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TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XXII.—

Lt.-COL. A. A. JAYNE,
D.S.O., O.B.E., M.C.



LIEUT.-COLONEL ARTHUR ALFRED JAYNE, the Controller of the Edinburgh Postal and Telegraph District, is a Kentish man with antecedents in Gloucestershire. He was born in 1878, and entered the Post Office service as a Sorting Clerk and Telegraphist at Gravesend at the unusually early age of 14. Provincial service, however, failed to hold him and he joined the staff of the Central Telegraph Office five years later. In March, 1902, after a competitive examination he was appointed to the Controller's staff and attained the position of Clerk, 2nd class. In August, 1914, just after the outbreak of war, his exceptional abilities were recognised by his appointment to the staff of the Traffic Section of the Secretary's Office.

The war provided Lt.-Col. Jayne with a great opportunity

which, as befitted a man of Kentish breed, he was not loth to seize. He was commissioned as a Lieutenant of the Royal Engineers (Signal Section) on Oct. 2, 1914, and immediately went to France where his exceptionally distinguished services in the field resulted in his rapid promotion to the rank of Major and in the honours which are represented by the letters which appear after his name.

In September, 1921, about two years after Lt.-Col. (then Major) Jayne returned to civil life, he was appointed Controller of Telegraphs at Edinburgh. On the amalgamation of the Postal and Telegraph Establishments at Edinburgh two years ago, he became Deputy Controller of the joint service and in the Spring of this year he became Controller on the appointment of his predecessor, Mr. C. Creighton, to the Postmaster-Surveyorship of Newcastle-on-Tyne.

Lt.-Col. Jayne holds his present rank in the Reserve of Officers.

THE POST OFFICE AND AUTOMATIC TELEPHONES.*

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

(Continued from page 16.)

(13) PROGRESS OF AUTOMATIC EXCHANGE CONSTRUCTION.

THE character of the new automatic exchanges to be catered for in London and the provinces in the immediate future is shown in Appendix 2. It will be observed that the schedule includes 161 projected exchanges with a capacity of about 368,000 subscribers' lines. Before this large amount of work can be completed many additional requirements will no doubt have matured. Extensions of existing provincial automatic exchanges will also be necessary in order to meet development.

The steps taken to provide for the special telephonic needs of London and to encourage British manufacturers to make plant of uniform characteristics have already been mentioned.

The difficult matter of acquiring sites, at or near the positions indicated by economic studies of the area layout, and designing and providing the necessary buildings, is proceeding as rapidly as present conditions allow. The contractors concerned in the manufacture of the exchange equipment are all working hard to produce and install the plant by the dates required, and their staffs of able engineers are in continuous touch with the Post Office Engineering Department. The Post Office staff responsible for planning and providing the external cable plant, and for grafting it economically into the London cable network, are also working strenuously under conditions rendered more and more difficult by the rapidly increasing congestion of underground London and the necessity for reducing street openings to the utmost possible extent. In some central districts it is no longer possible to find space for the necessary cable ducts under footways and roadways, and tunnelling deep down in the London clay has to be resorted to in order to gain adequate access to exchanges.

Automatic developments on so large a scale necessitate also the provision of a very highly skilled staff to engineer, supervise and maintain the exchanges. In order to meet this great need, it has been found desirable to set up a very completely equipped training school at the General Post Office for the purpose of giving a thorough training to the staff of the Engineering Department in the theory and practice of automatic telephony, and in the delicate work of switch adjustment, fault tracing and cognate matters. Graduated courses of

instruction are held for the skilled workmen who will actually maintain the exchanges, as well as for inspectors and engineers who will be responsible for the performance of the mechanism and the efficiency of the service rendered. The extreme complexity of modern automatic circuits and equipment is illustrated by the fact that a single automatic switching unit of 10,000 lines comprises no less than 5,000,000 "bank" contacts representing selectable outlets. Any one subscriber in such a unit can obtain connection with any other particular subscriber in the same unit via more than 240,000 different linkages. To reach all the subscribers on the unit he has at his disposal more than 2,400,000 different linkages—all this without passing outside his own exchange of 10,000 lines. In his recent book, "Fifty Years of Electricity," Dr. Fleming expressed the opinion that the design of modern automatic telephone systems represented "the high water mark of human creative power." Be this as it may, it seems improbable that a parallel could be found in any other application of science to industry to the mass of co-ordinated and controlled complexity constituted by the automatic machine required to meet the telephonic needs of such cities as New York and London.

The manufacturing organization necessary for the production of the automatic equipment needed throughout the Empire, and in foreign markets which British manufacturers have been able to secure, is very vast and complex. It is anticipated that, in the near future, an annual output of automatic equipment for a quarter of a million exchange lines will be producible in the factories of this country.

From the first inception of the Post Office telephone system it has been the policy of the Department to discontinue the purchase of telephone plant from abroad and to encourage the establishment, within the United Kingdom, of adequate manufacturing resources for the supply of all its needs. It was well recognised from the first that this would foster the setting up of a British industry which would cater for a far more extensive market than that represented by Post Office requirements, and the complete success of this policy is a matter for lively satisfaction.

APPENDIX I.

KEIGHLEY EXCHANGE.

COMPARATIVE STATEMENT SHOWING ESTIMATED COSTS UNDER MANUAL AND AUTOMATIC SYSTEMS.

(a) Busy-hour calling rate	1
(b) Proportion of local traffic	60 per cent
(c) Proportion of manual positions retained under automatic	60 per cent

	1925		1930		1935 (1,260 lines)	
	Manual	Automatic	Manual	Automatic	Manual	Automatic
<i>Capital outlay—</i>						
Exchange equipment	£ 7,490	£ 13,854	£ 8,803	£ 16,562	£ 10,095	£ 18,717
Subscribers' apparatus	4,704	5,009	5,725	6,253	6,673	7,429
	12,194	18,863	14,528	22,815	16,768	26,146
<i>Annual costs—</i>						
Interest	671	1,037	799	1,255	922	1,438
Depreciation	636	718	760	876	878	1,013
Maintenance	1,303	1,405	1,456	1,547	1,744	1,849
Operating	2,053	1,545	2,294	1,564	2,595	1,764
Total annual costs	4,663	4,705	5,309	5,242	6,139	6,064
Balance of annual costs in favour of manual	42	—	—	—	—	—
Balance of annual costs in favour of automatic	—	—	—	67	—	75

Costs which are common to both manual and automatic systems have been omitted from this statement.

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

APPENDIX I—continued.

MAIDSTONE EXCHANGE.

COMPARATIVE STATEMENT SHOWING ESTIMATED COSTS UNDER MANUAL AND AUTOMATIC SYSTEMS.

- (a) Busy-hour calling rate 0.7
- (b) Proportion of local traffic 70 per cent
- (c) Proportion of manual positions retained under automatic 28 per cent

	1926		1931		1936 (1,550 lines)	
	Manual	Automatic	Manual	Automatic	Manual	Automatic
<i>Capital cost—</i>	£	£	£	£	£	£
Exchange equipment	8,458	14,068	11,346	19,073	13,744	22,315
Subscribers' apparatus	4,388	4,944	4,449	7,210	8,340	9,288
	12,846	19,012	17,795	26,283	22,084	31,603
<i>Annual costs—</i>						
Interest... ..	626	927	868	1,281	1,077	1,541
Depreciation	685	757	956	1,060	1,192	1,296
Maintenance	1,526	1,722	2,186	2,466	2,822	3,186
Operating	1,390	535	1,865	764	2,526	1,136
Total annual costs	4,227	3,941	5,875	5,571	7,617	7,159
Balance of annual costs in favour of automatic ...	—	286	—	304	—	458

Costs which are common to both manual and automatic systems have been omitted from this statement.

MACCLESFIELD AND PRESTBURY EXCHANGES.

COMPARATIVE STATEMENT SHOWING ESTIMATED COSTS UNDER MANUAL AND AUTOMATIC SYSTEMS.

- (a) Busy-hour calling rate 0.8
- (b) Proportion of local traffic 75 per cent
- (c) Proportion of manual positions retained under automatic 53 per cent

	1925		1930		1935 (875 lines)	
	Manual	Automatic	Manual	Automatic	Manual	Automatic
<i>Capital outlay—</i>	£	£	£	£	£	£
Exchange equipment... ..	4,694	10,723	5,951	13,345	6,507	14,964
Subscribers' apparatus	3,261	3,433	4,472	4,890	5,248	5,822
	7,955	14,156	10,423	18,235	11,755	20,786
<i>Annual costs—</i>						
Interest... ..	438	779	573	1,003	647	1,143
Depreciation	419	511	552	697	627	802
Maintenance	784	811	971	1,015	1,156	1,205
Operating	734	480	876	549	1,183	573
Total annual costs	2,375	2,581	2,972	3,264	3,613	3,723
Balance of annual costs in favour of manual ...	206	—	292	—	110	—

Against the balance in favour of manual working shown in the statement, there will be an annual saving of £220 on line plant by the use of automatic.

APPENDIX II.

PROPOSED NEW AUTOMATIC EXCHANGES.

LONDON		PROVINCES		
Name of exchange.	Approximate number of lines	Name of area	Number of exchanges	Total number of lines
Beckenham	1,600	Bath	4	4,000
Bermondsey	2,000	Bedford	1	1,500
Bishopsgate	8,400	Birmingham	5	20,000
Central	10,000	Brighton	6	8,500
City	4,400	Bristol	5	8,000
Cricklewood	3,000	Burnley	1	1,700
Croydon	4,000	Chatham	4	2,000
Edgware	1,000	Cheltenham	2	1,400
Fulham	4,000	Chesterfield	2	1,100
Guildhall	10,000	Colchester	1	1,000
Hampstead	3,800	Colwyn Bay	2	3,000
Hendon	1,500	Coventry	2	3,500
Holborn	9,400	Dudley	4	3,000
Holloway	2,000	Edinburgh	4	15,600
Iford	2,500	Exeter	2	2,000
Kensington	6,000	Folkestone	4	2,000
Kentish Town	2,700	Gloucester	1	1,200
King's Cross	3,000	Halifax	1	3,200
Langham	7,600	Hanley	7	4,300
Maida Vale	6,000	Harrogate	1	2,600
Monument	10,000	Hereford	1	1,000
Oval	2,000	Ipswich	1	1,300
Primrose Hill	4,700	Keighley	2	2,000
Sloane	8,000	Kirkcaldy	1	800
Straud	7,400	Leeds	4	4,000
Tandem	—	Leicester	4	9,300
Thorton Heath	1,000	Liverpool	1	10,000
Wandsworth	3,000	Macclesfield	2	2,000
Western	6,800	Manchester	5	20,000
Whitehall	10,000	Newcastle	5	12,000
Wood Street	10,000	Nottingham	4	11,000
Woodside Park	2,000	Oxford	1	1,400
		Plymouth	2	4,000
		Portsmouth	1	600
		Rochdale	8	3,700
		Sheffield	9	13,000
		Shrewsbury	1	1,000
		Southend	3	4,000
		Southport	4	7,100
		Torquay	2	1,800
		Wakefield	2	2,000
		Walsall	2	2,000
		Watford	1	2,000
		West Hartlepool	2	1,400
		Wolverhampton	2	3,000
32 exchanges	157,800 lines	45 areas	129 exchanges	210,300 lines

WESTERN ELECTRIC TO BECOME "STANDARD."

THE Western Electric Company Limited, of London, will from Oct. 1, 1925, be known as "Standard Telephones and Cables Limited." The registered and executive office will remain at Connaught House, Aldwych, W.C.2.

An announcement has already appeared in the Press of the sale to the International Telephone and Telegraph Corporation of the International Western Electric Company by the Western Electric Company Incorporated.

Under this new ownership, the International Western Electric Company will in future be known as the International Standard Electric Corporation, and will continue to hold executive licenses under the foreign patents of the Western Electric Company Incorporated in the telephone and telegraph field, and will also continue to act as the exclusive distributors outside of the United States, Canada, and Newfoundland for all Western Electric manufactures.

The change in ownership of the International Western Electric Company, with whom the Western Electric Company Limited, of London, have been affiliated, will not involve any material changes in either the organisation or the broad policy that has always been followed by the latter Company, unless such changes are of a progressive nature.

WEST YORKSHIRE TELEPHONES.

THE West Yorkshire Telephone Discussion, Recreation and Social Circle recommenced its activities on Tuesday, Oct. 6, at Priestley Hall, Leeds.

This year an effort has been made to break fresh ground, and the following gentlemen have kindly consented to give lectures:—

S. H. Ibbettson, Esq. of Leeds.

T. B. Johnson, Esq., M.I.E.E., Supt. Engineer, and

Lionel Harvey, Esq., Engineer-in-Charge of the Leeds and Bradford Broadcasting Station.

A large number attended the opening meeting to hear what proved to be a very illuminating and helpful lecture on Psychology, by S. H. Ibbettson, Esq. The interest in the subject was clearly shown by the eagerness of all to take part in the somewhat lengthy discussion that followed. At times we were treading very deep waters, but such problems as "Were Adam and Eve jellyfish?" and "Does a goldfish really mind?" were lighter questions arising from the statement that all life came originally from the water, and that man developed his mind and soul in the process of evolution. The lecture was followed by a short one-act Yorkshire dialect play "The Prodigal Husband," which was written and produced by Miss C. L. Wood of the Accounts Section of the District Office. The play was humorous and true to life, and contained many epigrams which aroused repeated bursts of applause from the appreciative audience.

A very enjoyable evening terminated with dancing and games.—L. M. S.

TELEGRAPHIC MEMORABILIA.

THE Ministry of Posts and Telegraphs of the Irish Free State, according to the *Wireless Trader*, is about to appoint, or by this time has probably appointed, four gentlemen to the respective posts of Station Director, Assistant Engineer, Musical Director, and Announcer in connexion with the new broadcasting. The salaries are respectively £750, £300, £400 and £250 per annum; the posts of Musical Director and Announcer are to be part-time appointments. There is no mention of whether these officers are pensionable, but from all the information at present available to the writer the positions appear to be of a temporary nature. This, however, may prove to be but the initial stage of organisation.

It is stated in certain quarters that by agreement between the British, Canadian and United States Governments, commencing with the 1st of the current month, merchant ships will cease operating on wavelengths of 300 to 450 metres when within 250 miles of the coasts of the three countries. Reuter's agency, however, rather definitely states that this agreement only applies to the coasts of Canada, Newfoundland and the United States, adding that there is no such prohibition in the case of ships when within 250 miles of the coasts of the British Isles.

The fact of the matter is that the 300 metre wave is still used by some West-European coast stations, and that ships, whether American, British or of any other nationality, if they wish to communicate with a particular coast station must use the wave on which that station is listening.

The report of the West India & Panama Telegraph Co. Ltd., for 1924, announces that the balance of receipts over expenditure amounts to £4,889. This has been placed to the reduction of the debit balance brought forward which on Dec. 31, 1924, amounted to £77,190.

The Government competitive system of cables and wireless was opened on Dec. 1, 1924. Annual subsidies of £26,300 ceased on Sept. 30, 1924, but, by request of the Pacific Cable Board, the company continued its service between those two dates, receiving remuneration for doing so; consequently the new competition is not reflected in the year's results. In November last a circular was sent to share and debenture holders conveying an offer made by the Cuba Submarine Telegraph Co. to purchase shares and debentures of the company. The offer was accepted by shareholders whose holdings exceeded the necessary majority of 80% as stipulated by the Cuba Submarine Co. The whole of the outstanding debentures have also been acquired by the Cuba Submarine Co.

The London *Times* recently gave an interesting *résumé* of the results of the International Wireless Conference in Geneva, which dealt very specially with the broadcasting difficulties in Europe due to the fact that there are practically more broadcasting stations than wave bands available to meet them.

It is felt that instead of having the present large number of comparatively low-power stations, Europe in the future must have fewer and more powerful transmitters. It was realised from the beginning of the Geneva Conference that there were not sufficient separate positions in the broadcast wavebands to give to every station a place to itself. Some stations had to be put on the same wavelengths. This part of the scheme was governed by geographical considerations, the power used by any two stations, and their distance apart. All sorts of adjustments were made during the recent tests, but this portion of the plan was a failure. Sooner or later each station must have its own wavelength. Meanwhile something must be done to keep the present cause of interference between the stations of Europe to the least harmful limits. The conference decided on a temporary plan, which differs in many respects from that on which the recent tests were based. The new scheme came into operation on Nov. 1. Another meeting of the board will take place in December. New stations will be given positions below 200 metres.

Our readers will no doubt understand that the Geneva Conference was called together by the broadcasting organisations, and its "findings," while interesting, have no binding effect internationally, unless confirmed by the respective Governments.

To those of our readers who are scientifically interested in the Einstein theories, the ether, light and electrical phenomena, the following excerpt from our valued contemporary, *The Electrical Review*, should prove fruitful and thought-provoking.

