coast.

In a certain street in Whitley Bay three young girls filled the telephone box, but they were not phoning. They had more important business on hand. As a matter of fact, they were giving a few necessary touches to their toilet.

Armed with vanity bags, mirrors, powder-puffs, and lip-sticks, they were very busy, making the most of the shelter and the seclusion that the box afforded. It was no scamped affair either. Nearly a quarter of an hour elapsed before they stepped out briskly, looking spic-and-span, and apparently delighted with their new discovery.

Is it entirely a coincidence that a few days later a Littlehampton journal places *immediately* above a paragraph announcing the opening of a new call office at Bognor the following significant advertisement:—

— Skin Cream retains beauty's irresistible charm.
E. —, West End Pharmacy.

The number of wireless receiving licenses issued during the month of April, 1926, was 123,695 as compared with 75,617 in April, 1925, the total number of licenses in force at the end of April, 1926, being approximately 2,012,252.

PROGRESS OF THE TELEPHONE SYSTEM.

A REVIEW of the telephone statistics for the past financial year shows that the development of the Telephone System has been well maintained. Although there was a decline in the volume of new business during the summer quarter, there was a marked increase during the last six months of the year, the net addition to the number of stations, 30,870 for the October-December quarter and 32,245 for the January-March quarter, being each in turn the highest figure so far recorded for any quarter.

The total number of stations working at March 31 last was 1,390,153, an increase of 116,353 or 9.1% on last year's total. During the year there was a gross increase of 222,494 new stations, counterbalanced by 106,141 cessations.

The table below shows the growth for the year in London, England and Wales, excluding London, Scotland and Northern Ireland.

	Total No. of Stations		Increase.	Increase %
	At Mar. 31, 1925.	At Mar. 31, 1926.		
London	449,388	488,499	39,111	8.7
England and Wales (excluding London)	684,335	751,876	67,541	9.9
Scotland	123,115	131,474	8,359	6.8
Northern Ireland ...	16,962	18,304	1,342	7.9

Residence rate installations at the end of March, 1926, numbered 97,833 in London and 163,473 in the provinces, the total 261,306 representing 32.3% of the total exchange subscribers. Since the introduction in July, 1922, of a separate tariff for private house connexions, the percentage growth in residence lines has always been appreciably higher than the percentage growth in business lines, but during the year 1925/26, actually more residence rate subscribers were added to the system than business subscribers.

The net growth for the year was 39,355 residence rate and 35,270 business rate installations.

The number of Public Call Offices working at March 31 last was 20,300, which represents a net addition of 1,470 or 7.8% during the year. The total number in London at the end of March was 4,445 and in the provinces 15,855, an increase of 263 and 1,207 respectively over the totals at the end of the previous year.

Included in the total of 20,300 Public Call Offices are 1,929 street kiosks. The growth of this type of call office has been very remarkable during the past year, the total at March 31 representing an increase of 853 during the year, or more than double the growth for the previous year. The majority of the kiosks are situated in the provincial towns, but during the past year there has been a marked increase in the number in the London Telephone area, which totalled 245 at March 31 last as compared with 97 at the end of March last year.

As regards rural development, 210 new rural exchanges were opened during the year 1925/26, making a total of 882 exchanges opened since the inception of the Rural Development Scheme in 1922. In addition a further 60 exchanges were in course of completion.

With the increased provision of exchanges in rural areas, the development of rural party lines has diminished, but nevertheless, during the year there was an increase of 498 rural party line stations (5.3%), bringing the total at the end of March up to 9,872.

The number of Rural Railway Stations connected with Telephone Exchanges at the end of March, 1926, was 680, representing 762 telephone stations. Seventy circuits were added during the year 1925/26.

Trunk statistics for the year are not yet complete. The February figures are the latest available and during that month 6,525,103 inland trunk calls were dealt with, an increase of 638,994 calls, or 10.9% over the figure for the corresponding month last year.

The Anglo-Continental traffic for February was slightly heavier than for the two previous months. Calls to the Continent numbered 18,426 or 1,417 more than in February last year. The outgoing traffic represented 46% of the bothway traffic.

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

LONDON—Waterloo.

and among the more important exchanges extended were:—

LONDON—Battersea, Clissold, Loughton, Richmond, Putney, Walthamstow.

PROVINCES—Bilston, Blackburn (Automatic), Cleckheaton, Exeter, King's Norton, Kirkealdy (Automatic), Milnsbridge, Portobello, Sunderland, Winchester.

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

Bristol—Weston-super-Mare.

Kimberley—Langley Mill (Section of Nottingham—Langley Mill cable).

Taunton—Exeter (Section of Bristol—Plymouth cable).

Edinburgh—Linlithgow (Section of Edinburgh—Falkirk cable).

Leicester (Rothley)—Loughborough.

while 125 new overhead trunk circuits were completed, and 137 additional circuits were provided by means of spare wires in underground cables.

THE RUGBY RADIO STATION OF THE BRITISH POST OFFICE.*

BY E. H. SHAUGHNESSY, O.B.E., M.INST.E.E.

INTRODUCTION.

WHEN the Government decided upon the provision in England of a wireless station with a world-wide range, the Post Office Engineering Department was entrusted with the task of its erection. The Wireless Telegraphy Commission which was originally appointed under the chairmanship of the late Lord Milner, with Dr. W. H. Eccles (vice-chairman), Mr. E. H. Shaughnessy and Mr. L. B. Turner as members, undertook the general design of the station. The Post Office engineers, in consultation with the Wireless

SITE.
Owing to the large area required, considerable difficulty was experienced in obtaining a site, but ultimately an area of 900 acres (about $1\frac{1}{2}$ miles long by 1 mile wide) bounded on the east side by Watling Street and on the west side by the Oxford canal was obtained at Hillmorton, about 4 miles south-east of Rugby. The ground is level and not surrounded by hilly or wooded country, although a fox covert on the site had to be demolished, as it was under the proposed aerial. A water supply is available from a stream running through the site; the nearby railways and the Oxford canal afford transport facilities. The station buildings are erected about the middle of the site (see Fig. 1).

POWER PLANT.

The question of the power supply for the station was one which was very carefully considered, and after a close examination of conditions on the basis of comparative costs and reliability it was decided to accept a bulk supply from the Leicestershire and Warwickshire Electric Power Co., who are the authorised suppliers in the area.

The company has generating stations at Warwick and Hinckley, the Rugby area being served by duplicate mains from Warwick, whilst arrangements for linking with Hinckley are in contemplation. The incoming supply is three-phase, 50-cycle alternating current having an earthed neutral and 12,000 volts between phases.

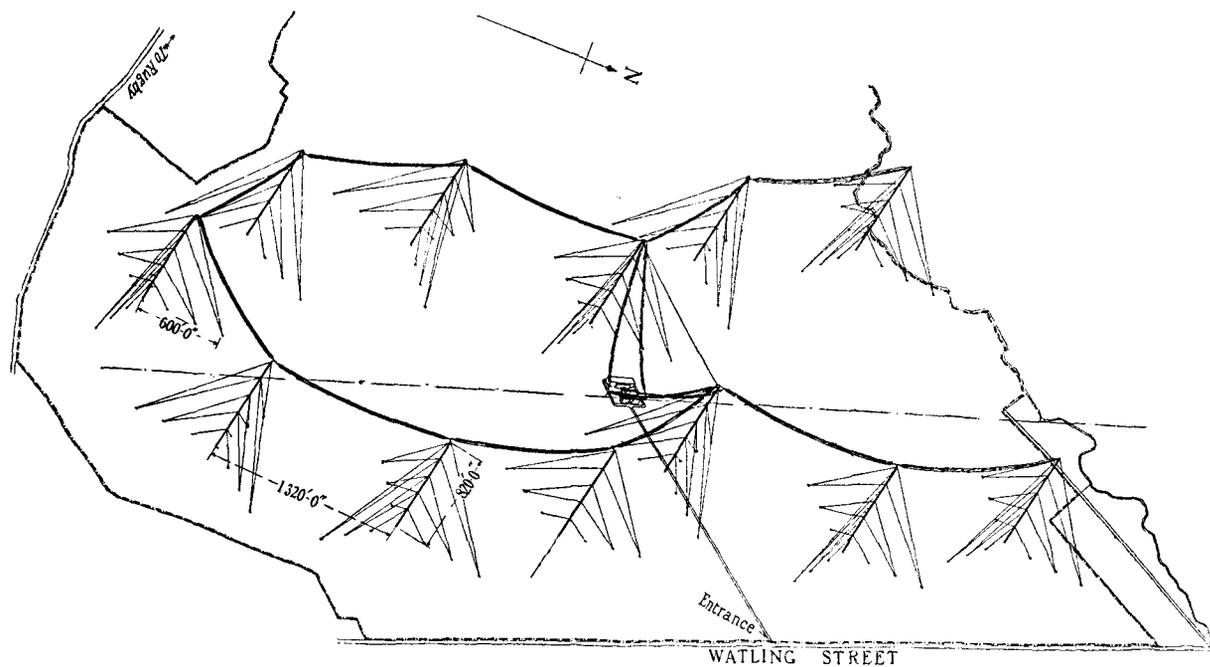


FIG. 1.—ISOMETRIC VIEW OF STATION.

Telegraphy Commission, carried out considerable preliminary experimental work and prepared detailed drawings and designs for the station equipment as a whole and for most of the plant; they also prepared the detailed specifications to which manufacturers have designed or made the remainder of the plant.

In the preliminary design of the station it was considered that in order to ensure reliable communication when working on a wave-length of about 18,000 m. (16.66 kilocycles) a minimum working current of 500 amperes in an efficient aerial supported on 820-ft. masts would be required. To meet this requirement and provide a safe working margin it was decided that the high-frequency generating valve plant should be capable of dealing with an input of 1,000 kW. to provide for a possible necessary low working efficiency of 50%. Such an installation would produce an aerial current of about 700 amperes to meet bad atmospheric conditions.

Originally it was considered that sixteen 820-ft. masts would be required to support a suitable aerial, but to avoid any unnecessary expenditure it was decided to erect in the first instance an aerial having a designed capacity of $0.045 \mu\text{F}$ on 12 insulated 820-ft. masts and to carry out tests to ascertain the limitations imposed on the aerial power obtainable by such factors as corona, insulation, etc., and to obtain data as regards the range of the station using this maximum power.

In order to keep this description of the Rugby radio station within reasonable limits it is proposed to describe the power plant and the external plant briefly and the radio-telegraph plant in detail.

Duplicate underground cables are provided between the radio station and the company's sub-station at Rugby, where automatic regulators are installed.

The two feeder cables terminate at the radio station in a separate selector switch which permits either or both cables being connected to the e.h.t. alternating current switchboard.

The radio station power-house consists primarily of a machine room 185 ft. by 47 ft. spanned by an 11-ton overhead travelling crane. The general layout is shown in Fig. 2. One end of the room is partitioned off for workshop and stores to which the crane has access and which can be readily utilised for extensions if this becomes necessary. Parallel with the main room is an annex, the lower portion of which contains a battery room and six transformer rooms. A separate room is provided for each power transformer, and these rooms can only be entered from outside the building. They are closed by steel doors furnished with ventilating louvres. The upper floor of the annex is a switch gallery open to the machine room. This gallery contains the high and low tension a.c. switchboards, high-tension a.c. starting cubicles for the main generators and low-tension d.c. switchboard.

In the machine room are the main motor-generator sets for providing high-tension direct current to the valves, two-frequency-converter sets used for heating valve filaments, together with motor starting cubicles and alternator control panels, and lastly two motor-generator and booster sets for battery charging and low-tension d.c. supply.

All power used other than that required for the main motor-generators is supplied by two auxiliary step-down (12,000/416 volt) transformers of 450 kVA output through the main low-tension a.c. switchboard. For reasons explained later it was found more convenient to supply each main motor-generator set through a separate transformer.

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

The larger motors (i.e. over 100 kW) installed are synchronous machines capable of operating on 0.9 leading power factor and as a result the station can be operated on unity power factor.

The c.h.t. a.c. switchboard is a 6-panel board consisting of 5 truck cubicles and a metering cubicle. The first truck contains an oil switch controlling the supply to busbars and also contains the company's meters with their respective instrument transformers. The next panel consists of a cubicle containing the Department's check meters and potential transformer.

The four remaining panels are feeder truck cubicles, two being connected to the auxiliary 450-kVA transformers situated immediately below the switchboard, whilst the third, of 2,000 kW capacity, controls the supply to the main motor-generator sets. The fourth truck is at present spare and interchangeable with the remaining three feeder-trucks. The low-tension a.c. 416-volt switchboard is of the normal slate pattern containing 16 panels, and controls all auxiliary power inside the station and the outside feeders to mast winches, pumps, etc. These switchboards, together with a number of other switchboards and cabling, was supplied and erected by Messrs. The General Electric Co., Ltd.

The requirements of the valve transmitter set called for a supply of d.c. power of from 1,000 to 1,500 kW at a potential of from 10,000 to 18,000 volts, with the negative side at earth potential, the higher voltage being provided to cope with probable developments in transmitting valves in the near future.

Owing to the possible failure of valves it was essential that whatever type of plant was installed it would have to be capable of standing a dead

provides a blast of air across the commutator. The brush gear is completely encased in bronze boxes, the connections to which produce magnetic fields directed to blow out from the machines any arc which may be formed at the brushes.

The bearings are each provided with a thermal relay which, in the event of overheating, rings a bell on the control panel and lights an indicating lamp on the hot bearing.

In order to avoid the use of insulated couplings between motor and generators, each set is supplied with power through a separate transformer. These transformers, manufactured by Messrs. Johnson and Phillips, are wound for 12,000 volts on the primary side and 2,200 volts on the secondary side. The insulation of the secondary winding from the primary winding and core bunched was designed for and subjected to a flash test of 50,000 volts. The secondary side is connected directly to the motor terminals by means of a 3-core paper-insulated cable, and all a.c. switchgear is on the primary side of the transformer.

The d.c. controls of each set are mounted on an auxiliary base-plate which carries generator field rheostats and shunt field rheostats for the main exciter and motor exciter.

The main base-plate of each set and the auxiliary base-plate are insulated from earth by being mounted on groups of porcelain insulators. The neutral point of the motor stator is connected to the base-plate. The mid-point between the d.c. generators is also connected to the base-plate through a leakage relay. In this way the potential of any portion of the set relative to the frames is limited to 3,000 volts d.c.

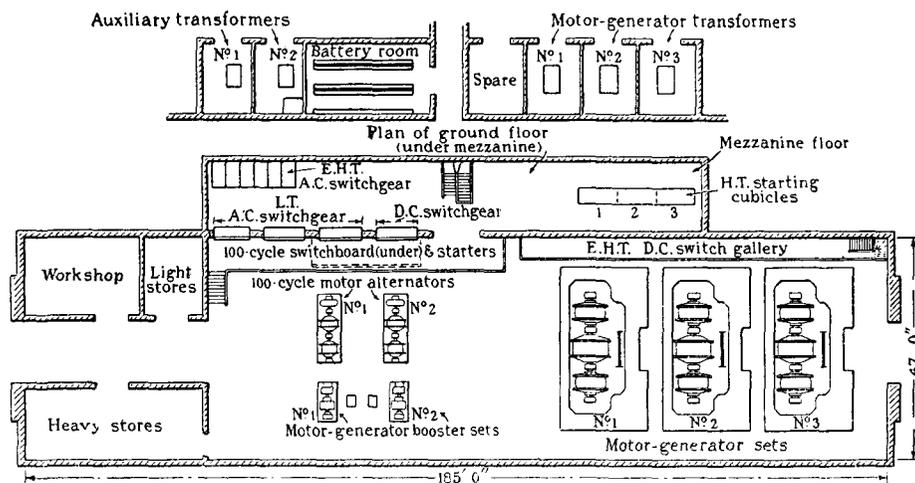


FIG. 2.— PLAN OF POWER HOUSE (scale $\frac{1}{4}$ in. = 1 foot).

short-circuit with impunity. Other special requirements were ability to operate under rapidly fluctuating loads, low self-inductance, and absence of voltage ripple.

The relative merits and suitability of machines, mercury-arc rectifiers and thermionic valve rectifiers for this duty were considered. Tenders were invited for the various types and it was finally decided to install motor-generator sets (see also Report of Wireless Telegraph Commission, Command Paper 1572-1922).

The machines were manufactured by the British Thomson-Houston Co., Ltd., of Rugby, and are an interesting development from machines designed for high-tension d.c. traction work. The Rugby generators, owing to the higher voltage and their operation in series, possess several new features, some particulars of which have already appeared in the technical Press and will only be briefly referred to here. Fig. 3 shows a wiring diagram of these sets. Three sets are provided, each having an output of 500 kW at 6,000 volts d.c., and space is provided for the accommodation of a fourth set. Each set consists of a three-phase self-starting synchronous motor of 640 kVA wound for 2,200 volts between phases, rigidly coupled to two d.c. generators connected in series, and two exciters, one of which is the main exciter and the other the motor field exciter; the main exciter provides field current for both d.c. generators and for the field of the motor exciter.

Each d.c. generator is a bipolar machine having an output of 250 kW at 3,000 volts and provided with interpoles and compensating winding. The magnet frames of cast steel are split diametrically, and, in order to avoid awkward joints in the pole-face windings, the break has been arranged through the centre of the main poles, which consist of twin poles, each half carrying its own spool. Another unique feature of the magnetic circuit is a band of laminations incorporated in the yoke to provide an undamped path for the commutating flux under rapidly varying loads. The commutator is of the same diameter as the armature, and all metallic parts in the vicinity of the commutator, which are connected to the frame, are protected by insulating shields. A series of fan blades mounted between the armature and commutator

When working in series each set has a base-plate potential corresponding to its position in the circuit; thus the first base-plate will be at 3,000 volts, the second at 9,000 volts, and the third at 15,000 volts above earth in each case.

The wiring diagram of the control panels on the auxiliary base-plate is shown in Fig. 4.