Soon after Professor Michelson announced the results of his experiments, which showed that the ether was stationary with regard to the earth at the surface of the earth, Prof. D. C. Miller reported the results of four years' experiments in his laboratory at the top of Mount Wilson to the American National Academy of Science, which indicated that at that height, 5,000 ft. above sea level, there was a "drift" of the ether, a motion relative to the earth at about six miles per second, or one-third of the orbital velocity of the earth.

The experiments conducted by Prof. Michelson in 1887 at the surface of the earth showed that the velocity of light in the direction of the earth's orbital motion was identical with its velocity at right angles to that direction, indicating either that the ether was carried along with the earth, or that matter in motion suffered a contraction in its length in the line of motion, which rendered impossible the measurement of the earth's velocity relative to the

ether. The latter alternative was in conformity with electromagnetic theory, as shown by Prof. Lorentz; but Prof. Miller's results point to the former—namely, that the ether is carried along with the earth at its surface, but is less completely entrained at an elevation above that surface. The Einstein theory of relativity requires no ether, so far as its mathematical expression is concerned; but if there is an ether, it must behave in accordance with the Lorentz contraction hypothesis. Prof. Michelson's experiments offered no obstacle to the Einstein theory, for that of 1887 indicated that linear motion through space produced no detectable effect on the velocity of light, whilst the more recent experiment related only to rotational motion, in which the two rays traversed the same path, and therefore the Lorentz contraction, if it took place, affected both equally, the result showing that the ether, if it existed, was stationary.

In a letter published in *Nature* of the 23rd inst., Prof. L. Silberstein discussed the subject, stating that Prof. Miller had observed on four occasions a relative velocity of 2 km./sec. at the altitude of the Case School of Applied Science, and a velocity of 3 km./sec. on the level of the neighbouring hills, but at the altitude of the Mount Wilson Observatory in four consecutive experiments he obtained with increasing precision a positive result of 10 km./sec., correct to within $\frac{1}{2}$ km./sec. This result, says the writer, is entirely antagonistic to the Einstein theory. He regards it as in conformity with the Stokes conception of the ether as modified by Planck and Lorentz, and suggests that the Michelson result for rotational motion can be accounted for on the assumption that the globe, being almost perfectly spherical, does not appreciably drag the ether in rotatory motion, its grip on the ether being purely gravitational. Prof. Silberstein also claims to account for the Einstein deflection of light rays passing near the sun by assuming that the ether is compressible.

SIGNAL FADING.—At a Citizens Lecture some little while ago, Professor Appleton, among other items, made some special remarks on "signal fading," a phenomenon well known to every experienced wireless telegraphist. Most listeners with valve sets, said the professor, were aware that at distances approaching 100 miles from a broadcasting station the signal intensity at night often underwent pronounced fluctuations varying from a loud-speaker intensity down to inaudibility in a minute or so. This "signal fading," as it was called, had been a puzzle for a long time, but experiments recently carried out at the Cavendish Laboratory, Cambridge, by Prof. Appleton and Mr. Bagnett had shown that the effect in such cases was due to the interaction of two sets of waves which reached the receiving station. One set of waves travelled straight along the ground from transmitter to receiver, while the other set was reflected by the upper atmosphere back to the receiver. Sometimes these two sets of waves reached the receiver in step, and their effects were additive, but sometimes they were out of step and tended to neutralise one another. The actual changes were due to the variability of the upper atmosphere, which altered the phase of the waves reflected thence. Theory indicated that fading should be more pronounced on a loop set than on a set with a vertical-wire aerial, and when an experimental test of this point was made at Cambridge with accurate instruments the theoretical prediction was verified. Loop fading was found to be greater than aerial fading, and from the results the angle at which the waves reflected by the upper atmosphere reached the ground again could be measured. The angle was found to be 60 deg. at Cambridge for the signals from 2LO. From this figure it was clear that the height of the layer could be estimated. This crucial test of larger loop fading than aerial fading might be regarded as the experimental proof of the existence of the "Heaviside Layer," which had been strongly contradicted by German and American radio engineers.

Once more to the quaint monuments and relics of our City of London. How many of our readers who use Cannon Street station or pass along Cannon Street daily have noticed the London Stone, built into the outer South wall of St. Swithin's Church? Stowe quaintly describes it:—"On the South side of the High Street, near unto the channel is pitched upright a quaint stone called London Stone, fixed in the ground very deep, fastened with bars of iron, and otherwise so strongly set, that if carts do run against it through negligence, the wheels be broken, and the stone itself unshaken." It is mentioned by Shakespeare in King Henry VI, but has a history that probably goes back to the Roman occupation, and is believed to be the central Roman milestone from which as from the Milliarium in the Forum of Rome, the Roman roads started and their distances were measured.

It is with regret that one places on record the "passing" of three respected members of the old Submarine Telegraph Coy., pensioned officers of the British Government telegraphs, namely Messrs. H. Brown, Ruthven and Manceau, the latter after nearly twenty-five years of retirement. The generation that knew these men of another age has all but gone, but those who remain recall with affection their differing but genial temperaments, the good-temper of one, the vivacity of another, and the charitable good-nature of 'Charlie' Manceau.

AUSTRALIA.—*The Electrical Engineer of Australia and New Zealand*, says that in the telegraph branch a total net loss of £188,982 was recorded, while the telephone branch made a profit of £50,677. The profit on the working of telephone exchanges was £90,257, that on the working of the Sydney-Melbourne trunk line, £15,093; that on the Adelaide-Melbourne trunk line, £6,657; and that on the Sydney-Brisbane trunk line, £4,197. On the other trunk lines a net loss of £80,489 was incurred. On non-exchange lines a total profit of £14,952 was made. During the year a commencement was made with the reconstruction of the Sydney-Melbourne telegraph line and the installation of the carrier wave system; preparations were made for installing telephone repeaters between Sydney and Melbourne.

It is exceedingly interesting also to note that the Teletype system of printed telegraphy was introduced on the Melbourne-Bendigo circuit.

Reuter's Trade Service states that £6,000,000 has been allotted to the P.M.G.'s Department for 1925-26 for telegraph and telephone extensions, including new buildings.

The carrying capacity of the Pacific cables is being increased by the laying of a new loaded cable on the route Suva-Fanning-Barnfield. Not a few experts in Australia, as elsewhere, regard it as essential to raise the capacity of the Atlantic connexions to the same working speed; otherwise the traffic will be delayed in the "Atlantic bottle-neck." It is suggested that the best course would be for the Pacific Cable Board to lay a new loaded cable in the Atlantic. It will be urgently needed in the near future.

Wireless matters are also going ahead, for a new wireless station has been opened at Wave Hill, Central Australia, about five hundred miles from Port Darwin.

The London *Daily Telegraph* points out that this is the first step in the establishment of an inland wireless system in remote parts of the Continent. Another station is at Camooweal, which connects the landline with the air mail. The Commonwealth operates stations which serve large areas in North Australia, and are a great boon to cattle stations and settlers generally. Previously the mail was delivered every six weeks. The cost of the two stations is £10,000, as compared with £60,000 land-line charges at 2d. per word, with a minimum of 2s. 8d. The private wireless plant at Burnett Downs, a station 171 miles from Camooweal, has proved of great value. The new stations will probably result in a network of private installations, and possibly additional Government stations.

The *Melbourne Age* announces the reduction of the fees for broadcasting licences as from Aug. 1. The new rates, if paid for twelve months in advance, are stated to be 27s. 6d. for Zone 1, 25s. for Zone 2, and 22s. 6d. for Zone 3, paid in half-yearly instalments if desired.

At the Imperial Press Conference, which is being held this year in Australia, Sir Percival Phillips (Great Britain) opened the discussion on broadcasting. He said that there seemed to be a prospect that broadcasting would conflict with the interests of the newspapers. Mr. C. F. Crandall (Canada) moved the appointment of a special committee of the Empire Press Union to keep in touch with the Dominions in order to watch the course of broadcasting. The resolution was carried.

AUSTRIA.—The *Daily Mail* reports from Berlin that the Telefunken Gesellschaft has secured the order for the construction of the new broadcasting station in Vienna, in competition against American and British tenders. Before placing the order, the Austrian Government consulted an international college of 24 experts as to which system was the best in practice. The Vienna station is to be two-and-a-half times as powerful as the station just erected in Berlin.

BELGIUM.—The Belgian Post and Telegraph authorities are shortly to commence the laying of new telephone and telegraph cables between La Panne and Herbesthal, between Brussels and Lille, and between Brussels and Rosendaal.

BRAZIL.—A wireless telegraph station, employing the Telefunken system, has been opened at Salinas, 70 miles east of Para, under the supervision of the Brazilian Telegraph Department. The charge for the transmission of messages to foreign vessels is 10 fr. for any number of words up to ten, and 1 fr. for each additional word.

Reuter's Agency, at Rio de Janeiro informs us that a new high-power naval radio station has been opened on the Ilha do Governador, in the Bay of Rio de Janeiro. It is equipped with Telefunken apparatus, and has a normal estimated range of 4,500 miles. Communication is established with naval radio stations in the United States, on the Continent of Europe, and at Panama and Puerto Rico. In addition to regular Government work, the station broadcasts weather reports and time signals.

CHINA.—At the moment Radio Rights Question appears to be more or less in an inextricable tangle. The Washington correspondent of the *Times* states that there are conflicting claims which arise out of the contracts between the Chinese Government and American and Japanese interests. The Chinese proposal was to create a radio system with the aid of American and Japanese corporations, but as this involved the cancellation of existing agreements with these groups, there was considerable opposition to it. A solution, says the correspondent, may be found in the formation of a consortium in which Great Britain and France would also be concerned.

So far we thought we understood, but another informant reports that the American Minister at Peking has demanded confirmation of a concession granted to the American Federal Wireless Company in 1921, and that the Japanese Minister demands similar confirmation for a prior concession to the Mitsui Company, dating from 1918. A third concession, it is said, similar to these two, was negotiated for in 1914 by the British Marconi Company. It is understood that the British Government favours the establishment of a joint working arrangement.

The next item from Reuter's Agency (Tokio) adds the following, which to a bewildered Westerner, and one not in the Diplomatic Service, does not clarify the situation. Says Reuter, "An official of the Chinese Foreign Office has stated that a French company recently opened a wireless station at Mukden, but ceased operations following a Japanese official protest."

That is a clear statement, but the next sentence seems to 'mush' everything again, for "Marshal Chang Tso-lin has nevertheless granted the French

company authority to continue operations, but the Japanese Ambassador in Washington will soon be instructed to begin conversations with the United States Secretary of State with regard to the Chinese wireless situation, in the hope of reaching a compromise, for it is understood that the Japanese and American Governments do not favour the Chinese proposal to float a loan for taking over all wireless interests in China. International joint management is suggested as a possible solution."

Matters are evidently advancing, for a later despatch says: "In the hope that the interested powers will reach a tentative agreement regarding Chinese wireless questions before the opening of the Tariff Conference, Mr. Matsudaira, the Japanese Ambassador at Washington, has been instructed to enter into conversations with Mr. Kellogg, the United States Secretary of State, immediately, lest propagandists should use Japanese-American differences to influence the Conference. Japan proposes that China should control and operate *omni-wireless* stations, guaranteeing the interested powers property rights. It is understood that China's note regarding wireless has not yet been answered, but Mr. Yoshisawa, the Japanese Minister at Peking, has been instructed to communicate with China unofficially with reference to the proposal, and also to advise her that Japan does not approve of a loan for the purchase of wireless rights. Following the conversations at Washington, the Japanese Ambassadors in London and Paris will be instructed to take up the question. Though China will probably not yet be able to carry out the proposal, Japan thinks that a temporary arrangement will be possible whereby the powers will operate until China is ready."

Just as we go to Press, past the middle of last month, comes yet another news item, which though still indefinite, nevertheless carries a hopeful tone in its final sentence:—"Sir Charles Eliot, the British Ambassador, and Baron Shidehara, the Japanese Minister for Foreign Affairs, had a conversation on Oct. 12 which is stated to have been of a very satisfactory nature with regard to the Chinese wireless question. It is also understood that the Japanese Government is emphasising the importance of the powers being united on their Chinese policy, and that it has instructed the Japanese Charge d'Affaires in London to seek Mr. Austen Chamberlain's co-operation to persuade America that a practical settlement of the wireless question is more important than the insistence on legal rights, which rights Japan is prepared to forgo if others will do the same."—and there until next month one must leave our readers with this very real Chinese puzzle still unsolved!

ITALY.—Marconi interests have received an order for a broadcasting station in Rome of a larger power than the one which was erected by it there some time ago, and which is now working. As soon as the larger station, which will be of 12 kw is in operation, the smaller, a 6-kw station, will, it is understood, be removed to Naples.

The new direct Italo-Argentina telegraph cable between Rome and Buenos Aires via Madeira and St. Vincent was formally opened for traffic by the King of Italy on the 12th ultimo—Columbus Day.

LATVIA.—The Latvian Government's monopoly on the sale of radio apparatus will be discontinued when the new broadcasting stations are opened. The latter commenced service on Oct. 1.

LONDON.—The necessity for the use of wires (underground or overhead) in connexion with wire-less services is very noticeable, and nothing possibly has brought this fact so much into prominence as the statements of the London Press concerning the re-organisation which came into operation on the 1st of the current month (November), when Leeds became the pivotal station controlling all broadcast transmissions relayed between the South and the North.

Hitherto, land-line connexions between one broadcast station and another have been operated through London, except for a small inter-communication switchboard at Glasgow for linking all Scottish stations. Separate lines have been used between London and practically all other stations, save in one or two cases, and the quality of transmission has suffered by the use of several hundreds of miles of unnecessary land-lines. From November all stations north of Leeds will be linked up by land-lines to Leeds instead of to London. Between London and Leeds four special lines have been set apart by the Post Office for the use of the B.B.C. Generally, only one will be wanted, but spares are provided for alternative programmes, control purposes, and emergency use. The arrangements at Leeds will be much more automatic than they have been from London. The chief function of Leeds as a pivotal point will be to improve the quality of all items it receives from London, before they are passed on. In the near future another pivot will be installed to facilitate simultaneous broadcast arrangements between London and the West Country.

A curious and possibly unique crime was recently perpetrated in the City of London, when thirty-four telephone circuits were interrupted owing to the theft of a portion of underground cable from one of the man-holes in the open street!

NEW ZEALAND.—The *Australian Electrical Times* says that figures made public last June show that there were just over 4,200 holders of listening licences in New Zealand. Until the 500-watt station of the broadcasting company is ready to begin service, the Government has authorised existing stations to carry on, and is subsidising them. Auckland's broadcasting station (IYA) has taken the call sign VLAK and wave-length of 420 metres. With a subsidy of £15 per week from the Postal Department and £15 from traders, and under the supervision of a local committee representing as well as the company, the trade Postal Department and listeners, an improved service is promised.

On the same subject the London *Morning Post* informs us that four new stations are to be erected in New Zealand, the promoters of a private company having entered into an agreement with the Government to erect four stations at Auckland, Wellington, Christchurch, and Dunedin, and to maintain an efficient service. It has been agreed that the company shall receive 25s. of the 30s. that the licences will cost.

PARAGUAY.—From Asuncion, Reuter's Trade Service cables that the Government of Paraguay has decided to erect a radio station at Fuerte Olimpo. The Minister of War and Marine, Asuncion, will receive tenders for the supply of materials and tools, the cost of which must not exceed 60,000 Paraguayan paper pesos.

PERSIA.—A recent report on Persia by Mr. R. H. Hadow, M.C., of the British Legation at Teheran, states that the Persian Army is engaged in constructing near that city a long-range radio installation with which it is hoped to communicate with Moscow and Beirut. Russian engineers are being employed, but Persians are to be trained to take their places. Similar but minor installations are projected at the various divisional headquarters of the Army, the places mentioned being Meshed, Shiraz, Tabriz, Hamadan, and possibly others.

PHILIPPINES.—The *Telegraph & Telephone Age* states that radio has made tremendous strides in the Philippines during the past year, and has proved an ideal means of communication in this immense group of islands stretching 1,000 miles north and south and over 600 miles east and west. The Philippines legislature has granted a fifty-year concession to the Radio Corporation of America and the Far Eastern Radio, an affiliated company, and installations to cover the whole country are proceeding rapidly. The terms of the concession provide that within a year the radio company must have in operation a broadcasting station that will reach every part of the archipelago. The Company is authorised to handle all ship-to-shore and shore-to-ship business as well as commercial wireless business to and from other countries.

RUSSIA.—The *Electrical Review*, writing on the Russian Weak-Current Trust, gives some most interesting information as to the proposed activities of this organisation. This Trust, whose chief manufactures are telephone and radio apparatus, has brought forward its productive programme for the year beginning on Oct. 1. The gross output will amount to 16,300,000 (pre-war) roubles, showing an increase of 94% over 1924-25. Telephone and telegraph apparatus will be turned out to the same extent as in the expiring year, while the output of measuring apparatus is to be increased by 50% and that of meters by 180%. As the production outlined will be 40% in excess of the capacity of the works, it is intended to overcome the deficiency by carrying out extensions and the provision of new equipment, which will necessitate the expenditure of 4,300,000 roubles. The working capital will also be insufficient, and a grant of 4,422,000 roubles is asked for by the trust. It is intended to increase the number of persons employed by 71% to 9,270, and the average wages will be raised by 10% while the costs of production are expected to be reduced by 8%.

SOUTH AFRICA.—The Johannesburg Broadcasting Co.'s station, which works on almost the same wave-length as the London station and on a power of from 1½ to 2 kw now has about 8,000 licence holders. A licence costs £2 5s., and the station has been in operation a little over a year. The company makes no profit but functions for the Government.

SPAIN.—A new telegraph cable between this country and Spain 500 miles in length, was landed at Bilbao by the cable-ship *Colonia*, which took only a week to perform the service. The new cable belongs to the Direct Spanish Telegraph Co., Ltd., which forms one of the undertakings which make up the Eastern Associated group.

In connexion with the Union Radio broadcasting station at Madrid, which was inaugurated in June, it is proposed to work out an elaborate relaying system. According to a recent report, relay stations are to be built at Barcelona, Seville, Valencia, Cadiz, Santa Cruz de Tenerife, Coruna, Oviedo, Santander, Bilbao, Palma de Mallorca, Granada, Salamanca, Pamplona, Logrono, Valladolid, and Malaga. By this means it is hoped to cover the whole of Spain and the Balearic and Canary Islands.

VENEZUELA.—According to a report recently issued by the Government Telephone and Telegraph Department, there are now 240 telegraph stations in Venezuela.

The new Beam service with Canada which was programmed to have commenced last month is unfortunately postponed. The staff of the C.T.O. who noticed the apparatus *in situ* ready for the G.A., were naturally disappointed though pleased to note that the London end had not failed to deliver the goods.

One hears from one and the other of ex-C.T.O. friends and acquaintances from time to time, and to those who are specially interested it may be said that Belderson is still vigorous as postmaster of Lydney, and McEwan still meandering around the Hoofdkerks of Belgium well and hearty.

Poetry.—“Speech is the instrument of poetry; poetry moulds it to its uses and idealizes it that so it may express ideal beauty. It gives it the charm and majesty of metre, it turns it into something that is neither voice nor music, but which partakes of the nature of both, something at once material and spiritual, something finished, clear and precise like the sharpest contours and forms, something living and animated like colour, something pathetic and infinite like sound.”—*Victor Cousin*.

J. J. T.

INTERNATIONAL TELEGRAPH CONFERENCE.

TELEPHONE NOTES.

A SPECIAL Committee was formed to consider the revision of the Telephone Règlement, under the presidency of M. Milon of the French Administration.

An important question had to be discussed before the Committee settled down to what would in ordinary course have been its normal work. Since the last conference of the International Telegraph Union, an important organisation, known as the Comité Consultatif International des Communications Téléphoniques, has been formed, with headquarters at Paris, to consider the best means of extending telephonic communication in Europe. This organisation, which is supported by nearly all the European Telephone Administrations, has to deal largely with technical matters, but it has also undertaken to study several questions such as those relative to tariffs, methods of working, etc., which are included in the Telephone Règlement of the International Telegraph Union.

There was another complication inasmuch as proposals had been put forward for the formation of a General Technical Committee, advisory in character, to be associated with the International Bureau at Berne. It was the intention that this Committee should deal with all questions relative to electrical communications, and that, if established, it should take over the work of the Telephone Consultative Committee.

It was finally decided to deal with the Telephone Committee as a separate matter, and to insert in the Telephone Règlement a special paragraph describing briefly the organisation and objects of the Consultative Committee. Provision was also made in the Règlement for this Committee to prescribe the conditions under which plant required for international telephone purposes should be constructed and maintained, and also the methods of working most suitable to ensure the greatest possible output from the circuits thus formed.

With regard to the revision of the Règlement itself it was obvious at the outset that there were two schools of thought among the members of the Committee. One school desired to include every possible detail that might be useful as a guide to the working of the international telephone system, while the other considered that at the present juncture it would be inadvisable to go too much into detail and that the Règlement should consist as far as possible of general principles, on which a more detailed code of instructions might be built up gradually by the Consultative Committee. In the end a compromise was arrived at, but only after prolonged discussions which covered several weeks.

The question of international telephone tariffs was one of the most difficult problems. A prolonged effort was made to include a definite figure at any rate for transit calls, but as it was found impossible to find a figure which would suit all the Administrations which supported the idea, it was necessary to fall back on the proposal to stick to guiding principles. Provision was, however, made for a paragraph describing roughly how transit rates should be calculated, and also for another stating that countries which provide wires for the purpose of establishing direct communication between distant countries shall have the power to demand a minimum revenue.

Another knotty question was the proposal to make a charge against the calling subscriber in cases where the called subscriber does not reply. This practice was at one time in force in this country, and it is still adopted in several European countries. The latter argue that the Administrations have a right to be paid for work undertaken on behalf of the subscriber, while the opponents of the proposal urged that such a charge would restrict development, and that the revenue obtained would be out of all proportion to the

irritation caused to subscribers generally. Ultimately it was decided that the practice should not be obligatory, and that an Administration should be allowed to make a charge for no-reply calls only by special arrangement with the other Administrations concerned in each service. It was, however, decided that in cases where a subscriber answered his telephone and refused to take up a call, the full charge should be made against the calling subscriber.

It was decided also that after the expiration of the first period of three minutes, which will remain an indivisible unit, long distance international calls shall be extended in one minute periods up to a maximum of six minutes, or longer if there are no calls on hand at the end of the latter period. Each minute in excess of the first three will be charged for at one-third of the ordinary charge.

Provision has also been made for *abonnement* calls during the slack hours of the day, as well as at night, where circumstances permit.

Provision has been made in the new Règlement for "Lightning" calls, which will take priority over all except urgent State calls and will be charged for at a very high rate, for "Fixed Time" calls with urgency to be paid for at a little more than urgent rates, and also for a system of "préavis." Under the latter arrangement messages can be associated with ordinary calls in order to endeavour to obtain the attendance of a particular person at the distant subscriber's telephone when the call is effected in its ordinary turn. The Administration will not, under this scheme, guarantee to obtain the attendance of the person required, and there is thus a great difference between this type of message and the "particular person" call obtainable in America. It should be stated that "Lightning" calls, "Fixed Time" calls and "Préavis" can be introduced only by arrangement between the Administrators interested, and this applies also to the system of "urgent" calls at triple rates which is in force in most of the European countries, and also to the present "avis d'appel" system which enables particular persons to be brought to call offices.

It has been suggested that in order to facilitate the preparation of calls in advance, a serial number shall be given to each transaction, odd numbers for outgoing calls and even numbers for incoming calls on each route. A system of this character has been in force in Sweden for several years, and it has since been adopted in other countries with satisfactory results.

These are the most important changes in the Règlement, but there are many minor changes which should lead to more detailed study by Administrations generally of the question of circuit output. It should also be mentioned that in the course of these discussions, every detail of the international telephone working has come under review. Members of the various Administrations stated the procedure followed in each instance in long distance working, and although it was found impossible to draw up a standard set of instructions covering the whole of the questions raised, the discussions have revealed a great many points on which detailed study is needed, and this study can usefully be pursued by the Consultative Committee.

H. G. T.

OBITUARY.

It is with the deepest regret that we have to record the death of Miss H. Cryer, Travelling Supervisor, Lancaster, which occurred on Oct. 11, at the Lancaster Infirmary.

The deceased entered the service as a Trunk Telephonist at Bolton in 1901 and served at that Exchange until 1920 when she was appointed Assistant Supervisor, Class II at Lancaster. In 1922 she was promoted to the position of Travelling Supervisor, District Manager's Office, Lancaster.

Miss Cryer was a conscientious and trustworthy officer, and the number of floral tributes which were sent by her colleagues throughout the district was a proof of the high esteem in which she was held.

TELEPHONE PROGRESS IN THE LIVERPOOL DISTRICT.

(Including Warrington, St. Helens and the Isle of Man.)

It is fully recognised that not only is there great scope for development of the telephone in this country, but that such development is essential to the cause of national efficiency. Naturally the long duration of war conditions caused serious interference with the telephone system, just as with industrial development in general, but during the past few years much has been done to overtake the arrears of work which had accumulated. As evidence of the vigour with which this object has been pursued locally, it may be stated that since the beginning of 1919 the number of engineering workmen employed in the district has been increased more than threefold, a large number of the new men being passed through special training courses in order that they might qualify for the work of bringing the plant up to date as rapidly as possible.

Telephone progress generally is gauged by the rate of increase in the number of telephones and by the ratio of the number of telephones to the population. The engineering stability and efficiency of the service depend in a great measure upon the continuous extension of underground cables in proportion to the growth of the system. The quality of the service is conditioned by the speed and accuracy of the operating staff in completing the connexions required by subscribers. All these various functions are co-ordinated to give the best possible service to the public, and it is the ambition of the Post Office not only to make the telephone a useful tool in promoting commercial and industrial prosperity, but also to make it a handy servant for purposes of social convenience. The continuously growing demand for new services encourages us to think that some measure of success has already been achieved, and no effort will be spared to ensure further improvements.

In normal conditions the development of the telephone industry naturally follows the fluctuation of ordinary trade and business. In times of prosperity the telephone traffic increases and in periods of depression it diminishes, but the range of fluctuation from the normal rate of telephone development is not generally so wide as the rise and fall in the volume of ordinary trade.

NUMBER OF TELEPHONES.

The number of telephones rose from 34,910 in 1912 to 53,414 in 1924, an increase of 53% in twelve years. During the last year 6,610 new telephones were fitted, or an average of nearly 130 per week; deducting cessations, this gives a net increase of 3,809, the gross and net figures constituting the highest record for the twelve years' period. For the four months ending Jan. 31, 1925, the net increase was 1,381, or at the rate of 4,143 per annum.

UNDERGROUND CABLE EXTENSIONS.

The growth of the underground cable system is shown in Appendix B. from which it will be seen that during the period of twelve years the total underground wire mileage rose from 99,444 to 175,825, an increase of 77%.

An extensive network of underground telegraph and telephone cables connecting Liverpool with other industrial centres, has been constructed (illustrated in the accompanying plan) and further extensions are being made. The greatest density occurs between Liverpool, Warrington and Manchester, and to carry the traffic over this route there are, at present, 452 underground lines, of which 379 are already in use and 73 are available for further growth of traffic. Direct underground cable communication between Liverpool, Birmingham, and London, was established in 1916. Since September, 1923, direct communications from Liverpool have been improved by the completion of new cables,

Liverpool—Chester, No. 2,
Chester—Rhyl,
Liverpool—Warrington—Manchester No. 4, and
Warrington—Northwich.

Cables providing for further outlets have been authorised,

Liverpool—St. Helens, No. 3,
Liverpool—Ormskirk, No. 2,
Ormskirk—Southport,
Ormskirk—Preston,
Ormskirk—Wigan,
Wigan—Atherton,
Northwich—Sandbach—Crewe,
Warrington—Wigan.

In addition to main line communications, many large extensions of the underground systems serving local telephone subscribers have been effected, and the work is still steadily progressing.

Concurrently with the extension of the underground system, overhead wires are being recovered, and it will be interesting to note that since 1912,

8,052 miles of open wire in the district have been cut down. In the ordinary suburban areas, in order to keep the cost of service within reasonable limits, it is still necessary to retain the use of short sections of open lines for distribution to subscribers' premises, but in the concentrated business areas of the city the overhead system of wire distribution is being entirely displaced by underground. In past years overhead lines in the Liverpool district have been peculiarly liable to interruption, due to the strong westerly and south westerly winds prevailing during the winter months. The more extensive employment of the underground system has already resulted in greatly improved stability and reliability of the service, and further improvement in this respect may confidently be anticipated.

The time will ultimately come when the need for a telephone in every home in the better class residential areas will be recognised in this country, as is already the case in America. When the development reaches this stage, and continuity of the telephone service in practically every house is assured, it will become economically possible to lead underground cables into the premises in the same way as water supplies are provided; the overhead system in such areas could then be dispensed with.

NEW EXCHANGES.

Complete new exchanges have been provided in the case of Ellesmere Port, Formby, Walton, Royal, Old Swan, Newton-le-Willows, Grappenhall, Birkenhead and Lymm. New rural exchanges have been established at Kirkby and Manley.

In addition, extensions of the existing equipment at many other exchanges have been carried out. The work of enlarging the South John Street, Liverpool, premises is now well advanced, and as soon as the new building is ready, the extension of the Bank and Central exchange switchboards will be commenced.

A careful study of the problems of automatic telephones is now in progress with a view to the introduction of this system in Liverpool and St. Helens at the earliest possible date.

TELEPHONE TRAFFIC MATTERS.

It may be of interest to note that in the Liverpool district alone the increase in telephone traffic between 1923 and 1924 amounted to 10%. In the latter year 52½ million local effective calls, 3½ million trunk calls, and 186,000 phonogram calls were handled.

The quality of the service has improved as a result of the modernising of equipment, and may be gauged by the fact that in 1924 the number of written complaints decreased by 20%, although intricate underground and equipment schemes were proceeding which, owing to the nature of the works, caused unpreventable temporary disconnexions, &c.

The expansion of the "Junction" services may be gauged from the fact that in 1914, subscribers could obtain "on demand" 28 exchanges; in 1924 the number of exchanges available "on demand" had been raised to 350.

CO-OPERATION OF PUBLIC AUTHORITIES.

In recent years it has become generally understood that although the Post Office resources are used for the purpose of co-ordinating the telephone service, provision of long-distance communications, and scientific research work directed to the discovery of improvements and reduction of costs, our local activities are primarily devoted to the service of local residents and business firms, who, in fact, jointly share in the ownership of the system, as is the case with municipal gas, electricity, water, and tramway undertakings. A reduction in working costs renders it economically possible to reduce the charges to telephone users; and, consequently, any assistance rendered to the Post Office staff in their operations tends to react broadly to the advantage of the community. It is pleasing to be able to record that these principles are now recognised by the Corporations and other public authorities, and by their officials, throughout the district; their co-operation in affording requisite facilities for carrying out the works of the Department is much appreciated.

ASSISTING LOCAL INDUSTRIES AND EMPLOYMENT.

The development and maintenance of the service necessitates the regular employment of a large number of workmen, as well as a large manipulative staff, while the purchase of apparatus, cables, line stores, and other materials, provides a considerable volume of trade for business enterprise. It has recently been stated that over one hundred thousand people are employed in the British telephone industry, and it is interesting to note that a goodly share of this work is secured by the business undertakings operating in the Liverpool district. It is also found that the orders placed by the Post Office not only have the advantage of providing supplies for home use, but that they have assisted British manufacturers very materially in organising their factories to compete in the markets of the world, with the result that there is a considerable volume of export trade undertaken by leading firms.

As regards the magnitude of our local works, it will be interesting to note that since the war major schemes which have been drawn up and authorised for improving the service in the Liverpool district are valued at approximately £1,300,000 for lines and apparatus.

Liverpool District, including Isle of Man.

APPENDIX A—NUMBER OF TELEPHONES.

Date Sept. 30.	NUMBER OF TELEPHONES.				
	Provided.	Recovered.	Net Increase.	Cumulative Increase.	TOTAL.
1912	—	—	—	—	34,910
1913	—	—	1,625	1,625	36,535
1914	—	—	1,957	3,582	38,492
1915	—	—	552	4,134	39,044
1916	2,062	2,308	—	3,888	38,798
1917	1,899	1,567	332	4,220	39,130
1918	2,348	1,241	1,107	5,327	40,237
1919	3,490	1,703	1,787	7,114	42,024
1920	4,928	1,761	3,167	10,281	45,191
1921	4,014	3,835	179	10,460	45,370
1922	4,761	3,149	1,612	12,072	46,982
1923	5,655	3,032	2,623	14,695	49,605
1924	6,610	2,801	3,809	18,504	53,414

Net increase, 53% in twelve years.

NOTE.—Number of telephones in Isle of Man, included above, increased from 919 in September, 1912, to 1,331 in September, 1924: 45%. For the three months ending Dec. 31, 1924, there was a further increase of 1,053 telephones, bringing the total up to 54,467 in the district.

APPENDIX B—UNDERGROUND WIRE MILEAGE.