Each main base-plate carries two high-speed circuit breakers, each connected in series with a generator armature. The high-speed circuit breaker is set for instantaneous tripping on about 5 times full-load current; it inserts a blocking resistance in circuit, and at the same time, by means of auxiliary contacts, trips the generator field contactor. The action of the circuit breaker is extremely rapid, the contacts being fully opened within 0.02 sec., whilst in order to suppress the generator fields as rapidly as possible the field contactors open the circuit without inserting discharge resistances. Each set is completely surrounded by an earthed metallic screen and the foundations contain a metallic network which is connected to the earthed screens. All controls are operated by means of insulated spindles from a position outside the screens. The e.h.t. d.c. terminals of each set are connected to a 2-position selector switch mounted on a gallery carrying the busbars. In one position the switch connects the machine in series with the busbars, whilst in the other position the machine is isolated and the gap in the busbars bridged. The screened enclosures and busbar gallery are protected by gates having double electrical interlocks. In addition it is impossible to enter the machine enclosures without first earthing the base-plate, thus preventing any possibility of shock from a static charge left on a machine after closing down. A complete system of electrical interlocks external to the machine enclosures is associated with the selector switches, machine controls and a.c. starters. The supply for this interlock system is taken from the 240-volt d.c. battery supply, and no-volt devices are provided to shut down the plant in the event of this supply failing. Any attempt to enter a live enclosure or to operate a selector switch while the busbars are excited will trip the field controls of all running machines. In the event of any generator developing a fault or in the event of any high-speed circuit breaker opening on overload, means are provided to trip the

field controls of all other generators connected to the busbars. As previously mentioned, the motor starting gear for each set is on the 12,000-volt side of the step-down transformer and consists of a steel cubicle containing isolating links, main and star-delta oil switches, overload and low-voltage trips, ammeter and power factor meter with current and potential transformers. Each cubicle is located on the switch gallery immediately over its associated transformer, to which it is connected by bare conductors passing through porcelain bushings in the floor. In operation the main oil switch connects one end of the three primary windings of the transformer to the line. The second oil switch is of the 4-pole double-throw type with double escutcheon. On closing the starting-throw the inner ends of the primary windings are connected together, the transformer thus being star-connected to the line

20 times, in all cases without flash-over or damage of any kind. A copy of oscillograms taken on a single set by the B.T.H. Co. during the official test is shown in Fig. 5. After installation two short-circuit tests were carried out with all sets in series and fully excited to a total of 18,000 volts d.c. with equally satisfactory results.

The d.c. supply from the busbars is transmitted to the valve room through duplicate armoured concentric paper-insulated cables, the inner conductor in each case being the high-tension conductor, whilst the outer conductor carries the return current at approximately earth potential. The cables terminate in a steel cubicle switchboard (Fig. 6) supplied by the General Electric Co., Ltd., consisting of two cubicles each provided with isolator and earthing switches, electrostatic voltmeter, and an electrically operated single-

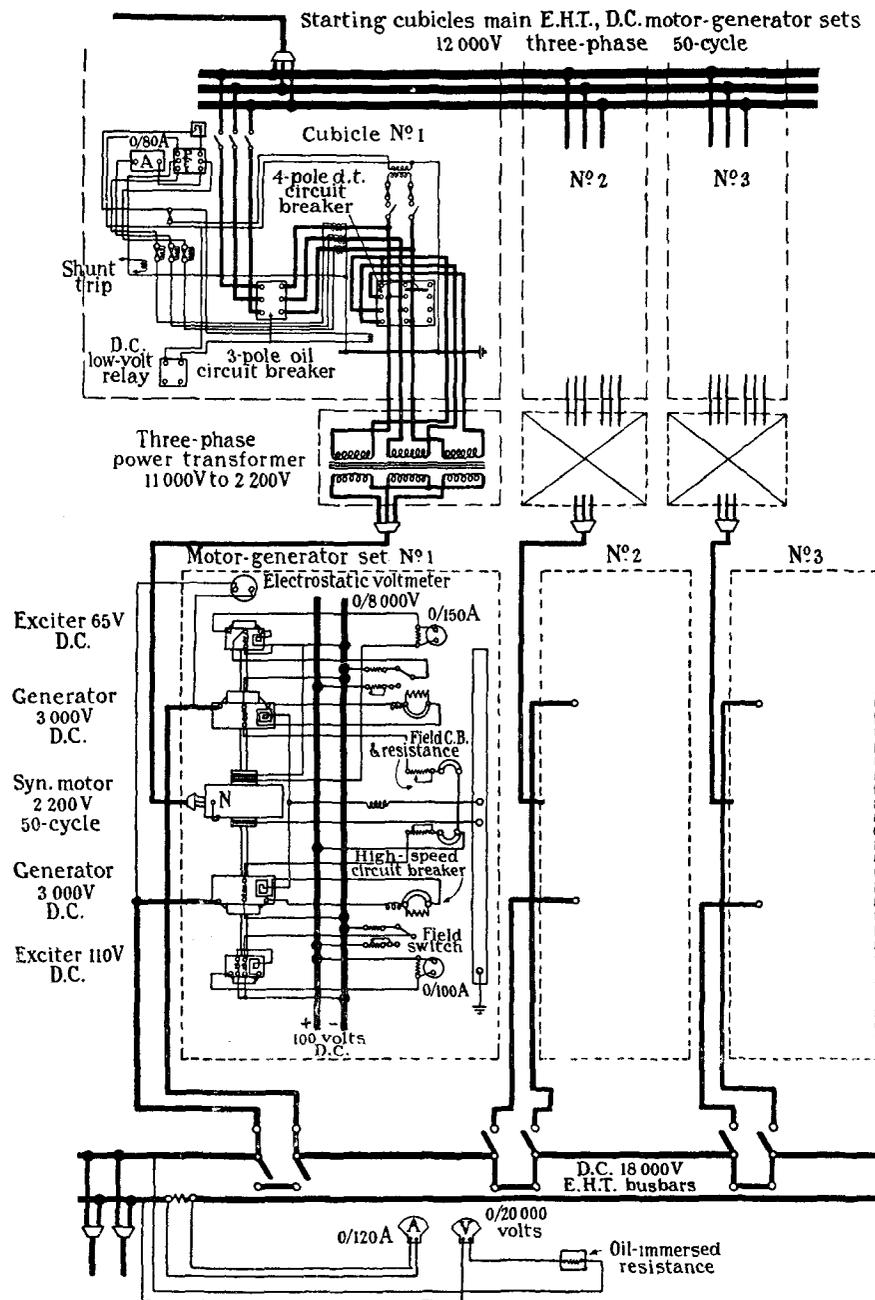


FIG. 3.—WIRING DIAGRAM OF MOTOR-GENERATOR SETS.

and delivering 1,270 volts between phases to the motor. The operation of a sliding interlock bar trips the starting-throw and frees the running-throw, which can then be closed to connect the transformer primary in delta, giving a normal running voltage of 2,200 volts between phases on the secondary. The switch cubicles were supplied by the British Thomson-Houston Co., Ltd.

In spite of the large dimensions of the machines for their output, necessitated by voltage requirements, the test-results showed an overall efficiency of over 87%.

In addition to the ordinary tests, the machines were subjected to short-circuit tests while fully excited; in the case of one set this test was repeated

pole 18,000-volt d.c. oil circuit-breaker provided with overload and no-volt trips. The no-volt trip coil on this switch forms part of a low-tension d.c. circuit and will be referred to subsequently as the "holding coil." One cable terminates in each cubicle, one cubicle being used to supply the main telegraph transmitter, and the other cubicle serving the experimental telegraph transmitter. In addition the telegraph cubicle has a selector switch interlocked with the oil switch which connects the e.h.t. d.c. supply to one of two short alternative feeders to the telegraph transmitter, the unused feeder being earthed. The oil circuit-breaker is designed to trip rapidly on interruption of the "holding coil" circuit which is energised from the 240-volt d.c. supply, and during tests the contacts opened 0.18 sec. after interruption of the "holding coil" circuit.