Date Sept. 30.	MAIN LINES (Trunks and Telegraphs).—Mileage of Underground Wire.			LOCAL LINES (Subscribers).—Mileage of Underground Wire.			GRAND TOTAL MILEAGE.
	Increase.	Cumulative Increase.	Total.	Increase.	Cumulative Increase.	Total.	
1912	—	—	19,514	—	—	79,930	99,444
1913	45	—	19,559	5,144	—	85,074	104,633
1914	467	512	10,026	2,503	7,647	87,577	107,603
1915	5,681	6,193	25,707	7,402	15,049	94,979	120,686
1916	70	6,263	25,777	347	15,396	95,326	121,103
1917	3,011	9,274	28,788	744	16,140	96,070	124,858
1918	1,659	10,933	30,447	466	16,606	96,536	126,983
1919	294	11,227	30,741	119	16,725	96,655	127,396
1920	8,802	20,029	39,543	10,276	27,001	106,931	146,474
1921	63	20,092	39,606	3,258	30,259	110,189	149,795
1922	—	—	—	1,392	31,651	111,581	150,544
1923	8,474	28,566	48,080	5,599	37,250	117,180	165,260
1924	825	29,391	48,905	9,740	46,990	126,920	175,825

Mileage Increases.—Main lines, 151%; Subscribers' lines, 59%. Grand total 76,381 miles, or 77%.

For the three months ending Dec. 31, 1924, there was a further increase of 4,480 miles, bringing the grand total up to 180,305 miles.

RADIO ASSOCIATION.

At a meeting of the Council of the Radio Association held on Oct. 15, 1925, at 24, Queen Victoria Street, E.C.4, the following were admitted as Fellows and Associates:—

Hon. Fellow.

William Le Queux, M.I.R.E., London.

Fellows.

Arthur Frederick Bulgin, London.

Albert Edward Chapman, Wallington.

Clarence Shirley Goode, M.I.R.E., Plymouth.

Herbert Geoffrey Morcom, B.Sc., A.M.I.E.E., Winchester.

Associates.

Harold Mark Avery, Stroud.

Douglas Horace Edward Barbrook, Ipswich.

Samuel Henry Wilson Browning, Kingstown, Ireland.

Edward Henry George Edwards, London.

Raymond Evans, Ystrad, Rhondda.

Harry Thomas Field, London.

Archibald Charles Harvey, Swindon.

The Telegraph and Telephone Journal.

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

Editing and Organising Committee - - -	}	J. STUART JONES.
		JOHN LEE.
		J. J. TYRRELL.
		W. A. VALENTINE.
Managing Editor - - ...	}	J. W. WISSENDEN.
		W. H. GUNSTON.

NOTICES.

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

VOL. XII.

NOVEMBER, 1925.

No. 128.

"TOUTING BY TELEPHONE."

SEVERAL paragraphs appeared in the newspapers last month on the subject of "touting by telephone" by salesmen which is alleged to be "so much on the increase as to be a daily source of annoyance to subscribers." Although only one concrete case seems to be adduced, it may be that the practice is spreading; but we cannot imagine a more ill-advised method of increasing business than that of wilfully annoying a purchaser *in posse*. It seems so ingeniously calculated to defeat its own end. Not long since this custom, which is said to find some favour in America, was reported to have been tried in the provinces, but on the first whisper of complaint, tradesmen hastened to assure the Press that it was unsuited to English habits and was not favoured by them. We hardly see how they could have adopted any other attitude.

The usual corollary of complaints is a crop of suggested remedies. One of these is the proposal that offenders should be reported to the Postmaster-General, who should warn them that if they cannot use their telephones properly they will be taken away from them. What merit there may be in the simplicity of this remedial measure is somewhat outweighed by the demerit of its high-handedness. Our old acquaintance "the privacy of the home" is once again threatened with "invasion." By now we should think it must have survived "the drums and trappings of many conquests." "Callers at the door," says one correspondent, "can be turned away, but callers on the telephone have to be answered." But surely callers at the door have to be answered, and the person who has personally to answer a door in order to

turn away a tout or canvasser is in no worse case than the person who has to answer the telephone for the same purpose. Those who are relieved of the first annoyance by a servant can devolve the duty of the second upon the same hands. The servantless householder or clerkless business-man has no sacred privacy even without the telephone. He has still to meet the problem of repelling the importunate.

HIC ET UBIQUE.

MR. SOSTHENES BEHN, president of the International Telegraph and Telephone Corporations of New York, recently came to London and took chambers in Laurence Pountney Hill. His negotiations, which, according to the *Morning Post* were kept a closely guarded secret, resulted in a five-million deal with the International Western Electric Co., under which are acquired rights to several valuable groups of telephone patents. He had recently acquired a substantial interest in the French Thomson-Houston Company. Financiers consider, we are told, that the mere fact that his company now owns preponderating interests in International Western Electric and the French Thomson-Houston would make it difficult for European Governments to refuse to listen to a suggestion to bring Europe's telephone systems under his control.

We will only remark that the financiers seem to be optimistic. Even the Italian Government which has just parted with its local exchange system to various groups of companies, still retains direct control of the internal and international trunk lines.

The *Times* Frankfurt correspondent, referring to the recent speech trials between certain German towns and London, says:

"Until the proposed Rhineland cable is sanctioned by the French military authorities, this route, which makes use of the existing overhead wires via Cologne and Amsterdam, is the only one available for direct communication with London.

The continued opposition of the French to the construction of the Rhineland underground cable, prevents the German Post Office authorities from proceeding with this very essential line of communication. Since 1922, Germany has repeatedly attempted to overcome this opposition, but the General Post Office state that their efforts to obtain the necessary permission are still unattended with success. The objection of the French appear to be based on the supposition that the cable would affect adversely the security of the troops. It is hoped that improved relations between the two countries will soon restore confidence in regard to matters of such economic importance.

It should be mentioned, however, that the direct Anglo-German lines now under construction will not be routed via Cologne so far as Berlin and Hamburg are concerned, but will run from the Dutch frontier via Duisburg and Dortmund.

The day before his election to the presidency of Germany, says *Telephony*, Field Marshal von Hindenburg left his Hanover villa and went to the castle of his son's mother-in-law at Gross Schwulfer, where he waited to hear the results of the election.

During the evening he received news of the election returns over the telephone. But at 10 p.m. the village exchange closed, and telephone communication with the outer world was cut off.

Such an occurrence is by no means rare in Europe, where many small exchanges are closed for the night. Such a system seems extraordinary to an American, for in the United States almost all exchanges give service night and day. In the Bell system 99.7% of the telephones—or practically all—are given service 24 hours a day.

We quote this paragraph not so much because we are intrigued by the telephone arrangements of the castle of the mother-in-law of the son of the marshal as by the interesting fact that the percentage of telephones on the Bell system enjoying a full-day and night service is 99.7 or exactly the percentage of Post Office telephones giving full service as stated in this *Journal* a year ago.

In conjunction with the work of electrifying the Swiss Federal Railway system, says the *Electrical Review*, the Swiss Telegraph Department has for some time been engaged in substituting underground for overhead telephone lines along the railway. The work of conversion has just been completed between Geneva and Winterthur and between Olten and Basle, while that between Winterthur, St. Gall, and Rorschach is well in hand.

According to *Commercial Reports* a contract was recently signed by the Minister of the Interior, acting on the part of the Turkish Government, by which a concession for the installation and operation of a telephone system was granted to the municipality of Smyrna for a period of 35 years. The municipality has agreed to obtain sufficient capital to cover all expenses, and the system will provide service for 2,000 subscribers. The concessionaire is obliged to complete the installation in the city of Smyrna within one year and three months of the procurement of the capital, and in the suburbs within two years.

It is reported that the telephone system of the Esthonian capital, Reval, is to be modernised by the installation of a 10,000-line exchange. The estimated cost is given as 170 million Estmarks, and it is proposed to commence the work next year, 54 million marks being allocated to it in the Budget for that year.

PROGRESS OF THE TELEPHONE SYSTEM.

THE increase in the Telephone system for the month of August amounted to 7,960 stations, the net result of 17,055 new stations and 9,095 cessations. The total number of stations, 1,317,522, includes 1,251,747 subscribers' exchange telephones, the remainder representing call office, service, and private wire stations.

The total number of private householders renting circuits at the reduced residence rates was 236,332 at the end of August, a net growth of 2,583 for the month.

The monthly analysis of telephone statistics is as follows:—

	London.	Provinces.
Telephone Stations—		
Total at Aug. 31	462,007	855,515
Net increase	2,253	5,707
Residue Rate Installations—		
Total	87,808	148,524
Net increase	977	1,606
Exchanges—		
Total	107	3,778
Net increase	1	15
Call Office Stations—		
Total	4,326	15,137
Net increase	12	91
Kiosks—		
Total	153	1,252
Net increase	4	78
New Exchanges opened under Rural Development Scheme of 1922—		
Total	—	757
Net increase	—	19
Rural Party Line Stations—		
Total	—	9,661
Net increase	—	51
Rural Railway Stations connected with Exchange System—		
Total	—	640
Net increase	—	6

The inland trunk traffic dealt with during June was, like that for May, unusually heavy. 7,132,411 calls were recorded, an average of 279,702 calls per day.

The continued development in the traffic is illustrated by the following quarterly comparison:—

	No. of calls made during quarter.	Average No. of calls per exchange line.
June 1923 ...	16,593,806	25.4
June 1924 ...	18,879,671	25.8
June 1925 ...	21,035,999	26.0

International outgoing traffic for the month of June was heavy, totalling to 18,501 calls, of which 10,058 were calls to France, 2,906 to Belgium, 5,268 to Holland and 269 to Switzerland.

The calls coming into this Country numbered 22,812.

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

PROVINCES—Ardwick (Manchester), Whitstable.

and among the more important exchanges extended were:—

LONDON—Chiswick, Hop. New Cross, Paddington, Tottenham, Walthamstow, Willesden, Hitchin.

PROVINCES—Birmingham (Midland), Caterham Valley, Edinburgh (Museum), Exeter, Oxted, Sellyoak, Worthing.

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

Kilmarnock—Irvine cable.

LONDON—Stanmore Hill.

ALTRINCHAM—Knutsford.

while 57 new overhead trunk circuits were completed, and 64 additional circuits were provided by means of spare wires in underground cables.

REVIEWS.

"Talks about Wireless." By Sir Oliver Lodge. Published by Cassell & Co. Ltd., VIII + 251 pages.

The wireless enthusiast will be familiar with Sir Oliver Lodge, first from his contributions to the literature of the subject, and secondly, and in a more intimate manner, from the interesting lectures which he has recently broadcasted from the London Studio. There will therefore be no need to say more, in introduction of the book under review, than that the delightful atmosphere of these lectures runs through the whole volume. It consists, as the title indicates, of a series of "Talks," chatty articles dealing with matters of interest to all wireless men, both amateur and professional.

The book is divided into three parts. In Part I the author deals with broadcasting, the history of the beginnings and development of radio-telegraphy and telephony, and simple explanations of some more or less abstruse theoretical points.

In Part II more practical matters, such as the design of capacities, inductances, resistances and transformers, methods of aerial excitation, and points in connexion with the use of receiving valves so as to obtain the best results, are discussed.

The third part of the book is devoted to calculations for amateur constructors, and simple methods are given by means of which anyone, not specially trained in mathematics or physics, can work out the data necessary for the proper design of a wireless set intended to give any desired results.

The book is not in the least of the "text-book" type. The author is indulging in informal conversation with his friends who are following in the path which he himself did so much to open up. We can recommend its perusal to all of our readers who are in any way interested in wireless matters.

LONDON TELEPHONE SERVICE.*

BY M. C. PINK.

In the short time at our disposal this evening, it is not my purpose to attempt any detailed description of the organisation of that department of the Post Office known as the London Telephone Service, and to describe the work of that service in detail. I think, however, that it may be of interest to the members of this society to hear a brief description of some of the problems with which we have been faced, and to examine some of the characteristics of the London telephone traffic. One is more inclined now-a-days to look upon the telephone service as one which can be drawn upon as required, like the gas and the water; and while it is comforting to feel that the public is beginning to get used to the acceptance of such a service under such conditions, it is as well to have some conception of the factors which enter into the work of maintaining these conditions.

Most public supply services have a very long period of experience behind them. They are supplying commodities to which the public has been accustomed for years—not only a small section of the public, but the whole community down to the humblest dweller in a single room. The telephone service was for many years regarded as the luxury of the few. It is clear to some of us that it must in time become a necessity of the many, and a fundamental problem for us is the determination of the rate at which the transition from luxury to necessity will be achieved.

The question of provision for future needs is affected by several factors, but obviously the first thing to be determined is the measure of the demand for subscribers' lines 5, 10, 15, &c., years ahead. Many of you are aware of the care which is taken to examine the question of the probable development and to forecast the growth. If the actual development achieved follows the lines of the forecast then all is well, but it will be clear that any deviation from the forecast may very materially affect the programme for future provision of plant.

Prior to the War a very careful estimate of the probable trend of development was made. It was obvious that the War conditions would materially affect this forecast, but it would be beyond the wit of any man to foresee what would happen. One could only wait until sufficient post-war experience had been gained, and then determine the tendencies. As a rough guide, however, it was assumed that the pre-war development estimate might stand, subject to a deferment of five years to cover the War period.

Fig. 1 will give you an idea of the trend of the pre-war development estimate, and the effect of deferring that estimate for five years. Included in the diagram are curves showing the actual yearly development achieved, the last official estimate of further development and the projection of the

PAST GROWTH AND ESTIMATED DEVELOPMENT OF DIRECT EXCHANGE LINES :- [All London]

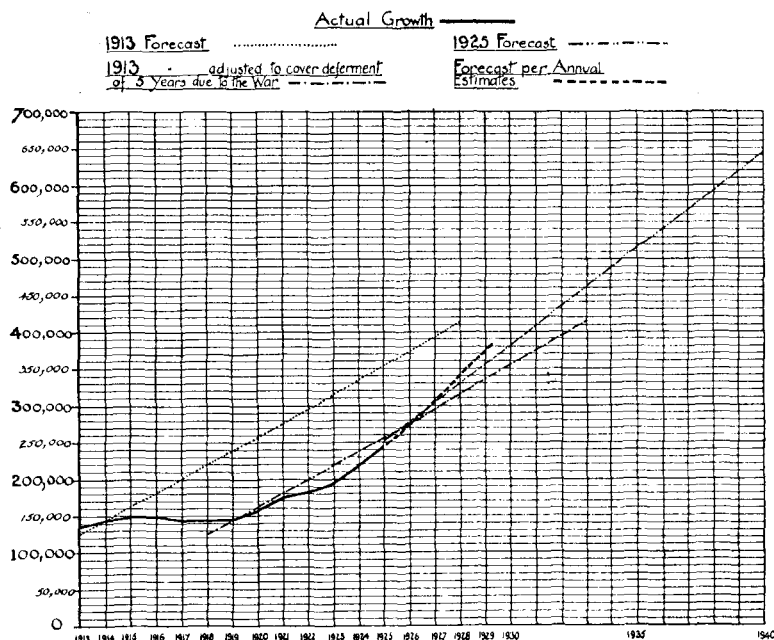


FIG. 1.

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

present tendencies. You will notice the divergence in the projected curves, and when you see the scale of the number of exchange lines to be provided for, I think you will readily appreciate the problems that have to be faced in order to keep pace with the development when it materially exceeds the estimate. You will see for example that the deferred pre-war estimate assumed a total in 1930 of 355,000 exchange lines in the London area. The post-war estimate computed that that number would be 383,000, but it is now thought that the number is more likely to be about 420,000, and when you consider that this development is spread over the whole of the area, and affects the design of each exchange, you will appreciate the extent of the detailed study that has to follow such alterations in the development estimates.

PAST GROWTH AND ESTIMATED DEVELOPMENT OF DIRECT EXCHANGE LINES [Hampstead and Maida Vale]

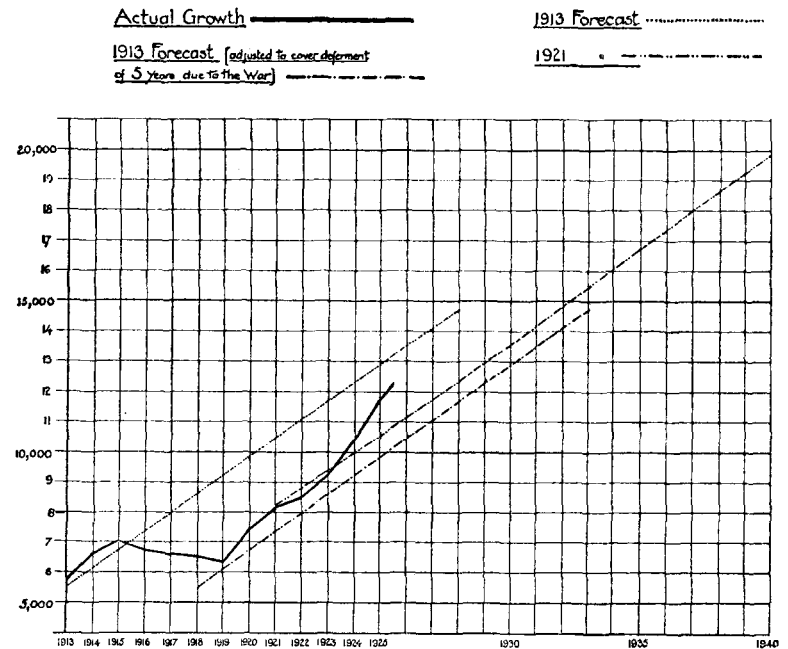


FIG. 2.

In some individual areas the departure from pre-conceived ideas is very marked. I show three examples in the next three figures (2, 3 and 4). You will notice that in the case of Hampstead and Maida Vale—which for this purpose are regarded as one area—the actual growth has never fallen to the modified forecast which took account of War time conditions, and is now running away so such that it is rapidly approaching the pre-war forecast. In the case of Mountview, the exchange serving the Hornsey area, it will be seen that the tendency is to exceed the post-war forecast, and to return to the growth anticipated before the War. Wanstead is a very remarkable case. Here a re-study was made some time ago, and this assumed a return of the pre-war forecast, but the actual growth is such as to suggest that the pre-war forecast will be nearly doubled in ten years.

The development studies show us where exchanges have to be extended, and where new exchanges have to be provided, but the amount of the plant involved in each case is also dependent upon the number of calls made and received by each subscriber. In the case of each exchange a careful estimate has to be made of the calling rates that are likely to apply in future years. Projected calling rates must to a large extent be based upon experience, but there must also be taken into account any known features of policy which may affect the subscribers' use of the telephone. There have been very material difficulties since the war in determining what calling rates are likely to apply.

Fig. 5 shows the average calling rate per line per day on the register exchanges in the London area since the war. You will see how the calling rate increased in 1919. This was not a true measure of the user of individual subscribers. It has to be remembered that after the Armistice all businesses were eager to return to their pre-war conditions, and to make up for the losses of the war period. The war experience had demonstrated in a striking way the value of telephone communication, and many people who had ignored the telephone before the war were anxious to have it installed. All the telephone manufacturers had had their energies diverted from ordinary commercial development, and it was a considerable time before the department could provide all the service that was needed. In the meantime the would-be telephone users used their neighbours' telephones, with the result that existing lines were pressed with traffic which was in a large measure transferred to new lines when they became available. This condition had barely straightened itself out when the alterations in telephone tariffs in 1921 very materially affected the calling rates of subscribers. Up to that time large subscribers had in many cases been obtaining service for less than it cost us actually to operate their calls, quite apart from the cost of plant, engineering staff, &c. It is quite natural that when such services were put on a

remunerative basis, and subscribers were called upon to pay very much heavier telephone charges, they would take very much greater care in the use of their telephone service. In 1919 the weekly calling rate at all register exchanges in the London area reached 47 to 48 calls per line, but in the summer of 1921, after the application of the new rates, it fell to about 37 calls per line. Since then the public have found that the telephone rates are not so bad as they were painted. There has been an increase in confidence in the telephone system. The introduction of quarterly payments has been more fully appreciated, and the calling rate has risen above 40. It is below 40 again now, but this is not surprising in view of the rapid increase in the number of comparatively small users.

PAST GROWTH AND ESTIMATED DEVELOPMENT OF DIRECT EXCHANGE LINES *(Mountview)*

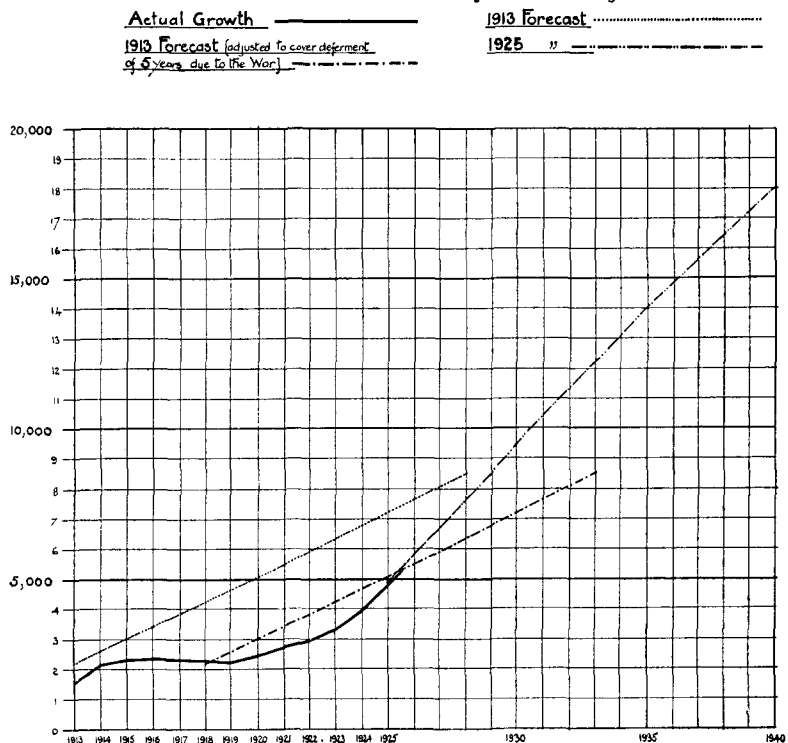


FIG. 3.

In addition to the consideration of the fluctuations in the overall calling rate for London, it may be of some interest to remark on the extent to which the calling rate has altered in different types of exchanges. At Avenue Exchange, which had a very large proportion of flat rate lines prior to the alteration in the tariffs, the abolition of the flat rate caused a very marked reduction. The rate fell from the order of 16 calls a day to 13. There has been a further reduction since that time, but in this connexion it must be remembered that the Royal Exchange, which was opened in November, 1923, took from Avenue a very large number of heavy users. At Gerrard, again, there was a marked drop following the increase in the tariff, but it is interesting to record that confidence has been restored, and the calling rate has crept back to a point fairly near to that achieved during the pressure period of 1919.

Croydon is one of the exchanges which scored over the tariff revision. Croydon and other exchanges outside the County of London had been required to pay a 2d. fee for all calls for subscribers other than those on their home exchange. The new tariff conceded a single unit charge only for calls to all exchanges up to 5 miles from Croydon. The inner 5-mile circle of London was counted as a point and was regarded as included in the 5-mile radius. In this way Croydon and other exchanges similarly situated obtained a very marked reduction in their call fees as a set off against their rental increases. Subscribers were very slow to appreciate this, and at the outset the new tariff caused a marked drop in the calling rate. It may be observed, however, that the user has recovered, and now tends to be somewhat higher than it was before the alteration in the tariffs.

The exchanges which were very badly hit by the new radial charges were those in the outlying parts of the London telephone area. Under the old tariffs these exchanges had enjoyed a 2d. fee to any exchange in the London area. Under the present tariff, which is lower than that introduced in 1921, the charge from Redhill to the inner London exchanges is 5d. and from Tilbury the charge is 7d. In consequence the calling rate has not recovered to the same extent as elsewhere. I think the confidence of users in areas like Redhill has returned, and for a time there was a definite upward tendency in the calling rate. The demand for service in all such areas has, however, been extensive following the development of new residential sites, and the lower user of the new people is now tending to depress the overall calling rate for the district.

It must be remembered that a small change in the calling rate means a very large alteration in the volume of traffic to be handled. You will see from fig. 6 that the traffic peaks and depressions are emphasised, and it may be interesting to you to account for some of them. You will see the regularity of the falling traffic at Easter and Whitsuntide, and during the Summer months each year.

The effect of trade depression was felt early in 1921, and the alteration of rates in that year coincided with the coal strike, which further affected adversely the volume of telephone traffic. It will be noticed how far the Summer traffic of 1921, on the new tariff basis, was below the old tariff Spring traffic. Towards the end of 1921 and during 1922 there was a marked recovery. The Autumn traffic rose above the Summer traffic, but you will observe the marked drop in November and December. The General Election took place at the middle of November.

1923 showed a further marked increase. You will notice how during July of 1923 the traffic remained at a high level instead of falling away as it usually does. This was due to a heat wave which rather upset our calculations, and gave us a very strenuous time. The "Annual General Election" occurred shortly before Christmas, and again caused a reduction of traffic, which was soon wiped out by the marked increase which always comes at Christmas time.

1924 showed a very remarkable increase over 1923. It is interesting to note the effect of different types of strikes. The peak in January was due to the railway strike. The depression in February occurred at the time of the dock strike. The first of the two peaks prior to Easter was caused by the tram and bus strike. Again we find the depression due to the General Election in the Autumn.

I think you will note with interest the fact that the traffic at the exchanges represented by this chart rose from a total of 7,800,000 calls per week at the beginning of 1925 to a total of 9,800,000 calls during the week immediately before Whitsun.

I have indicated the very great pressure that was thrown on to the London telephone system during the years immediately following the War, and referred to the way in which would-be subscribers used the existing exchange lines until new cables and exchanges could be brought into use. Before the War an extensive building programme had been drawn up, sites had been purchased, and buildings had been planned. Post-war experience in any case demanded a review of the programme, but apart from the reviews involved it was quite clear that considerable delay must occur in completing the new main buildings. The public could not wait for this, and urgent and special steps had to be taken to provide relief exchanges accommodation. Additional positions were crowded into existing buildings such as Avenue and Victoria. The old Bank Exchange, that was due to be scrapped years ago, was again loaded up. The Avenue area was relieved by the rapid provision of a temporary Minorities Exchange near the Mint. Temporary premises were rented in Holborn, and the Chancery relief exchange was provided. These are good examples of what had to be done in the inner area. The suburban area had to be similarly treated. The pressure on Croydon, for example, was very great, and it was necessary to instal relief exchanges at Thornton Heath

PAST GROWTH AND ESTIMATED DEVELOPMENT OF DIRECT EXCHANGE LINES *(Wanstead)*

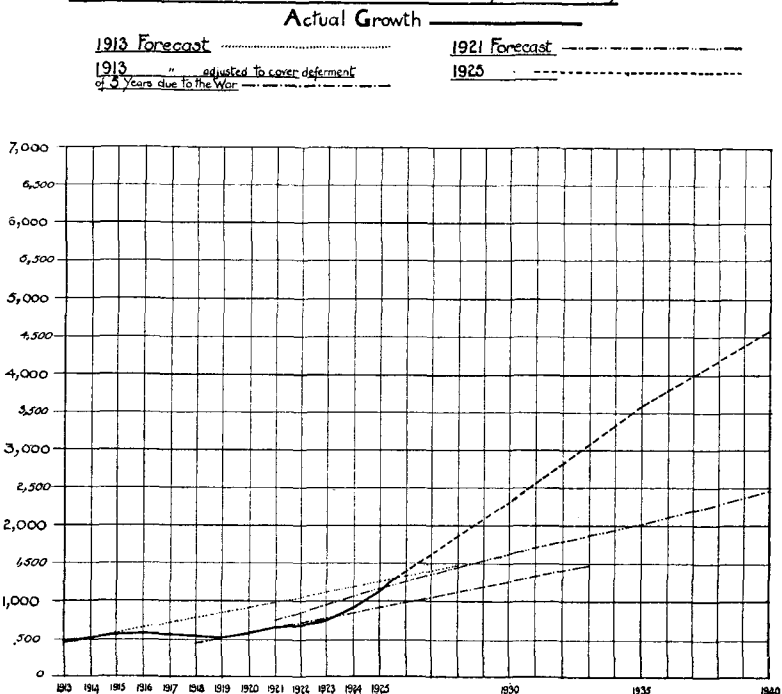


FIG. 4.

CALLING RATES FROM ARMISTICE TO DATE:—(London as a whole.)

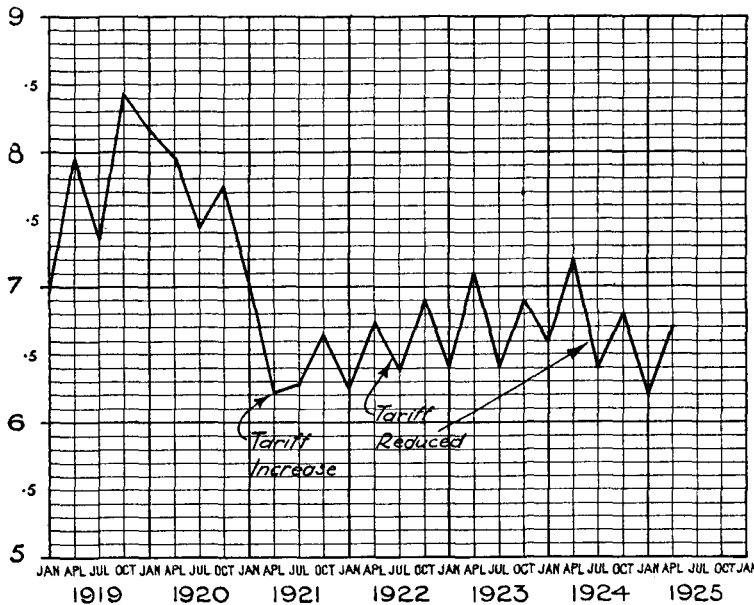


FIG. 5.

and Addiscombe. Further relief buildings and equipments were provided in areas like Eltham, Hounslow, Hendon, &c.

There is no doubt that if the department had not thrown its energies into the completion of all these relief schemes in the shortest possible time, there would have been a huge outcry against the Post Office Telephone System, and the difficulties in connexion with the alteration of the rates would have been intensified. As the various cases were developing it was very trying to experience the inevitable delays that took place; but when we look back on what was accomplished I think that a feeling of satisfaction must be experienced. It is well to remember that a very large proportion of the exchange installation work in these relief schemes was carried out by the Post Office Engineering Department, and I doubt whether the work performed by them on these exchanges, and in all the relative cabling schemes has ever been fully appreciated. In this connexion it is interesting to recall

the history of one switchboard which has entered largely into the London relief measures. Just before the War the Victoria Exchange was rebuilt, and the positions removed from the old exchange were stored. During the War the Air Ministry commandeered the Hotel Cecil for its Headquarters, and moved in with about two days' notice. A temporary telephone installation very much larger than that which had previously served the hotel was provided in a few days, and the Engineering staff performed the notable feat of providing a full No. 1 C.B. Exchange with accommodation for 1,500 lines in the remarkably short period of six weeks. The old Victoria positions were used for this exchange. Before the War the new Clerkenwell Telephone Exchange building had been erected, but it was not possible to obtain the new exchange plant at the time—after the War—when it became essential to open a Clerkenwell Exchange. Immediate needs were met by transferring the whole of the plant used for the Air Ministry at the Hotel Cecil to the Clerkenwell building, where it formed a temporary Clerkenwell Exchange. In due course the main Clerkenwell Exchange was provided and the subscribers lines were transferred thereto, but at that stage the provision of a Bishopsgate exchange was essential, and the same old Air Ministry board was then used as a relief Bishopsgate Exchange. The traffic

TOTAL EFFECTIVE AND INEFFECTIVE ORIGINATED CALLS per WEEK

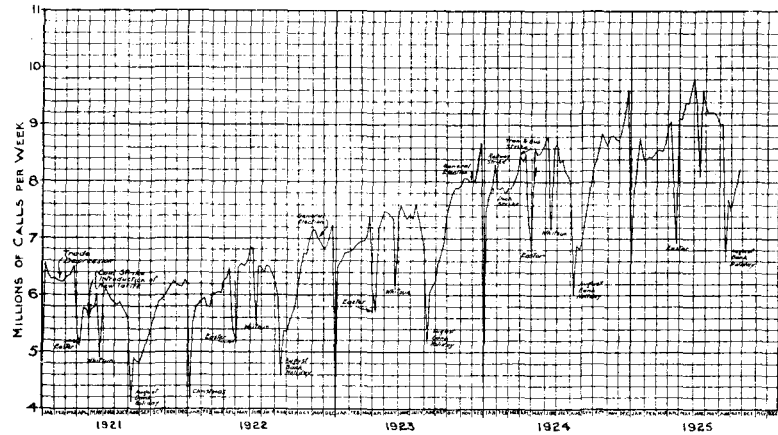


FIG. 6.

characteristics at Bishopsgate differed from those at Clerkenwell, and it became possible to recover a portion of the switchboard. This portion has been used for other relief schemes. The new Bishopsgate exchange is now under construction and when that is complete it will again be necessary to utilise the old board for some other temporary exchange.