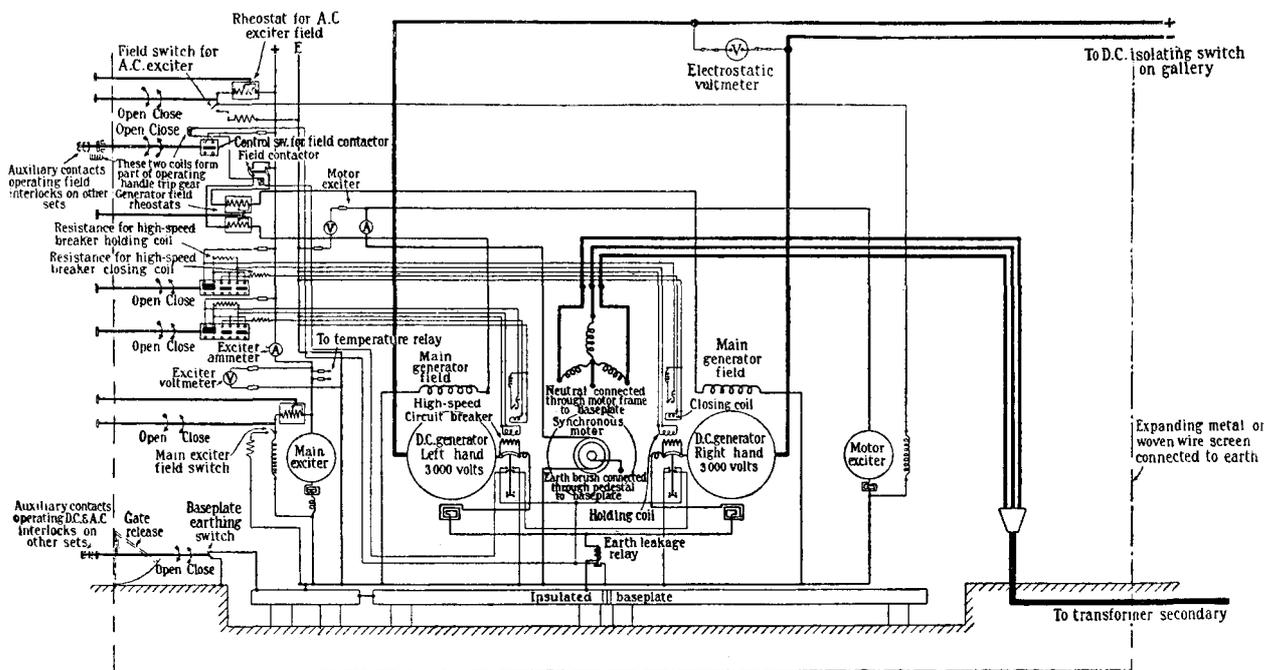


FIG. 4.—WIRING DIAGRAM OF CONTROL PANEL OF 500-kW MOTOR-GENERATOR SET.

The use of oil circuit-breakers to rupture high-tension d.c. circuits is thought to be a novelty, but tests on short-circuits of 18,000 volts showed that the switch could successfully clear the fault without damage.

The valve filament supply of the station is obtained from two 200-kVA frequency-converter sets each consisting of a 416-volt 50-cycle synchronous motor driving a 200-kVA 354,478-volt 100-cycle three-phase alternator. Each set is provided with a pony motor and exciter. Tirrill regulators are provided on each alternator control panel to limit a.c. voltage fluctuations, and as an additional safeguard the regulators are fitted with excess-voltage cut-outs to provide against the possible failure of the regulator. The voltage maintained by the Tirrill regulators can be varied by remote control from the valve room.

These sets, together with the smaller d.c. generator and other motor-generator sets installed elsewhere and referred to later were provided by Messrs. Newton Brothers, Derby. The alternator control panels were provided and erected by the General Electric Co., Ltd.

For the operation of various control and protective circuits, and as an emergency lighting supply, a small secondary battery consisting of 120 cells of 200 ampere-hours' capacity has been installed. For charging this battery, 30-kW induction-motor-driven generator and booster sets are provided in duplicate. Automatic switches are provided to short-circuit and disconnect the booster, leaving the battery on the busbars in the event of the motor stopping, the generators being protected by overload and reverse-current circuit breakers. The d.c. busbar voltage is kept at 240 volts and the booster supplies the difference between the battery voltage and this value.

The workshop situated at one end of the power house is provided with a work bench and a number of power-driven machine tools including a 6-in. screw-cutting lathe, 21-in. vertical drilling machine, power hacksaw and shaping machine.

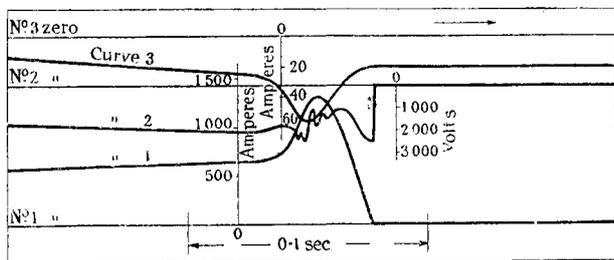


FIG. 5.—OSCILLOGRAM OF SHORT-CIRCUITING TEST ON 500-kW, 6,000-VOLT MOTOR-GENERATOR SET.

- Curve 1.—Short-circuit current (1 cm=756 amps.).
- Curve 2.—Voltage across high-speed circuit breaker, commutating pole and compensating windings (1 cm=3,271.8 volts).
- Curve 3.—Shunt field current (1 cm=48 amps.).

All circuits and machines are provided with protective devices designed to prevent damage from high-frequency currents. On the e.h.t. direct-current generator set, spark-gaps having non-inductive resistances in series are connected across each generator armature. On other machines or feeders straight-filament lamps in cast-iron boxes are shunted across the machine terminals or feeder. In a few cases where the machine current is small a condenser of 2 μ F capacity with lamps in series is used.

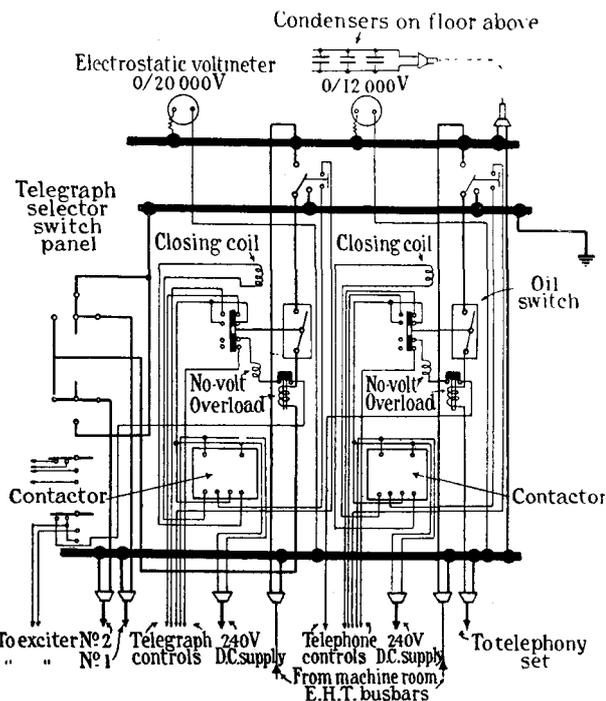


FIG. 6.—WIRING DIAGRAM OF E.H.T. DIRECT-CURRENT CUBICLES IN VALVE ROOM.

The switchgear in the valve room, consists of the steel cubicles for controlling the e.h.t. direct-current supply and a dead-front board of 20 slate panels carrying all auxiliary supplies for the telegraph transmitter, together with some of the supplies for the telephone sets. A small dead-front slate board of 4 panels supplies all other power required for the experimental telephone set.

The 20-panel board controls the supplies for filaments, grids and anodes of the earlier valve stages and for grid bias of the main valves. The supplies

are obtained from duplicate motor-generator sets housed in a small machine room adjoining the valve room.

Other supplies provided by this board are a 240-volt d.c. supply for switch controls and machine excitation, a 50-cycle 416-volt three-phase supply to motors of motor-generator sets and air compressors for keys, a 300-volt d.c. supply for the grid bias of the experimental telephone transmitter, and lastly the 354 478 three-phase 100-cycle supply for heating valve filaments on the telegraph and experimental telephone sets.

Two sets of busbars are provided for the filament supply, one set being associated with each alternator, to which it is connected through a remote-controlled solenoid-operated oil switch. The filament supply to individual valve panels of the telegraph set is taken through a double-throw 3-pole switch on the front of the board and then through a 3-pole contactor mounted behind the board. The double-throw switch enables the valve panel to be connected to either set of busbars, whilst the contactor is in each case remote-controlled from the valve panel where a step-down transformer is situated.

The switchboard and contactors were supplied by the General Electric Co., Ltd.

While on the subject of power supply it may be interesting to mention that a supply of current was required for providing aircraft obstruction lights on certain masts. As the masts are highly insulated from earth it was impracticable to take supply directly from the mains. The difficulty was overcome by mounting a 2-kW 240-volt d.c. dynamo on the mast and driving it by means of a suitable 50-cycle squirrel-cage motor on the ground through the medium of a rubber motor-cycle belt. The motor, which is a totally enclosed weather-proof machine, is provided with automatic starter actuated by a Venner time switch so that the lights are automatically switched on at sunset each evening and switched out at dawn.

HIGH-FREQUENCY GENERATING VALVE PLANT.

The high-frequency generating plant was designed to utilise thermionic valves and to be capable of dealing, if necessary, with an output to the aerial of 500 kW continuously under commercial conditions. For the purpose of preliminary calculations the wave-length was taken as 18,000 m, the capacity of the aerial as 0.045 μ F, and the total aerial circuit resistance as 1 ohm.

The aerial was designed so that it could be used as one large aerial or be readily divided at the station building into two unequal parts to provide for simultaneous telegraph transmissions on two aerials, and for this purpose two separate down-leads were provided.

The high-frequency generating plant had therefore to be designed so that it could be readily used for such simultaneous transmissions when necessary. However, after the plans had been prepared it was decided to carry out experiments in transatlantic telephony from Rugby in association with the

suitable combination which was tried out commercially at the Post Office, Northolt valve station, and proved successful.* The primary source or master oscillator at Rugby is a valve-maintained tuning-fork having a frequency of about 1,800 cycles per second (this frequency being adjustable within small limits), and the high frequency required for controlling the main set is obtained by selecting the 9th harmonic of the tuning-fork frequency.