Before leaving for the moment the question of local exchanges, it may be of some interest to recall that the tariff alterations of 1921 involved a change

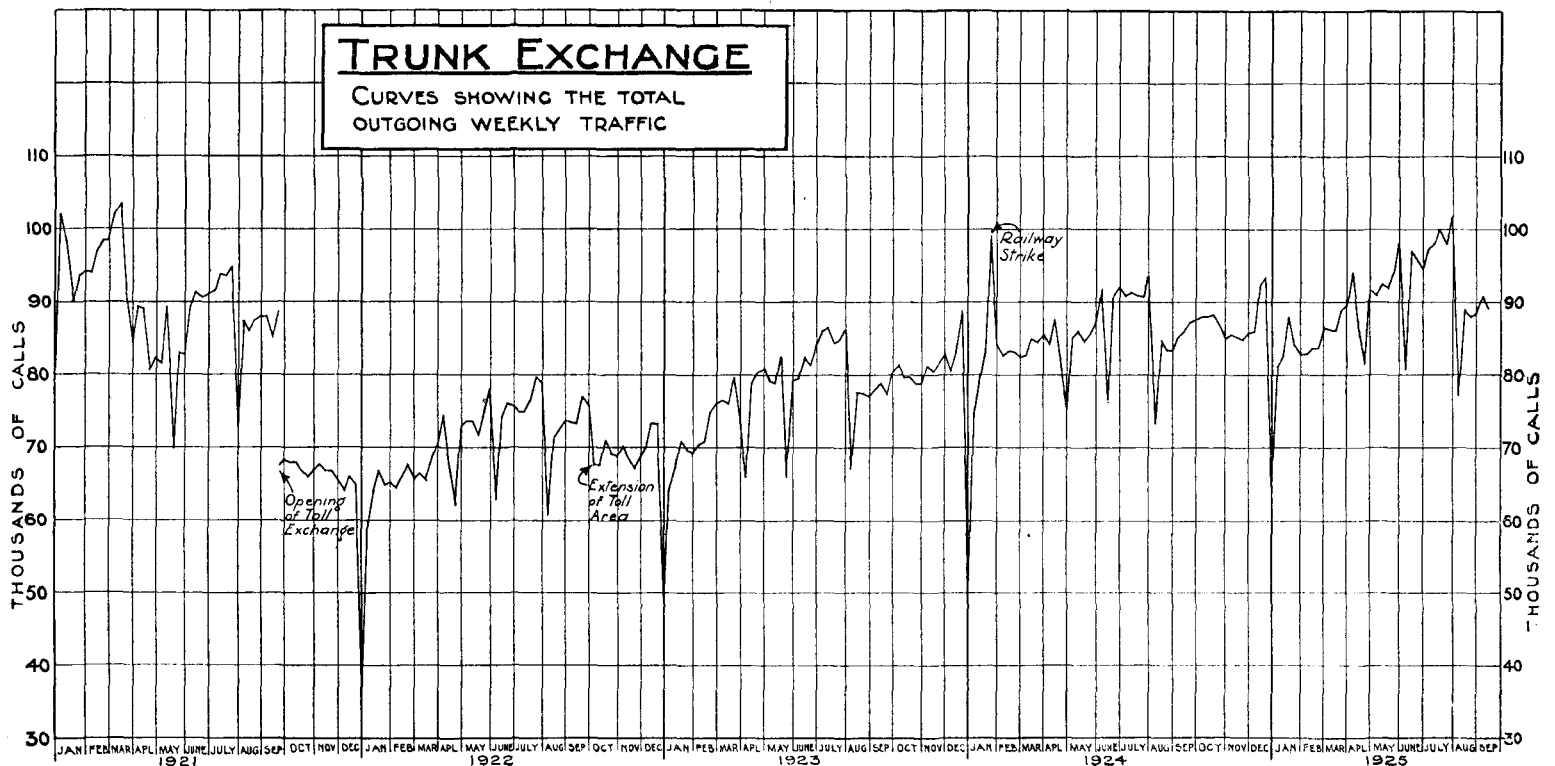


FIG. 7.

TOLL AREA

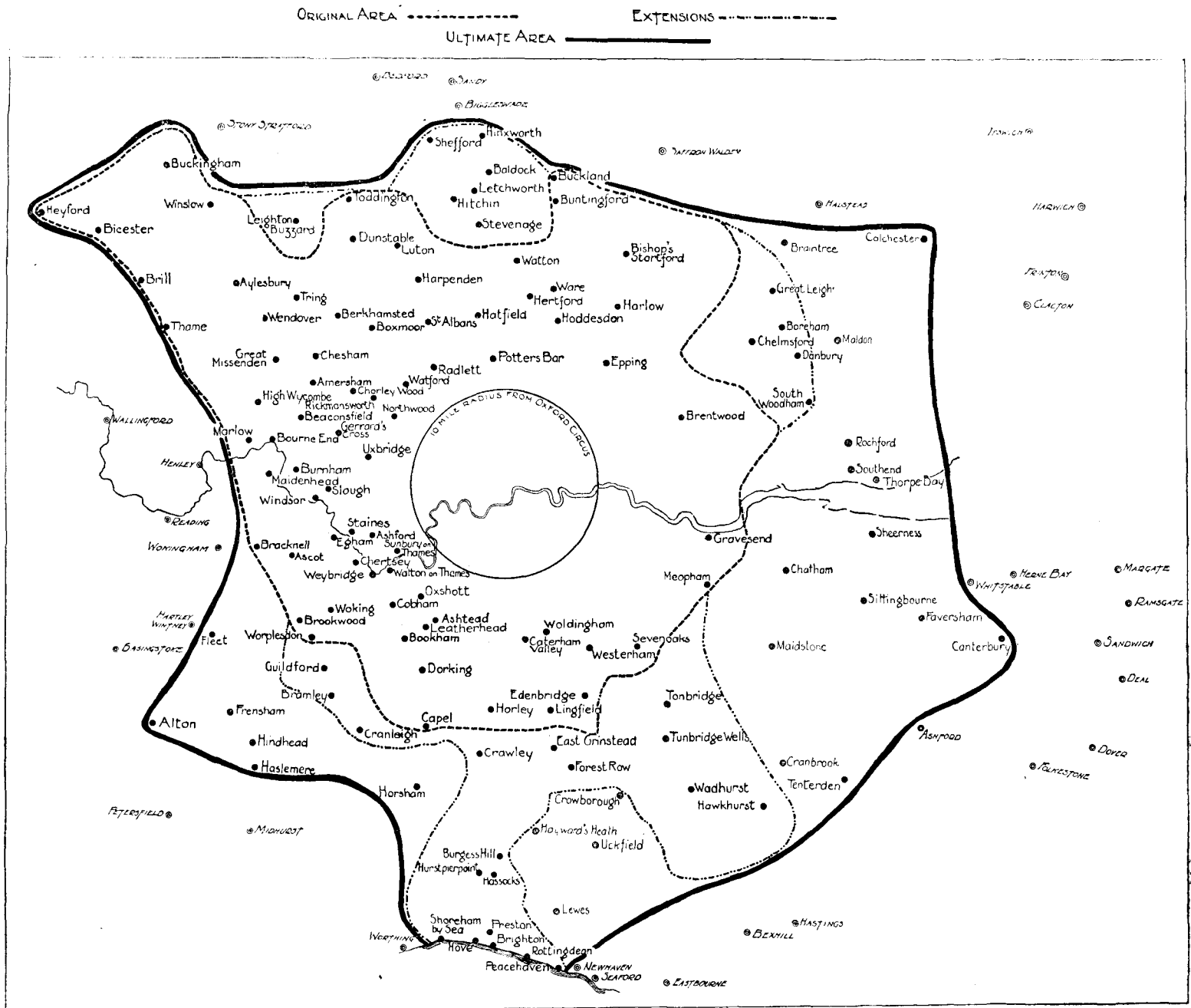


FIG. 8.

of the marking of each of the 176,000 exchange lines and considerable modification in the junction markings. Under the old tariff the measured fees had been comparatively simple. Calls for exchanges within the County of London carried a single unit fee, and those for exchanges outside the County of London were charged as two units. The new rates introduced a radial system of charge which, although considerably simplified by a decision to regard the whole of the area within a radius of five miles from Oxford Circus as a single point, involved the introduction of several zones within the London area, and the zone system was complicated by the fact that if the calling exchange were outside the 5-mile ring its charging zones differed from those of all other exchanges. These conditions involved the preparation of special charge lists. For the exchanges within the 5-mile ring one list sufficed, but for all exchanges outside the 5-mile ring individual lists had to be compiled.

The complications of the new tariff made it essential to display notices on all the operating positions throughout London. Considerable thought had to be given to the evolution of a satisfactory design, and means had to be devised for exhibiting the notices without spoiling the standards of neatness and tidiness which have always been associated with the London Exchanges.

When the flat rate was in operation it was not the universal practice to supply a message register for every subscriber, whatever his rate. The result was that at 12 exchanges many subscribers were without registers, and these had to be supplied in readiness for the rate alterations. The total number of registers so supplied in London exceeded 20,000.

I should now like to make some reference to the London Trunk System.

Fig. 7 shows the weekly volume of outgoing Trunk calls. You will notice that the general characteristics of this curve are similar to those which apply in the case of local traffic. The same depressions at Easter, Whitsun, and in August and the same peak of Christmas pressure. In some respects the trunk system is even more sensitive to the general conditions of the country than the local system, and special events sometimes have an extraordinary effect on the amount of trunk traffic. An outstanding instance is that of the railway strike in January, 1924, when the volume of traffic forced through the Trunk Exchange was nearly as much as the maximum traffic handled in any week during this year. Local service tends to fall off towards

the end of July, following the end of the London season. The Summer pressure in the Trunk Exchange, as you will observe, is maintained right up to the drop for the August Bank holiday week, but the traffic after the Summer holidays does not recover to the same extent as the local traffic.

You will notice that there was a marked drop in the trunk traffic in 1921 which has only just been made up. This drop in 1921 was due to the opening of the Toll Exchange, and I should like to take this opportunity of referring to the causes that gave rise to the opening of that exchange.

Before the War it was foreseen that the capacity of the main Trunk Exchange would soon be reached.

After a study of the conditions and an examination of the position of other telephone administrations, the conclusion was reached that relief to the Trunk Exchange should be afforded by withdrawing the shorter trunk lines. It was felt that there was not a sufficient justification on the shorter routes for the preliminary delays which must inevitably be associated with the system

in Norwich Street. Meanwhile a temporary extension of the Trunk Exchange was carried out. The War came along, and it was not possible to complete the toll scheme during the War. It was, however, proceeded with after the Armistice, and the toll system was inaugurated by the then Postmaster-General—Mr. Kellaway—in September 1921. Fig. 8 will show the area served by the Toll Exchange in the first instance, and the extensions to the area which have since taken place. It was hoped to arrange for the exchange to serve ultimately the whole of the S.E. coast, and the area up to about 65 miles around London in all other directions. Owing to transmission difficulties it has been necessary to restrict this scheme, and the ultimate area as at present conceived is indicated by the heavy line. From the outset the system appealed to the public, and I am confident that the service improvement resulting from its introduction was of very distinct value in soothing the sores which the higher tariff engendered. It was true that subscribers had to differentiate between the Trunk and Toll Exchanges, and although careful publicity work was done in this connexion, it was felt that possibly the number of errors on the part of the public in circulating calls to the two exchanges

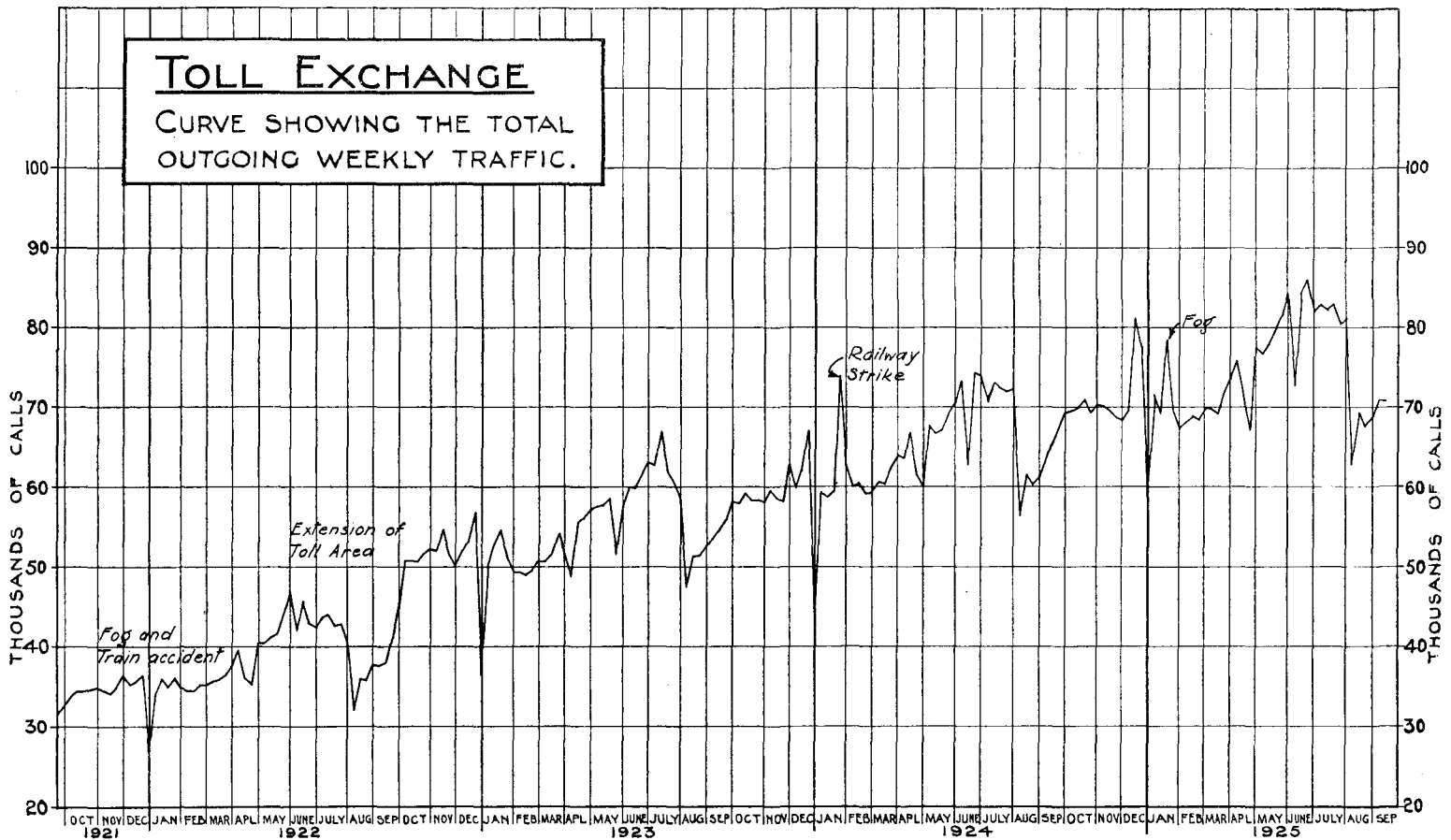


FIG. 9.

under which subscribers' calls are recorded by one operator and then offered to the subscriber by another operator after an interval of time. Under the standard trunk system a call is handled by a minimum of 7 people. The caller is first connected to the recording operator who takes particulars of the call, after which the caller clears. The connexion to the recording operator is made by the agency of the local A operator, and an operator at what is known as the record distribution position. The ticket is passed by tube to a distributing point where a further operator sends it to the appropriate trunk line position. The fifth operator then takes charge; she calls the distant trunk operator (number six) and also passes particulars of the call to a "B" operator at the local exchange in London. You will see that the whole process in its simplest form requires assistance from 7 people in the various exchanges.

Our object was to cut down the handling to a minimum, and to ensure that calls to the inner trunk area immediately around London could be obtained on demand practically as quickly as local calls. The general lines of the new system, and the number of positions which would be required for the first Toll Exchange were worked out in the L.T.S., and accommodation was found

would be heavy. At the outset this was so, but the public very soon learned the new system, and the proportion of calls passed in error to the Trunk Exchange soon fell within a reasonable range. A percentage error of about 1½ appears to be an irreducible minimum. For a long time we used to help callers who got on to the Trunk Exchange in error by flashing their local operators into circuit for them, and asking them to transfer the callers to the Toll Exchange. This is no longer done. The caller has to repeat the call himself, and I think this course must tend to make callers more careful, and so to ensure greater accuracy.

Fig. 9 shows the outgoing toll traffic, week by week, since the opening of the Toll Exchange. The large increase at the beginning of October, 1922, was caused by the extension of the toll area. This accounts for the abnormal increase of the earlier 1923 traffic over that of 1922, but you will see that the following years' increase in the toll traffic has been most remarkable. You will again note the effect of the railway strike on the amount of traffic handled, and also of the heavy fogs experienced in January last.

(To be Continued.)

NOTES ON TELEGRAPH PRACTICE.

BY G. T. ARCHIBALD.

XI—Concerning Telegraph Apparatus used by the Post Office—Past and Present.

No series of articles on British telegraph practice would be complete without some reference to the more important types of apparatus which have been, and are still, in use, with special reference to their traffic carrying capacity, and this article, and the two which will follow it, will be devoted to that subject.