The frequency produced by this means is remarkably constant, the frequency variation with temperature of the tuning fork being about 1 cycle in 10,000 per degree C. A small adjustable electric heater is provided to

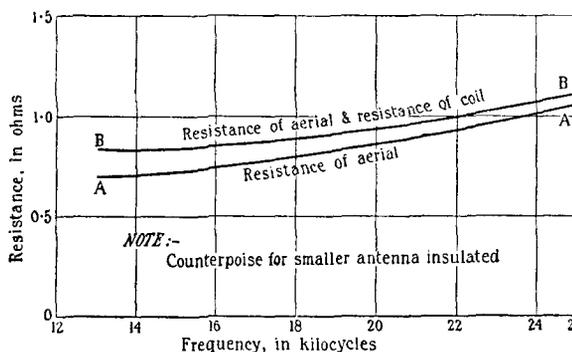


FIG. 7.—CURVES OF AERIAL RESISTANCE, ETC.

Curve AA.—Resistance of telegraphy antenna (0.033 μ F).

Curve BB.—Total resistance of aerial circuit with 0.033 μ F antenna.

enable the temperature of the box containing the tuning-fork to be kept constant.

The "tuning-fork" stages of amplification may be briefly described as follows. The output from the valve-maintained tuning-fork is of the order of micro-watts and this is amplified once at low frequency. The 9th harmonic is then selected, filtered and amplified three times with low-voltage valves, giving a final output of 100 watts from the last of these three stages. The tuning-fork and all the above stages of amplification are contained in two copper boxes mounted one above the other, the various stages being carefully screened from each other by copper partitions, and this complete unit is termed "tuning-fork unit." The connections of this unit are shown in Fig. 8.

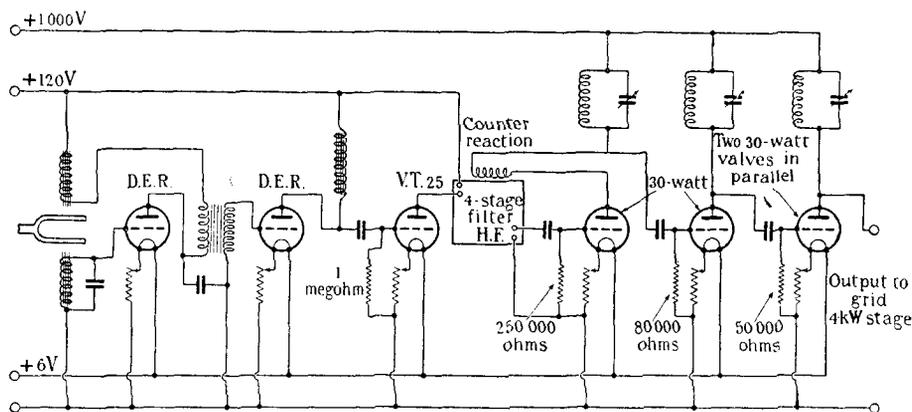


FIG. 8.—DIAGRAM OF TUNING-FORK UNIT.

American Telegraph and Telephone Co., and the smaller part of the aerial has been reserved for this purpose for the present and so diverted from its intended function of forming part of a large aerial for the full telegraphic power of the station, or of being used for a second radio telegraphic channel.

In consequence, the aerial immediately available for the telegraph transmitter is the larger part erected on 8 masts which has a capacity of 0.033 μ F. The resistance, as measured after erection, of this aerial at various frequencies in the region of the required transmitting frequency with the masts insulated, is given by curve A of Fig. 7. Curve B of the same figure gives the total resistance of aerial and aerial tuning inductance.

It is essential with the ever-increasing number of transmitting stations that special efforts should be made to maintain constant the frequency of a radio transmitting station and thus reduce the possible interference to a minimum by permitting the use of highly selective receivers.

It was therefore decided to investigate and if possible develop the use of the valve-maintained tuning-fork of Eccles and Jordan as a primary source of constant oscillations. The Post Office research staff produced a

The output from the tuning-fork unit is amplified three times before it is delivered to the aerial circuit, the various stages being designed to deal with input powers of the order of 4 kW, 50 kW, and 1,000 kW respectively and giving output powers of 2 kW, 30 kW and 540 kW respectively. These are referred to as the 4-kW stage, the 50-kW stage and the "power units" respectively. The combination of the 4-kW stage and its associated 50-kW stage form an "excitation unit." Excitation units and tuning-fork units are provided in duplicate so as to reduce to a minimum the possibility of delay due to faults, and the arrangement is such that either tuning-fork unit can be used with either excitation unit and either excitation unit can be used to drive the final stage of amplification, which consists of a number of power units.

All the stages and units are contained in high-tension enclosures. The arrangement has been planned so that all meters can be read conveniently, and so that such tuning adjustments as are necessary while the power is on can be made from outside the high-tension enclosures.

* A. G. LEE: *Electrician*, 1925, vol. 94, p. 510.

Fig. 9 is a plan of the ground floor of the transmitting building and shows the layout of the high-frequency generating plant, etc. The excitation units are seen in duplicate on the right, and the five power units on the left.

The switchboard immediately behind the control table is the 20-panel switchboard, referred to previously, which is associated with the filament

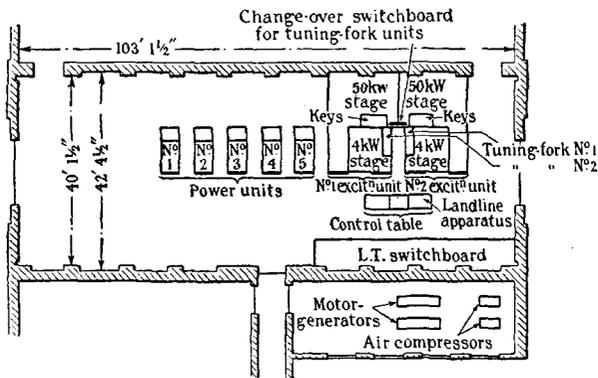


FIG. 9.—PLAN OF TRANSMITTING BUILDING.

supply to the amplifiers and the machines in the auxiliary machine room immediately behind this switchboard which supply the power for the earlier stages of amplification in the tuning-fork unit, the grid bias voltages, compressed-air pump motors, etc.

this h.t. supply to be switched on to the 4-kW stage, the 50-kW stage, and whichever power units are in use, by the pressing of a single button on the control table, and ensures at the same time that all accessible units are "dead."

The general scheme adopted is as follows:—

- (1) A change-over switch is provided which connects the h.t. supply to one or other of the excitation units.
- (2) The h.t. supply is fed through the excitation unit to the busbar supplying the power units.
- (3) All the safety switches and devices form a "series" circuit with the "holding coil" circuit of the high-tension d.c. switch, which is remote-controlled from the control table.
- (4) The change-over switch of (1) also makes the necessary transfers in the control wiring of (3) as between the excitation units.

GENERAL SCHEME OF CIRCUITS.

Fig. 10 is a skeleton diagram of the circuit arrangements from the output of the tuning-fork unit to the aerial, showing the circuits between the 4-kW stage and the 50-kW stage, between the 50-kW stage and the power units, and between the power units and the aerial. The tuned high-frequency circuits at the various stages are indicated by the thick lines. A particular characteristic of the circuits is the use of a single tuned circuit between one stage of amplification and the next, and the use made of capacitive coupling for giving the necessary voltage variations on both anodes and grids. Some of the advantages of such capacitive couplings are:—

- (1) A condenser provides a low-impedance path for the harmonics necessarily generated by a valve transmitter when it is operated

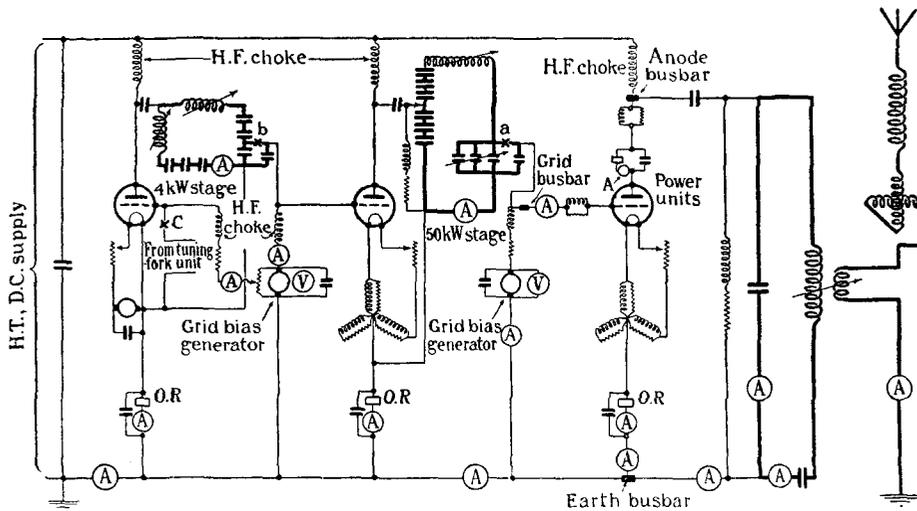


FIG. 10.—DIAGRAM OF TRANSMITTING CIRCUITS.