It is a fact worthy of mention that when Professor Morse, who invented the telegraph instrument which bears his name, sought financial aid from the American Government, Congress was besieged with petitions begging it to refuse all assistance. The reason for this opposition was the fear that telegraphic development would throw out of employment thousands of men engaged in mail work. With unusual lack of imagination Congress, for many years, refused to help Morse, the mere idea being resisted strenuously from every quarter.

Telegraphy was more fortunate in this country, for once the public had realised its potentialities, an agitation was set up for better and still better facilities, and no foolish objections were ever raised to its growth and development.

It will probably be news to the younger generation of telegraphists and many others who are interested in telegraphy, that the type of apparatus most commonly in use in this country—the Morse sounder—achieved its popularity and success more by accident than design. The printing telegraph invented by Professor Hughes in 1855 had been bought by an American telegraph company which resolutely declined to allow any rival to use it. Professor Morse, commissioned by another company to provide a recording telegraph, conceived the idea that it would be safer to transcribe telegrams from a code, so that the Company might retain the slip upon which incoming signals were recorded, whereas their competitors, using the Hughes, gummed the slip to a form and delivered it to the addressee, thereafter losing all trace of the contents of the delivered form. Professor Morse perfected a type of apparatus in which the dots and dashes were sent to line by a hand worked key and were embossed on a paper strip at the receiving end. Telegraphists found that they could read the signals from the movement of the armature, and it soon became the practice to ignore the recorder, and to receive the telegrams by sound. Strange as it may now seem, this method of reception was looked upon with disfavour by supervising officers, but ultimately it came to be acknowledged that aural reception was highly efficient, and Morse instruments were afterwards made without the recording mechanism.

Meanwhile, in 1858, the Wheatstone Automatic System was patented by Professor Charles Wheatstone and John Matthias Augustus Stroh. A small number of circuits were equipped with this type of apparatus at the transfer in 1870, the speed of working being about 80 words per minute. Morse sounder working made little progress, and in 1873, by which time the speed of the Wheatstone automatic system had been raised to 200 words per minute, the following circuits were in use :—

Single Needle	...	...	...	...	3,582
Wheatstone A.B.C.	...	...	...	...	2,367
Morse Printing	...	...	...	...	1,509
Brights Bell	...	...	...	...	394
Sounder	...	...	...	...	211
Wheatstone Automatic	...	...	...	...	98
Hughes Type Printing	...	...	...	...	23
Others	...	...	...	...	100
TOTAL					8,284

At that time telegraph men regarded the Wheatstone automatic system with something akin to awe; thirty-nine circuits were equipped with it, the Central Telegraph Office, London, being included in thirty-one of them. These circuits and those fitted with Hughes apparatus were worked under simplex conditions.

A point of interest which may be mentioned here is that Sir Charles Wheatstone derived a royalty of £1,600 per annum from the postal telegraph service for the use of the Wheatstone automatic system patent.

The Wheatstone A.B.C. system, also invented by Sir Charles, was used extensively by private firms as an expeditious means of communication between main and branch establishments in the same district, and was also a useful but slow working instrument from a Post Office point of view. It is described in Bond's "Handbook of the Telegraph," published in 1873, as "the most readily understood of any of the telegraph instruments; indeed it may truthfully be said—He who runs may read it."

The single needle instrument held pride of place, however, in the seventies. As has already been said it was easy to learn, and the signals could be read off either visually or by ear. A development of the single needle was the double-plate sounder, and this again rendered yeomen service previous to the standardisation of Morse sounder working. Working speeds of from 25 to 30 words a minute were not uncommon on these instruments.

Morse sounder working continued to make only slow progress until 1879, when the Post Office bought Stearn's duplex patents for £2,000 per annum during the continuance of the patent rights. At first duplex development was retarded by poor line insulation, but it is gratifying to our national pride to know that despite all difficulties the system was worked in this country for many years before other administrations realised its possibilities. The first duplex system was that devised by Gintl in 1853, in 1872 Edison invented the quadruplex system. Gerritt Smith improved the latter system, and subsequently the Post Office adopted it, paying £25 per annum for each circuit.

Quadruplex Morse working was not entirely satisfactory until 1904, when Mr. A. W. Martin, a Post Office engineer, eliminated what was known as the "B" kick. From that time until the development of the multiplex printing telegraphy, quadruplex Morse was the backbone of the service.

Another development in Morse communication was the Delany multiplex, installed on several important routes about 1886. Originally a simplex system it was duplexed by a Post Office engineer, Mr. S. A. Pollock, in 1901. It is noteworthy because it was the forerunner of the modern multiplex systems, and is best described as an interesting experiment. It was never popular with telegraphists because it was not a reliable system, and was abandoned in 1904, largely owing to the necessity of providing suitable conductors for the propagation of the signals within limits which would render the service profitable. The speed of working did not exceed 25 words per minute, but 20 words a minute was probably the most efficient working speed.

An interesting feature of Morse working is the concentration of lines carrying only a small amount of traffic. The lines are led to a switch, and are connected by plugs and cords, as required, from that point to one of a number of working sets instead of being permanently connected to separate sets. The principal advantages of this arrangement are :—

- (i) Table space, apparatus, staff and artificial light is saved at the transmitting or "concentrated" office and
- (ii) the operators are not called upon to take charge of a number of circuits, each being stationed at one or other of the concentrator working positions.

As a general rule lines which carry upwards of 20 telegrams an hour are not concentrated during the period when the traffic

reaches that figure. A switch operator is provided if five or more circuit operators are required: it is the duty of this operator to distribute calls and outgoing traffic amongst the working operators, and to record all cases where out stations are required to wait until a working set is disengaged, a speaking key being provided for this purpose. In cases where the outgoing traffic cannot conveniently be passed along by the operators a junior officer is employed in the distribution of the work.

The development of the concentration system is an interesting story. As early as 1854 the Electric and International Telegraph Company employed what was known as the Umschalter Switch, which enabled inter-communication to be established between circuits led to it. The system worked well, but its application to Morse working ceased on the transfer of the telegraphs to the State in 1870.

Many of the old telegraph companies encouraged and developed the practice of providing private telegraph circuits equipped with Wheatstone A.B.C., one of the biggest installations of the kind being that of the Universal Private Telegraph Company at Newcastle-on-Tyne. Business men found the arrangement to be of immense value (it must be remembered that the telephone was not then available), and it was so popular after the transfer that it became necessary to adopt some system of concentration in order to conserve accommodation in telegraph instrument rooms. In 1874 a switch on the Umschalter plan was installed at Newcastle-on-Tyne, and although 50 circuits, partly rented by subscribers, and partly serving small post offices, were led to the switch only 15 instruments were required at the Head Office. Facilities for inter-communication between private wire subscribers were also provided. In 1884 the private wires were converted from Wheatstone A.B.C. to telephone working, and were then transferred to a separate switch. Similar switching arrangements were in use at many offices for several years.

Considerations of space and economical staffing rendered it imperative that the concentration of circuits should be extended when, following the introduction of the sixpenny tariff, the telegraph system was extended to large numbers of small country post offices which dealt with only a small number of telegrams a day.

From this point onwards, the influence of the telephone on telegraph switching apparatus can be traced. In 1892 a new concentration switch, similar to the telephone switches then in use, was designed. No provision was made, however, for inter-communicating facilities. At first only those lines justifying permanent concentration were led to the switch; later on, when further experience had been gained, it was found convenient to include other lines which did not warrant continuous independent staffing outside the peak pressure period. A further development was the concentration at offices open always of the lines requiring attention during the night. Separate concentrator switches were installed for night concentration purposes, and these were placed in or near the news section—usually the scene of the greatest activity at night—in order that the maximum economy in staff and artificial light might be attained.

The latest design of telegraph concentrator switchboard, fitted with visual engaged signals and automatic operator's clearing signals, is a reliable and efficient piece of apparatus, combining simplicity of design with ease and comfort in operating.

Naturally the steady improvement in telephone apparatus has continued to exercise its influence in the consideration of improvements in telegraph switching apparatus. There would not seem to be much need for automatic telegraph concentrator switches, but it is not altogether surprising that the application of automatic selection to telegraphy should have been studied. The use of small telegraph offices served by Morse apparatus is rapidly diminishing, consequently the field for this form of working would, in any case, be limited.

Automatic telegraph concentrator equipment must meet the special conditions applicable to telegraph working. It must, if

it is to be wholly efficient, either provide facilities for readily giving the "Wait" signal when all working sets are engaged or eliminate the necessity for giving that signal. It must distribute the calls evenly amongst the available working sets, and in strict order of rotation. It must also include suitable facilities for connecting the working sets when required for outgoing traffic, and it must be noiseless, or nearly so, in operation. Moreover—and this is an important consideration—it should not be more expensive to maintain and operate than the ordinary manual switch.

The question was considered from time to time before the war, but no progress was made until 1921, when an experimental equipment was built by the Engineer-in-Chief. The apparatus was promising, and ultimately a twenty-five line automatic switch with fifteen working positions was built and installed at Leicester. It did not at first fulfil all the above-mentioned conditions, but the results were encouraging and various improvements were effected from time to time. In the end, however, it became clear that equally good, if not better, results could be obtained from less costly and more simple apparatus, and it now seems quite certain that automatic telegraph concentration will not be proceeded with.

One of the principal advantages which it was hoped to gain by the use of automatic equipment, was the saving of the switch operator, but the experiment at Leicester did not satisfactorily meet this point. The condition had been met in phonogram rooms by the installation of a system called the Ancillary System, and an experimental telegraph equipment on the lines of the phonogram system was put into operation at Newport, Mon. It consists of a telegraph concentrator without the usual plug shelf, known as the "Home Section", to which the concentrated lines are led, and a number of ancillary panels on which the lines are multipled. Two working sets are connected to each panel; a switch clerk is not required as the operators set up and break down their own connexions. In this form of working it is necessary to place the sounder of the right hand operating set at the right hand side, instead of at the left hand side, which is the normal arrangement, in order to leave a clear view of the ancillary panel.

No visual engaged signal was provided in the experimental equipment, and difficulty occurred owing to the fact that an operator dealing with an incoming telegram was sometimes cut off by an operator endeavouring to dispose of outgoing traffic. This defect has since been remedied, and the installation has proved so successful that similar equipment is now being provided at other offices.

The study of telegraph concentration undertaken in connexion with the experimental automatic equipment, revealed the fact that concentration at small offices where there is only a small number of minor circuits is not economical. As a result concentration switch working has been abandoned at a few offices.

(To be Continued.)

CONTRACT BRANCH NOTES.

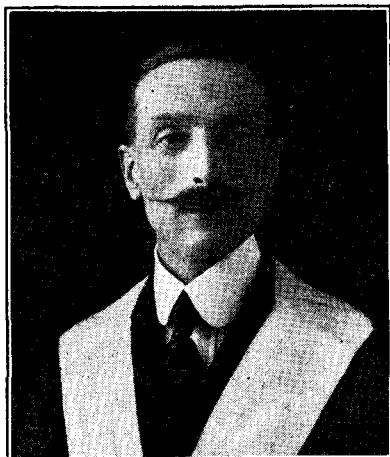
A rather unusual event took place on Sept. 26, when two members of the Contract Branch, Messrs. A. J. Atkins, and P. G. Davey, deserted the ranks of bachelorhood on the same day. On behalf of their colleagues, and with a few appropriate remarks, Mr. Muirhead presented the former with a handsome timepiece, and the latter with a silver oxidized curb, fire screen, and companion set. In accepting the gifts, each expressed extreme confidence in the step being taken. Man was ever thus.

PRESENTATION TO MR. S. J. SMITH.

On his retirement, Mr. S. J. Smith was presented with a fine Bligh's three-valve wireless receiving set.

THE LATE C. F. ARROWSMITH.

THE London Telephone Service in particular, and the Post Office Telephone Service in general, suffered a severe loss during October by the death of Charles F. Arrowsmith. At the time of his death he held the post of Assistant Superintendent of Traffic, Class I, in charge of the Buildings Section of the Traffic Branch of the L.T.S., a position where he did most excellent work in applying official standards, rules and regulations in the manner best calculated to bring health and happiness to the staff. He was always kindly and courteous in his relationship with others, a very model in method and orderliness, as well in official duties as in the many other spheres in which he sought to serve his day and generation. He was what the parsons would describe as an exponent of the "gospel of the second mile," or, in other words, he ever gave full measure, adding that little extra touch of personal devotion to his duty, which redeems duty from drudgery and elevates it to sunlit spheres of spontaneous service.



We in London will miss him sadly, with his gay and happy nature, but we know our loss will be shared up and down the country, for wherever one went in the provinces amongst telephone men and women, one was sure when it was learned that one came from London to be asked—Do you know Arrowsmith of Gerrard? One's proud affirmative reply would induce yet another story of his kindness exhibited at one stage or another in the telephone history of a confrère. His name will always be associated with Gerrard, where both under the regime of the late National Telephone Company and the Post Office, he for years held the office of Exchange Manager. Nevertheless he had held many posts in the service, having at one time acted as personal clerk to Col. Clay, when the latter was Metropolitan Superintendent, and to Mr. Dalzell, when the present director was a superintendent in the days of the company.

The funeral was held at Putney Vale Cemetery on Monday, Oct. 19, and the large numbers who were present testified to Charles Arrowsmith's faculty for friendship. All who enjoyed that friendship will unite in sympathy for his near and dear ones whose sense of loss must be intense indeed. May they long be spared to be inspired by his example of cheerful service.

Our photograph shows him in the Masonic regalia of a Worshipful Master, for he took the keenest interest in everything associated with the craft. He was also a Chief Inspector in the Metropolitan Special Constabulary.

Mrs. Arrowsmith requests me to convey her thanks to the officers and staff throughout the London Telephone Service, whom she says it is impossible to thank sufficiently for the very beautiful floral tokens she has received on behalf of her husband, and to say how deeply she feels their great affection for him and how very grateful she is for the many letters of sympathy in her terrible loss which she has received. H. D.

TELEPHONE NOTES.

Transatlantic Telephony.

Major A. G. Lee, M.C., B.Sc., in a lecture on "Some of the Experimental Work of the (G.P.O.) Wireless Section," delivered before the Society of P.O. Electrical Engineers, recently gave some very interesting information regarding the effort which is being made to link up the American and British Telephone systems. "Experiments in Transatlantic Telephony" he said "were commenced over two years ago by the operation of a high-power valve transmitter at the Rocky Point Station, about 70 miles from New York. A long receiving antenna, seven miles in length, was erected at Chedzoy in Somerset in 1923. We have already on several occasions relayed the received speech over the British trunk lines to subscribers in London and even as far

as Glasgow. The quality of speech is good. The later development of the experimental work includes the provision of 200 kw. telephony at Rugby and a new antenna at Wroughton near Swindon. We hope to commence two-way telephony via Rugby and Wroughton during the forthcoming winter." But "Single-way telephony, which has already been accomplished, is a relatively simple matter compared with two-way or duplex telephony which we are about to attempt. It is difficult to find room in the ether for this communication, as all the available space is already taken up. When atmospheric conditions are bad, speech is rendered unintelligible. Obviously, the bulk of the calls will be required to be completed during the hours common to business on both sides, that is from say 2 p.m. to 6 p.m. G.M.T." The curves showing the intelligibility of received speech at all hours of the day and night, which Major Lee displayed, did not convince one that under existing receiving conditions satisfactory speech throughout these business hours was to be expected in summer. By having several wave antennae side by side, however, calculation shows that improved reception of a high order may be obtained. Consequently two such antennae will be erected in the first instance. If therefore practice can be made to coincide with theory the outlook is hopeful.

Fault Finding.

Whether the American variation of English is rich in slang or is merely full of picturesque expressions, some of its telephone terms strike one as being particularly apt. A case in point is the term "trouble shooter," invariably applied to the faultsman. A case in which the description was also literally true is given in *Telephone Engineer*. The story is of one Byron Puleston, a section patrolman on the Transcontinental Chicago—Los Angeles circuit. A fault was located near Cutter, N.M., a place "as far away from anywhere else as a place can be and still be anywhere." Puleston was sent to clear the fault, a mere step of 40 miles. Being unable to detect anything wrong at the place indicated by tests, he eventually camped for the night to await developments. At dusk a flock of ravens appeared and assembled "to talk things over. The wires sagged down and made solid contact, this being the direct cause of all the trouble." Eventually after three days and three nights, Puleston, with the aid of a shot gun, "got it across" to the birds that an adjournment *sine die* must be made. A good story, but Byron Puleston will excuse us saying he has missed his opportunity. Next time he really must live up to "movie" hero standard. There he was in wide open spaces under Western Stars, and the story of his adventure merely confirms that it was "a bird on the line," and that he had to use a "blunderbuss" to scare it. That there were no stone-throwing or kite-flying boys about is beside the point; we prefer the callous human, quick as thought on the draw of a "six shooter."

"Enthusing" the Staff.