The main high-tension d.c. switch is remote-controlled from the control table.

The final stage of amplification (i.e. the power units) is not provided in complete duplicate as in the earlier stages. The power-station practice of having a number of units capable of being worked in parallel on common busbars has been adopted. The principal advantages of such a system are:—

- (1) It permits an easy flexibility as regards power required for a particular transmission at a particular time of the day, which may be very important from the point of view of not having more valves in use than required and so reducing the consumption of power and also valve replacement costs, which are likely to be a large item in the maintenance costs of the station.
- (2) It provides a simple method of repairing a faulty unit or of replacing worn-out or faulty valves while the station is in action.
- (3) The installation can be easily adapted to provide either two simultaneous transmission on separate aerials, or a single transmission at larger power on a combined aerial.
- (4) It gives facilities for testing different types of valves.

HIGH-TENSION D.C. SUPPLY.

The excitation units and the power units are designed to utilise the same voltage high-tension d.c. supply, and a simple arrangement permits

as an efficient power amplifier, and thus acts as a desirable harmonic filter.

- (2) The actual voltage-swings are easily and accurately calculable both for design and during adjustment.
- (3) The power factor of a good condenser being very low, the voltage and current are practically in quadrature.

(To be continued.)

GREEK TELEPHONE SERVICE.

The sole rights for the reorganisation and exploitation of the Greek telephone and wireless services have been secured, in face of competition from American, German, French, Swedish, and Italian concerns, by the New Antwerp Telephone & Electrical Works. The contract is worth about two and a half millions sterling.

THE SUMMER CONFERENCE OF THE INSTITUTE OF PUBLIC ADMINISTRATION.

THE Conference of the Institute, which this summer will be held at Balliol College, Oxford, from July 23 to 26, promises to be of special interest to Post Office officials. The subject chosen is that of the administration, in general, of public utility services, regarded from various aspects. Thus we have papers on the public regulation of the privately-owned services on the one hand, and on the operation and finance of publicly-owned services on the other, while a third section of the programme deals with this species of administrative work as it affects the official who is engaged upon it.

It is not, perhaps, generally realised how large a part of the public services is concerned in one way or another with public utilities. The Post Office, for instance, which accounts for two-thirds of the whole Civil Service, is one of the largest public utility undertakings in the world. The Ministries of Health and Transport and the Board of Trade are very largely occupied in their regulation and control. Moreover, the field is one in which no-one could claim that finality has been reached. Ideas are constantly changing. Acts of Parliament which to one generation seem to be the last word in Parliamentary wisdom are seen by the next to have been obstacles to progress and impeters of the highway. Simultaneously, the rapid march of physical science and engineering, art and technique, create new problems in public control or public operation as rapidly as old problems are for the moment given their quietus—a quietus which may be but a cat-nap, or may prove to be a tolerable night's rest, but which we can scarcely hope will be, for any of them, their long last slumber. No doubt the authors of the great financial reforms which culminated in 1866, thought that in embodying the Post Office in the ordinary budgetary system of the country, and in providing that all Post Office revenue should form part of the general revenue of the country, and that all Post Office expenses should be voted by Parliament as part of the ordinary expenses of the national administration, they had chosen the course which was beyond question and for all time right. Yet after a bare seventy years, we find doubts cast upon the merits of that system. Germany has recently abandoned it. India has abandoned it for the State Railways, and may (if she has not already done so) apply the same process to the Post Office. In France the same idea is in the air, and even in this country the Chancellor of the Exchequer has recently—and it may be for the first time—drawn a fundamental distinction between the expenditure of the Road Fund and the Post Office on the one hand and that of all other departments on the other. Lastly, we have at this moment, we learn, the Railway Rates Tribunal engaged in framing the new schedules of railway rates, and Parliament occupied *once more in the attempt to establish conditions which will provide this country with an adequate supply system of electrical energy.*

It will be apparent, therefore, that the Institute, in choosing the administration of public utilities as the subject of its summer conference, has chosen wisely and opportunely. The conference should be of considerable interest to all who are officially concerned with the subject in any of its aspects. The full programme is given below.

The various papers are printed and circulated beforehand and discussed in conference.

Apart from the conference itself, arrangements are made for members to see something of the beauties and interests of Oxford, and time is available for those who like to do their own sight-seeing. The inclusive cost is 12s. 2d. a day for those for whom accommodation is available in the College, and at about the same rate for those who have to sleep outside but take their meals in College. All further information can be obtained from the Hon. Sec.

(Programme Committee), Institute of Public Administration, Palace Chambers, Bridge Street, Westminster. Early application is desirable.

Chairman of Conference: Mr. JOHN LEE, C.B.E., M.A., M.Com.

Friday, July 23.

(10.30 a.m.) "The Principles of Regulation by Public Authorities of Privately Operated Utility Services." (2 Papers.) 1. Mr. Garnham Roper, C.B. (late of Board of Trade). 2. Mr. W. T. Stephenson, B.A. (London School of Economics).

(2.30 p.m.) "The Appropriate Types of Authority for the Operation of Publicly Owned Utility Services, and the Powers which they should have." (4 Papers.) 1. Sir J. G. Broodbank (late of Port of London Authority). 2. Mr. C. Delisle Burns, M.A. 3. Sir Geoffrey Clarke, C.S.I., O.B.E. (late Director of Posts and Telegraphs, India). 4. Mr. W. Moon (Town Clerk, Liverpool).

Saturday, July 24.

(10.30 a.m.) "The Finance of Publicly Owned Utilities in Relation to the General National or Local Finance." (4 Papers.) 1. Mr. James Dalrymple (General Manager, Glasgow Corporation Tramways). 2. Mr. R. G. Hawtrey (Asst. Secretary, Treasury). 3. Mr. C. Hurcomb, C.B. (Asst. Secretary, Ministry of Transport). 4. Mr. J. R. Johnson, F.S.A.A. (City Treasurer, Birmingham).

(2.30 p.m.) "Informal Discussion on the Policy of the Institute of Public Administration."

Monday, July 26.

(10.30 a.m.) "The Spheres of the Accountant and the Economist in the Administration of Public Utility Services." (2 Papers.) 1. Mr. F. J. Alban, F.S.A.A. (Cardiff). 2. Sir Henry N. Bunbury, K.C.B. (Comptroller and Accountant-General, G.P.O.).

(2.30 p.m.) "University Education in Public Administration." (3 Papers.) 1. Professor W. G. S. Adams, M.A. (All Souls, Oxford University). 2. Mr. I. G. Gibbon, C.B.E., D.Sc. (Principal Asst. Secretary, Ministry of Health). 3. Principal Grant Robertson (University of Birmingham).

BROADCASTING COMMITTEE 1925.

THE Crawford Committee appointed to advise as to the proper scope of the Broadcasting Service and as to the management, control, and finance thereof, has completed its enquiry, and its report was presented to Parliament on March 5 as Command Paper 2599.

Its main recommendations were:—

That the broadcasting service should be conducted by a public corporation acting as Trustee for the national interest;

That the corporation which should either be set up by Act of Parliament or be incorporated under the Companies' Acts, should be licensed by the Postmaster-General for a period of not less than ten years, should be known as the British Broadcasting Commission and should consist of not more than seven or less than five independent Commissioners;

That the undertaking of the British Broadcasting Company should be transferred as a going concern to the Commissioners on Jan. 1, 1927;

That the fee for a receiving licence should be maintained at 10s.;

That receiving licences should be granted to the blind free of charge; and

That the Commission should be represented in Parliament by the Postmaster-General and should present an annual report to Parliament.

* * * * *

The Government has accepted the recommendations of the Committee and the procedure for giving effect to them is now under consideration.

LONDON TELEPHONE SERVICE NOTES.

Chars-a-bancs.

Soon or late in holidays most peoples' thoughts turn to chars-a-banc rides, which are as a rule not inexpensive, but very few of the staff could have cherished the thought that for two weeks the normal method of transport to and from the exchanges would have been by such means and that the rides would be "free, gratis, and for nothing." Yet it was so for the two weeks of the General Strike.

It is not the purpose of these notes to give impressive statistics as to the number of passengers carried, and the number of miles run, but to remark in a general way on the more human aspect of things.

The outstanding impression left in one's mind is the extraordinary good humour of everyone concerned, whether they were passengers or whether they were officers employed in operating the service. It must be confessed that nominal 28-seater coaches frequently carried 75% overloads, but every member of the staff was so keen in being on duty in time that the habits of the sardine were assumed with a smile. Speaking of sardines, the officers regulating the loading and despatching of the vehicles expressed the opinion that the packing of this delectable fish must be child's play compared with their job.

The second impression one got was the pluck shewn by the girls travelling along the routes on which there were disturbances. None shirked the journeys, and fortunately there was no serious mishap.

A record of casualties was kept in the Emergency Transport Office, and only five or six entries appear. The victims will see the humour of the following:—

- Miss A. Hit on cheek by tomato.
- Miss B. Hit on neck by potato.
- Miss C. Hit on arm by stone.
- Miss D. Hit on wrist by half brick.
- Miss E. Hit on ankle by same half brick.

The officer marking the last two entries shewed admirable restraint in not adding a reference to a well-known proverb.

The fame of the transport office seemed to be spread abroad, for on one occasion a telephone call was received from a large firm of outfitters asking whether room could be found on the coaches for sixty of their staff. The officer to whom this was referred suggested that the enquirer should be asked to send sixty sleeping suits for the night staff, but a more tactful reply was given.

Another impression left was the remarkable adaptability of officers of all grades. Rank was forgotten, and only the job in hand mattered. On the first morning, for instance, a certain Superintendent could have been observed jumping on the running boards of official chars-a-bancs requesting the production of pass cards and politely but firmly telling unauthorised joy riders to alight.

On another occasion a passenger produced, very hurriedly, a pass card very much like the official one. The scrutineer was ready for him, for the transport officer already had an exhibit of a card packed with a brand of table jelly. Nothing doing that time.

Tribute must be paid to the drivers who entered into the spirit of the scheme. One of them had his vehicle stopped by a mob and the connexions to his magneto were pulled off. He and his passengers sat tight until the police arrived. The driver then got down, connected up again and continued his journey. One of the passengers remarked to him that he was pretty cool, "Oh" said the driver, "I'm not afraid of this crowd, I was in the Black-and-Tans."

On another route some of the mob mounted the running boards. The driver acted quickly. He accelerated, overtook another vehicle and drove so close to it that he scraped the intruders off as though they were flies.

The regulator concerned will forgive the following incident being related. It was Friday night and raining hard. He, in common with the rest, had been on the Embankment in the rain for four hours. But he was still smiling. Just as he was about to get one of the coaches away three or four stragglers ran up and he opened the door for them. They got in, and as he was closing the door one of the stragglers bumped his head against the hood. Rain water had accumulated, and enough to fill a large bucket poured down on to the regulator, catching him full in the face. He actually laughed!! That is the spirit that pervaded the whole band of workers.

* * * *

Sport.

On March 31 further steps were taken towards the encouragement of a sports movement in the L.T.S. A council was formed, and in these notes next month it is hoped to give some account of the council's intentions.

* * * *

Culled from the Exchanges.

City.—Following two postponements due to the General Strike, the City Exchange Staff held a dramatic performance at King George's Hall, on Tuesday, May 18, to assist the Fund for the rebuilding of the Benenden Sanatorium.

The programme was ambitious, but was carried through with efficiency and confidence by all concerned. Three one-act plays were presented—"The Wrong Flat," "Great Grandmother's Gown," and "A Little Fowl Play"—and all were exceedingly well done and cordially appreciated by the audience.

All the parts, including several male characters, were taken by girls, and it must be confessed that the translation from skirts to trousers was completely successful, being aided very materially by the prevailing fashion of shingle and Eton crop.

Those who took part were the Misses M. Chane, N. Cripps, K. Wickham, E. Middleton, D. Marriott, R. Bouttell, and Miss I. Pollard. So good were they all that none would wish for special praise, but one may be permitted to remark that the Misses Chane, Cripps, Wickham, and Bouttell played their parts manfully.

The stage management was in the hands of Miss Mignott, and the smooth running of the whole show was adequate testimony of her ability.

Between the plays Miss Gwen Pike danced with grace and charm, and Miss A. M. Frost sang delightfully.

Orchestral items were provided by Leonard Coombs' "Bon Accord" Orchestra, and Miss J. Heath provided the pianoforte accompaniments.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage:—

- Miss M. G. TOMS, Asst. Supr., Cl. II., on probation, of the North Exchange.
- Miss B. M. CHANNER, Asst. Supr., Cl. II., of the Sidcup Exchange.
- Miss M. L. HAESTIER, Telephonist, of the North Exchange.
- Miss G. M. BROWN, Telephonist, of the Trunk Exchange.
- Miss V. M. M. MAGUIRE, Telephonist, of the Trunk Exchange.
- Miss I. MUIR, Telephonist, of the Gerrard Exchange.
- Miss A. SIMPSON, Telephonist, of the Gerrard Exchange.
- Miss W. HERBERT, Telephonist, of the Park Exchange.
- Miss A. C. ARSTED, Telephonist, of the Park Exchange.
- Miss E. L. PEARCE, Telephonist, of the Paddington Exchange.

CORRESPONDENCE.

TYPING FROM SOUNDER.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

WERE we on the threshold of Morse, the system advocated would be good, but as things are, is 25 years behind the time. We have, to a large extent, relegated sounder work to such small stations that the introduction of noiseless typing machines would be the antithesis of economy. Press work, too, is at a minimum, and the only instrument capable of several distinct copies is the "Royal," which was specially designed for this particular purpose. But three typewriters of this pattern, if placed in proximity, would negative sound reception. In other words, it would be difficult to devise a manifolding noiseless machine.

The future holds the extension of the automatic keyboards. These will function to those stations which guarantee a regular flow of traffic. The others whose traffic is of a minor character may pass to the phonograms.

Your correspondent, "W.T.L.," alludes to slip-decoding by typewriter. This is to-day practically universal, and so far as syphon slip is concerned obtains in all offices dealing with cablegrams.

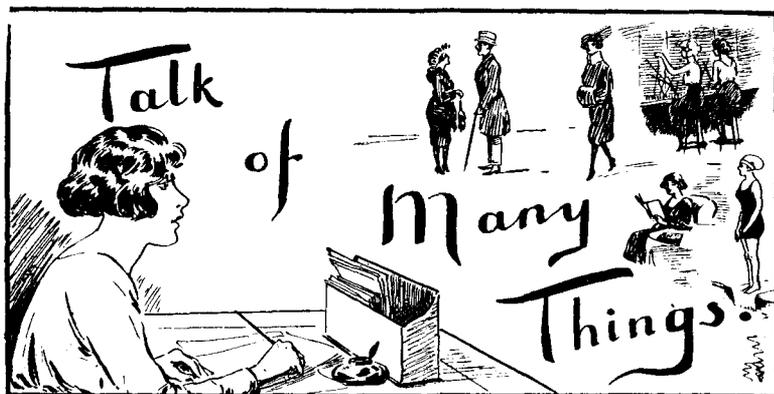
Perhaps it would be better to direct our attention to the phonogram section. Cable companies utilise the noiseless typewriter for this purpose. Their operators, whose switchboards are constructed to accommodate the machines, type all cablegrams and conversations. The machines run so smoothly that there is no disturbing factor to the 'phone. A continuance of the trial in this direction might with advantage be made in the "phonograms" and the "wireless."

In regard to your correspondent's personal exploits, it should be borne in mind that individual performances of great merit have been set up during the last 20 years by several TS and provincial operators, but these I venture to assert have an academic interest only. To stress them in any degree is but boosting the obvious. They are the flowers adorning the grave of the defunct.—Sincerely yours,

WILFRED T. GEORGE.

C.T.O., May 20.

WE TELEPHONISTS



Sic Transit Gloria.

ANNUAL leave is a balm which soothes past frets, restores tired bodies, and heals sick hearts. It gives leisure, pleasantly busy, and a placid contentment with things and people, and, not least, with ourselves. It gives us the open air, the sea-scented breeze, the warm sun, the rattle of shingle, and the boom and swish of the breaker. The world vibrates with fresh unaccustomed sound through which merry chatter and the happy laughter of children at play on the sands run like a bright theme in a sweet chorus. Time and circumstance place events in perspective, and we can contemplate May, 1926, with an air of detached judgment and can recall gleams of humour from beneath a grey sky and a black outlook. The frenzied rush of the Embankment, the surge of G.P.O. North, the scramble amid the quiet seclusion of Lincoln's Inn Fields are a confused dream. Gone will be the glow of virtue acquired when we rose at unwonted hours to catch the first "bus, and the sense of adventure will be dead. Even the drenched and harassed regulators with their monumental patience and their encyclopaedic knowledge of routes and their wonderful skill in the science of cubic capacities will be but a memory. Rain and cold wind, bustle and confusion, doubt and annoyance will seem so remote that we shall half believe that they were imaginary. By that time too, and in such circumstances, the novelty and surfeit of riding in a chars-a-banc will have disappeared, and we shall find ourselves ambling contentedly towards the pier at 10.30 a.m. to take a whole seat in a touring chars-a-banc. Then memory will return vividly and with it will come scenes and sounds of "route one, oh, so and so." Something will be missing, however, we shall feel that the delight of transport is not inducing the anticipated transport of delight, and we shall proceed to compare to-day with yesterday. The stiff formality of the boarding-house crowd might with advantage be replaced by that franker joviality of the mixed crush of official colleagues. The men will regret either openly or in secret that they are now more seated than sat upon. It will seem inappropriate that the collection for the driver is not made in either a messenger's hat or in the prim bowler of a high official. Where too is the adventure of Canning Town and Shoreditch? No, things are not quite the same and the enthusiasm engendered in olden times at the thought of a chars-a-banc ride fails to return and so we shall sit back to enjoy our tour with an air of bored indifference.

PERCY FLAGG.

Echoes of the Strike: Chars-a-banc Rules.

As there appears to be some misapprehension regarding the orthodox procedure *re* travelling in the present emergency, it is thought that an instruction should be issued for the information of all concerned.