"Six years ago the People's Gas, Light and Coke Company of Chicago was in bad odour with the public. All it needed was a tombstone," it is said. How it got into that condition doesn't concern us here. For the sake of the story, we must assume it was due to public enterprise imposed during the war. One Samuel Insull was called in and his story is—"When I became president in March, 1919, I found the organisation shot to pieces, the result of the war. . . . I found the organisation was so demoralised that from top to bottom those inside the organisation had not much more belief in it than the public had. . . . I started out to enthuse them with the same belief in the company that I had myself. I knew it wasn't much use to cultivate the public and woo its confidence until I had won the confidence of the employees." W. E. Hutchins, United Home Telephone Company, Muskegon, Michigan, has just been telling how the interest of telephone employees may be obtained. An essential part of his system consists in the Chief Operator keeping a daily efficiency record of all employees and supplying a weekly report to each. Here is the form used:—

Number	Name	Week ending	192
		Inattention to	
Absence	5	Signals	10
		Care of	
Tardiness	5	Equipment	10
Discourtesy	10	Team Work	5
Phraseology	5	Ticket errors	5
Talking with			
Operators	10	Tone of Voice	5
Talking with			
Subscribers	10	Insubordination	20
		Chief Operator.	

While there is no denying that "A man is relieved and gay when he has put his heart into his work," to quote another illustrious American, Mr. Hutchins' method does not appeal to us as aid to "enthusing" employees, notwithstanding his assurance that the employees look for the reports with eagerness.

Television.

After many months of experiment Douglas F. Coffey, aged eighteen years, a student of Wisconsin University, reports that he succeeded several times in transmitting moving pictures by radio from his radio station in Madison to his home at Sunny Crest, on the other side of Lake Mondota, a distance about seven miles. The State Department of Markets has offered Coffey the use of its Waupaca and Stevens Point radio stations for further experimental operations, says *Telegraph and Telephone Age*.

The only "Girl."

Many Glacier Hotel, in Glacier National Park, Montana, employs the only full-blooded Indian telephone girl in the United States, if not also the only one in the world, says *Telephony*. "Her voice seems to suit her work admirably, she can trill her r's just as easily as other operators, she is said to be extremely capable, as prompt and accurate in making telephone connections as is her pale-faced cousin, and tourists have always found her pleasantly friendly and helpful, though somewhat reserved."

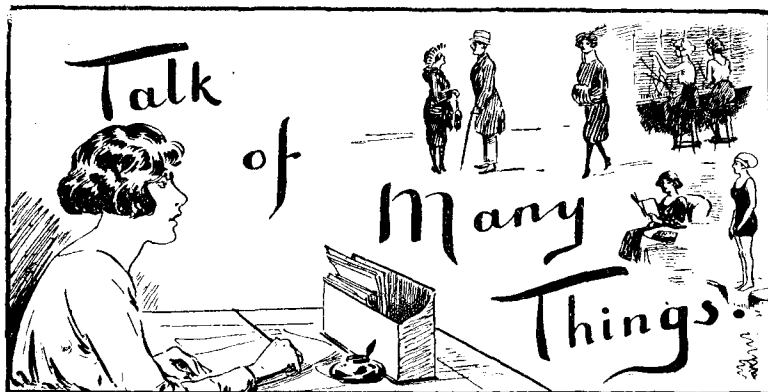
Litigation.

Ancient the recent order of the Ohio Legislature that a state-wide investigation be made into the rates of the Ohio Bell Telephone Company, *Telephony* states that it has been agreed that \$25,000 of the \$100,000 provided for this purpose would be sufficient to provide for the legal end. At least \$75,000 is to be spent in employing engineers and experts.

Radio by Telephone.

The Hague "will be the first to adopt a new discovery which enables telephone users to hear all wireless concerts which are broadcast" claims the *Sunday Times* correspondent at the Hague. Readers of this column will remember that Holland must yield priority in this to a certain Independent company in America at least. It is interesting, however, to note that "the system adopted by the municipal telephone service is a modification of that worked in Berlin and Frankfurt" and that in these German towns "the novelty has hardly been a success."

WE TELEPHONISTS



Power.

LIKE most people, except those unfortunates who were born on Feb. 29th, I have a birthday regularly once a year. Usually I receive a present—sometimes more than one—and since my birthday falls well outside the Christmas zone the presents I receive do not have to do double duty. Here again I am fortunate, and so perhaps it may seem ungracious on my part to complain. Based on the number of presents I have had I am nearly one hundred years old; but, so far, no one has given me a fire-engine—I mean a real one, not a toy. I want a motor fire-engine so that I can drive through the most crowded streets of London at the busiest times. I want to watch the traffic divide so that I can pass. I want to exceed the speed limit, to drive on the wrong side of the road, and to feel that all the policemen on the route are openly conniving at my lawlessness. I want to see people hurry at the clamorous sound of my gong, and to feel that their pulse quickens as I thunder past. Why? Well—

Breathes there a boy with soul so dead
Who never to himself hath said

I want to be an engine-driver, a fireman, a ship's captain? No, of course not. And how few men there must be who, being alive, are not thrilled at the sight and sound of a fire-engine, who are not impressed with the majestic dignity of a main line locomotive as it rolls grandly into the terminus, or who would not be proud to be the captain, who, with a gesture, controls with unerring precision the movements of a 50,000 ton liner. We do not all respond to the feeling in the same way, of course. I know a learned man with an alphabet of degrees who would like to address an audience at the Albert Hall, so that he might revel in the cheers which greeted his discourse—I think he said cheers, but I believe he would be equally gratified with jeers.

There can be only a few men who do not respond to the thought that by faith mankind can remove mountains. Theorists would confound me with a variety of reasons as to why this should be so, but without doubt there is a fascination in the possession and exercise of power. The witch-doctor of the savage tribe amazes us with his impudence, but although in attaining to the

dignity of civilisation we have shed woad and loin cloths, the witch-doctor remains. He is more complex and fearsome, but we still hold him in something like superstitious awe and we envy his power.

And so I want a fire-engine to drive—but probably I shall never do more than drive a pen.

PERCY FLAGE.

"Yesterday, To-Day, and To-Morrow."

Readers of the *Journal* who are present or prospective members of the London Telephonists' Society—especially those with recollections of the merry evening spent in King George's Hall on Dec. 15 last—will be glad to know that the innumerable requests for the repetition of the Telephone Musical Play "As You'd Like It; or Much Ado about Something" have found a response in the current Session's programme of the Society. Miss McMillan, Editress of this column, has added new lyrics to the two acts of her original play; while a third act has been added for which Miss McMillan has written the lyrics and Mr. Pounds and Mr. Beck a mirthful "book." The newly constituted whole, under the alluring title quoted above, will be given at King George's Hall on Dec. 11, where history should repeat itself in another enjoyable evening.

Apropos of this, Miss Clayton's clever cartoon in last month's *Journal* forms an appropriate reminder, notwithstanding the accidental omission of the title.

P.D'A.

Sermonettes.

The startling possibilities from the instructional point of view of Miss Turner's ingenious incorporation of an Exchange name in high poetry, at the end of her article last month, have inspired a contributor to indite the following exhortations. The service allusions are, of course, mythical:—

Streatham! Rest! Thy warfare o'er,
"Sleep the sleep that knows no breaking;"
Dreams statistical no more,
"Days of toil nor nights of waking,"
Joy with sorrow now is blended,
For the Peg Count Week is ended!

Let's linger, Latchmere,
Along the lovely leafy lanes that line
The path to purple Progress' prickly prize;
And snatch the subtle Speedwell from the sedge,
By bosky bowers.

Time flies, O Greenwich—
They cannot time themselves! Like busy bees
Improve each shining hour. In durance vile,
Gather sweet honey in ambrosial toil—
For Time is—Money!

Cement thy bricks, O Brixton
With Atlas white cement. A rolling stone
Gathers no moss. See, therefore, that thou walk'st
In all things circumspectly.

Guide safely home
All thy lost dogs, sweet Battersea!
Weed out the weaklings: gently shepherd them
To Lethe's chamber!

Pad lightly, Paddington,
In writing thy reports. Seek wholesome brevity—
Least said is soonest mended. Shun the lure
Of eloquence; the subtle quip, the gibe
That leadeth to Perdition!

Addiscombe! Awake, Beloved!
Thou the wild flower of the Service,
Thou with staff not inefficient,
'Tis not thought that we at this stage
Fiercely need pursue the question;
But in grave consideration
Ponder daily, ponder nightly,
How, in name of Mr. Faweett,
Thou dost take thy mystic Records!
That the work may be more joyous—
That the time may pass more gaily—
And our Chief be more contented!

P.D'A.

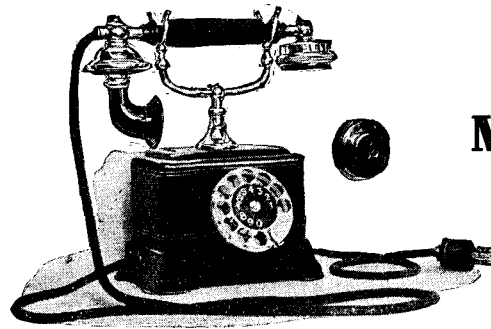
(We hope to print some more of these admonitions next month.—Ed.)

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.

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METHODS OF ANALYSIS AND DESIGN

By **K. S. JOHNSON,**

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LONDON TELEPHONE SERVICE NOTES.

The late Mr. C. F. Arrowsmith.

THE L.T.S. has suffered a severe loss by the death of Charles Arrowsmith. He will ever be held in affectionate remembrance by those whose pleasure it was to work with him. Untiring in his efforts on behalf of others, he inspired confidence and obtained willing service from his colleagues. Such as he can ill be spared.

An obituary notice appears elsewhere in this issue.

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London Telephonists' Society.

The London Telephonists' Society embarked on its seventeenth session when it held its first meeting of the current session at the London Central Y.M.C.A. on Friday, Oct. 9. The drawing room in which the meetings are normally held had been newly decorated, and the addition of a number of settees made it more comfortable than ever.

The customary half-hour concert was arranged by the staff at the Hampstead Exchange, and was very enjoyable.

Mr. W. J. White, the new President, after being introduced by Mr. P. W. H. Maycock, delivered his presidential address, which proved to be very interesting. He referred to the War as being the line of demarcation between what he called the "Old Era" and the "New Era," and dwelt on the changes and advances that had taken place in society generally—with especial reference to women-folk—roads and transport, and finally telephones. In speaking of telephones, Mr. White spoke at length on the coming of automatics, the new apparatus, and the work of telephonists.

In conclusion the President referred to the possibilities of a wider outlook of the objects of the society, and as examples of this, he suggested it might be possible by suitable organisation to secure a reduction of fares and hotel charges at holiday resorts. He also pointed out that the society might well take the lead in the direction of providing suitable accommodation for those of our staff who are by force of circumstances compelled to live away from their homes.

Reference was also made to the very attractive programme which had been prepared for the coming session, and it was hoped that it would lead to a much larger membership. With regard to the competitions, special mention was made of the photographs competition, and the President hoped that members would look through their summer holiday photographs in order to make up sets of three which would best portray "happy holiday incidents" and submit them when the time comes.

There was a goodly attendance—about 150—the address was well received and Mr. White received many congratulations.

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Telephone and Telegraph Society.

The honour of opening the session fell to Mr. M. C. Pink, Assistant Controller (traffic), who gave a paper entitled "London Telephone Service." Mr. Pink commenced by reviewing the telephone development within the London area, and, reviewing the rapid growth, demonstrated the calling rate characteristics, particularly as they have been influenced by the introduction of a message tariff for all lines. The action necessary in order to keep pace with the growth was also reviewed. Trunk and Toll traffic was referred to and the problems of staffing exchanges to meet traffic requirements was explained. The method of obtaining records of the volume of traffic were stated, as were the steps taken to test the quality of service rendered to subscribers. The paper concluded with a consideration of immediate problems and of some of those which loom ahead.

In a paper covering so many aspects of the service, there was no time for much detail, but those who attended the meeting gained a comprehensive view of the traffic problems confronting the L.T.S. in its efforts to make telephoning worth while to the community.

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L.T.S.S.A. Gala.

The Seventh Annual Gala took place at the Pitfield Street Baths on Oct. 2. As usual the available accommodation was filled with enthusiastic spectators bent on cheering their own exchange to victory, or in the absence of such a happy ending, applauding the victors whoever they were.

The wide interest taken by the staff in swimming is best illustrated by the number of competitors who entered for the 33 yards handicap race. There were 107 names on the program, 78 of whom faced the starter. The Learners' Race competed for by those learning to swim during the year attracted an entry of 28. The "Pounds Cup" was competed for by teams from 17 exchanges, and it is fine to see the small exchanges having a tilt at their more famous sisters with little hope of winning the trophy, but with the determination to land the sealed handicap.

The various events resulted as follows:—

LEARNERS' RACE.			
Miss M. Porter (Lee Green) ... ..	...	...	1
Miss Cavender (Regent) ... ..	...	...	2
Miss Haines (Bishopsgate) ... ..	...	...	3

"POUNDS" CHALLENGE CUP.			
Gerrard ... ..	...	...	1
Misses Hayter, S. Wilson, H. Davis, and L. Burt.	...	...	2
Victoria ... ..	...	...	3
Misses E. A. Amos, J. Fern, Bailey, and Drinkwater.	...	...	3
Trunks ... ..	...	...	3
Misses L. K. Davies, McBirney, Riches, and Isaacs.	...	...	3

The time was 1 min. 45 secs. which is pretty good going.

The Sealed Handicap in connexion with this event was won by Clissold (Misses Years, Phillips, Digby and Mallard). Lee Green were second and Regent third.

LOTOS SHIELD.			
Accounts Branch ... ..	...	...	1
Messrs. Frier, Teed, Thompson, and Wild.	...	...	2
Traffic Branch ... ..	...	...	3
Contracts Branch ... ..	...	...	3
Time: 1 min. 42 secs.			

33 YARDS HANDICAP.			
Miss Collier (Victoria) ... ..	...	...	1
Miss Knight (Trunks) ... ..	...	...	2
Miss Luxton (Bishopsgate) ... ..	...	...	3

SUPERVISORS' RACE.			
Miss L. K. Davies (Trunks) ... ..	...	...	1
Miss J. Davies (Trunks) ... ..	...	...	2
Miss McNee (Avenue) ... ..	...	...	3

DIVING CHAMPIONSHIP.			
Miss D. K. Stevenson (Avenue) ... ..	...	...	1
Miss McBirney (Trunks) ... ..	...	...	2
Miss E. Williams (Regent) ... ..	...	...	3

The Challenge Shield held by the exchange scoring the most points was won by Trunks.

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Demonstrating a Telephone Call.

An interesting lecture entitled the "Pathway of a Telephone Call" was given recently at the City Temple Lecture Hall under the auspices of the London Telephone Service. The lecture was illustrated by a practical demonstration, a portable model depicting the "A" side of one exchange, and the "B" side of another having been erected on the platform.

The demonstration, which, by the way was the first of its kind in this country, was well received by an audience of some 150 people, and that it had evoked a lively interest was evident from the keen questioning that took place at its conclusion.

The apparatus is, it is understood, available for use throughout the country at meetings of Literary societies, institutions &c.

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From Avenue Exchange: Club Swimming Gala.

Oct. 9 was a momentous date, when our first swimming gala was held in much state. The small Aldgate Baths were the scene of the fray, where we all sat well back to keep clear of the spray; for the cream of the swimming clubs met in full force—and they made a 'big splash,' as a matter of course!

Our own Traffic Officers all looked such pets!—as M.C. and stewards, with gorgeous rosettes! And our Chief Supervisor presented the prizes. (A rather damp job, as our critic surmises!)

The L.T.S. clubs played a prominent part, and Gerrard scored handsomely right at the start. We clapped each event, and cheered all the winners—but grieved that there wasn't a race for beginner's!

In the Handicap final Victoria won, and for real graceful swimming—well, Trunks took the bun!

At the Obstacle Race we all laughed till we cried, when Avenue only just beat Riverside.

In the Men's Open Team Race our cheers did not cease, when Otter beat Plaistow and City Police.

Mr. Coombs' Team excelled in their diving display, and the Club diving later was really O.K. Miss Stevenson won, and received a good clap, as also Miss Pratt in the Club Handicap.

In the 100 Yards Race for Ladies (free style) Plaistow United soon bore off the prize with a smile!

The Pillow Fight later was won by Miss Brush, who vanquished her victims with never a blush! and the Life Saving Stunts were all hugely enjoyed. (The costumes, as well as the methods employed!)

The Swimming Display, by Misses Elliott and Coles, who spun, dived and floated—then swam like twin soles!—and mimicked torpedoes, protruding their feet, in time to soft music, was really a treat!

We thank our Club Orchestra, chiefly because they rendered their services minus applause! Their music at intervals filled up the void between each event, and was greatly enjoyed.

Do you ask—was our Gala a brilliant success? Listen in—and you'll hear the club members shout, "Yes!!"