The following rules have, therefore, been compiled for the guidance of the staff, and whilst it is realised that they do not cover every travelling contingency, they should be regarded as governing the general conduct of chars-a-banc passengers.

Any departure from these rules will not be counted as a major irregularity, provided it can be proved that the officer concerned has acted with fact and discretion.

- (1) Every member of the staff holding a travelling pass must board the chars-a-banc at the official stopping-places only, as attempts to stop these vehicles by means of semaphore and similar methods may result in the arrest of the would-be passenger, on suspicion of being concerned in an organised hold-up, and the officer's failure to report for duty cannot be regarded as special leave.
- (2) To board the chars-a-banc, raise the right foot 18 inches from the ground bending the knee at an angle of 50°, and having found the step (usually concealed beneath the mudguard), vault lightly into the chars-a-banc, taking care to avoid landing on umbrellas, suitcases or other impedimenta owned by fellow-passengers, as this may lead to argument and may cause serious complications. The female staff are warned against overcrowding when male passengers are present, as several cases of housemaid's knee have been reported, and it is feared the contagion may spread.
- (3) In view of its sinister association, and in order to frustrate any suicidal tendency, no Chief Supervisor or other female officer of

similar rank may walk along the Embankment in search of a chars-a-banc, as repeated failure to reach same may have tragic results. Any breach of this rule will be regarded as a serious offence, and any driver failing to recognise and rescue a Chief Supervisor from the said Embankment will be severely reprimanded by the Transport Officer, and his licence will be endorsed.

- (4) Passengers over 6 ft. in height are recommended to take a course of Swedish exercises, during the Strike, as this will in many cases facilitate the adoption of a deckchair-like attitude on entering the chars-a-banc. The question of providing cranes for the purpose of hoisting aboard diminutive passengers is under consideration.
- (5) Passengers are warned against travelling on the doors or sides of the chars-a-banc, in view of the difficulty of obtaining adequate supplies of Sloan's Liniment and Doan's Backache Pills.
- (6) Persons of attenuated proportions, whose presence is likely to be overlooked by chars-a-banc drivers, are cautioned not to stand sideways when signalling same, as all cases of failure to stop when requested cannot be investigated by the Transport Officer.
- (7) If assisted to enter or leave the chars-a-banc by a messenger boy or other of that ilk, a curt nod is considered sufficient acknowledgement of services rendered, but if assisted by one of a higher grade, such as the P.M.G. or Controller, all the teeth may be shown and a few remarks may be appropriate, but these should only include such innocuous subjects as the wrong number trouble, speed of answer, and clear at Fulham or Pimlico, &c.
- (8) During the summer months no awnings will be provided on any chars-a-bancs, and passengers are advised to preserve their schoolgirl complexion by wearing shady hats, as any appearance of sunburn may lead to the total abolition of Annual Leave.

Note.—The above instruction has now been cancelled on receipt of the intelligence that the Strike has gone on strike and that normal conditions are now resumed.

D. D. & C. A. S.

The "Hello" Girl.

(An appreciation).

How doth the busy "Hello" girl
Proceed throughout the Strike?
She travels in a chars-a-banc,
Or on a motor bike.

Sometimes the chars-a-bancs are full
And she is left behind—
Then frequently she gets a lift
From passing strangers kind.

Maybe upon a private car,
A van, or else a lorry—
Whatever be the vehicle,
To board it she's not sorry!

And if she is the victim of
A hostile demonstration,
When cars are stopped and missiles thrown,
She shows no perturbation.

She bravely faces obstacles,
And strives to do her duty,
Disdaining gibe or epithet
(However full and fruity!)

If means of transit there are none
She does not tear her hair,
But resolutely foots it out
Upon old Shanks's mare!

She takes up duty straight away,
When at her destination—
Determined she will not delay
The Service of the Nation.

She meets with cheerful fortitude
The trials of the day,
And beneath the press of traffic
Her good humour ne'er gives way.

If quite marooned, and far from home,
She has a bed provided—
From which she rises with the lark,
To see the room is tidied.

She spends the night in sheltered calm,
Her guard, a Supervisor,
Who proves, when fears her flock alarm,
A ready sympathiser.

She substitutes late duty girls
To catch the final "bus,
And fills the gaps at eight next morn
Without the slightest fuss.

In fact, she is a thorough "sport"
On duty or at play—
And it is clear the Country ought
To value her to-day!

C. A. S.

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Trunk Exchange.

A few weeks ago, the Trunk Exchange staff gave a very enjoyable social evening in the dining room of the G.P.O. (South) Refreshment Club. The object of this function was to raise funds for the re-building of a wing of the Sanatorium at Benenden, recently destroyed by fire.

The originator of the idea was Miss Nurse, who, together with a band of very capable and hard-working assistants (including Mr. Dobson and Mr. Grove as M.C.'s) deserves very high praise for a most enjoyable evening, in which the usual bright and pleasing element was very much in evidence. Special mention should be made of the excellent programme of music provided by Miss Rowland, a supervisor of the Trunk Exchange.

The proceeds of the event amounted to £50. This included the sums of seven guineas handed to Miss Nurse from the members of the C.O.A., and £5 from the Toll Exchange staff. As the amount collected far exceeded expectations, everyone who gave their services thought it quite worth while

R. C.

Edgware,

Or the Exchange which cannot grow up.

My father was an Engineer,
I never knew my mother ;
'Twas he equipped me C.B.S.
Like Hatch End, such another.
My growth for years was very small,
My home a tiny wee cot ;
I answered slowly when at all
And such a heavy fee got
When putting through a call for town
That only rich folks used me ;
Father prepared for me a gown
That all who saw abused me.
There came a time, a happy day,
People no longer shirk us—
Proclaimed within the magic ring
Ten miles from Oxford Circus.
My father, though of " National " fame
Has gone to nameless limbo ;
His brothers, cousins, uncles, sons,
Viewed me with arms akimo.
The M.C.C. would have me move
To quite a different quarter,
But father's relatives regard
The change as wicked slaughter.
They say I'm every bit as good
As heaps of their exchanges
Erected in the Provinces
Where nothing ever changes !
They are prepared to patch my gown,
And speaking quite at random
Suggest my service will improve
When they have opened Tandem.
I only hope they may be right,
But Tandem seems to linger,
These birds in bush I value less
Than one gripped by my finger.
A gentle timid Traffic man
Had planned me a new dress
And promised me a nice new home
I felt elate, you guess.
He said that as I grew and grew
They'd dress and house me squarely,
Until my Automatic robe
Could be provided fairly.
But father's friends exclaimed " oh no !
" That talk is idle prattle, might
" Not all requirements be fulfilled
" If Edgware were a satellite ?
" 'Tis true the place will much extend
" And orders flow in fast.
" We've seen this happen oft before
" Nor will it be the last.
" For economic reason sound
" Confined to our dominion
" Based on hypotheses profound
" We've formed a firm opinion
" However fast Edgware may grow
" The limit of one unit
" Must not exceed three thousand lines
" From further growth we'll prune it.
" And saving all along the line
" We'll open new exchanges,
" With topical and arbitrary
" Names we will ring the changes."

Many there are of taking names,
Hines Cross or Hedley Green,
With Chandlers Hill a useful third,
All striking and none mean.
Edgware will work on Maida Vale,
Hendon and Colindale too,
Till Cricklewood in twenty-nine
Is ready for the tail two.
The tiny mite, young Colindale
Hypothecates on Hendon
And it for calls both out and in
He solely must depend on.
Hendon itself is satellite
With Maida Vale as Mater
Who gives the child to Cricklewood
Just upon nine months later,
But Colindale and Hendon both
Like Edgware, their near neighbour,
Are children of such sturdy growth,
To feed them is a labour.
And Cricklewood can ill support
Developing exchanges—
Hypothecate or satellite—
There's need for further changes.
" Once satellite—for ever thus "
An engineer has said it.
'Tis true he gave no reasons
Yet his statement we must credit.
Hendon like Edgware having grown
Must be in turn dismembered,
And further satellites be formed
With names to be remembered.
But fate in store a kindlier end
For Colindale announces
From parasite on satellite
To parentage it pounces.
For Colindale must then support,
With all the usual features,
Edgware, two units, Hendon relief
At least three greedy creatures.
Thus criss and cross and cross and criss
The merry game progresses,
Whilst nothing to an Engineer,
All others it impresses.
For engineer's economies
Is quite a special science,
There's not another art or craft
With which it has alliance
It's clear as clear to Engineers,
If dark to all besides,
It confirms whatever statement
An Engineer provides.
You take it all for granted,
Or you reject it quite,
For you've no more chance to prove it wrong
Than they to prove it right.
So here's a health to Engineers
Whose methods of economy
Are based on laws more subtle than
Those found in Deuteronomy.

TIM O'ROUS.

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.

OBITUARY.

CITY EXCHANGE has suffered a second sad loss within a few months by the death of Miss A. Gamlin, an Assistant Supervisor of long service. Apart from her official duties Miss Gamlin was an enthusiastic worker on behalf of the Hospital Saturday Fund and assisted very materially in the successful effort to double the contributions made by the City staff.