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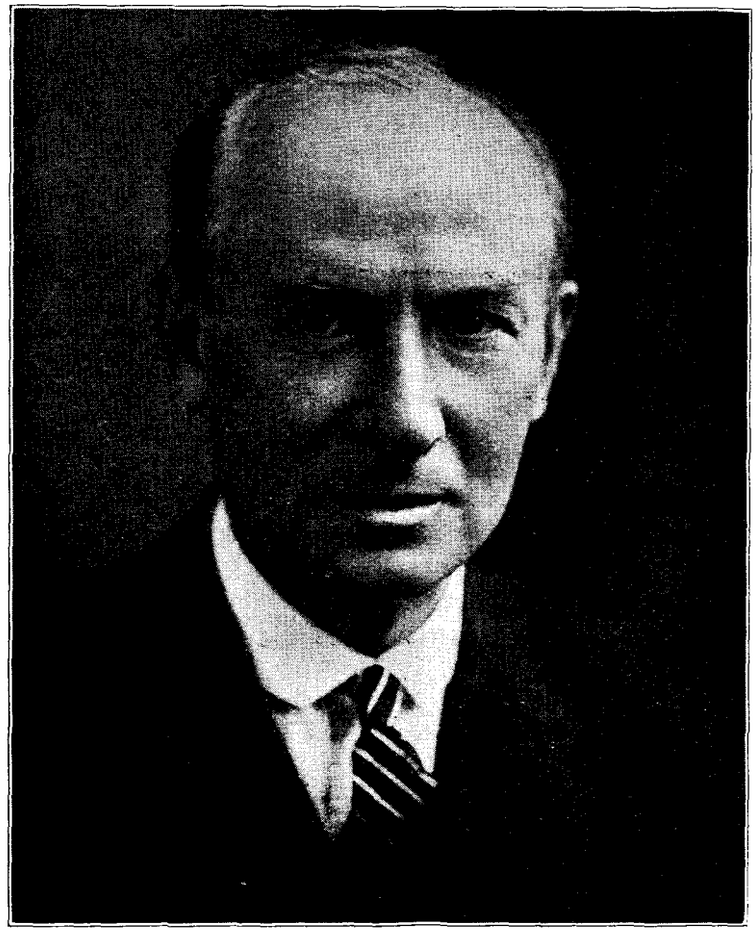
TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XLIII.— JAMES STUART JONES, M.B.E.

JAMES STUART JONES, who has just succeeded John Lee as controller of the Central Telegraph Office, was born on Aug. 31, 1872. He began his Post Office career in May, 1892, as a Second Division Clerk in the Savings Bank Department, and was appointed to the Supplementary Establishment of the Secretary's Office in April, 1895, just before the acquisition of the Telephone Trunk wires by the State. He was selected, with John Lee, as an Assistant Traffic Manager at Headquarters in October, 1907, and by successive steps attained the rank of Deputy Chief Inspector of Telegraph and Telephone Traffic in July, 1924. His translation to the C.T.O. as Deputy Controller followed the retirement of A. W. Edwards in July, 1926.

Stuart Jones, as he is known over the length and breadth of the country, is a synonym for sterling worth. In the mid-nineties he was mentioned as "writing a good letter." As Assistant Traffic Manager, he and his colleague



[*Photograph by Elliott & Fry, Ltd.*

secured many improvements in trunk telephone working, and steered the ship through the difficult "call wire" waters; and it is on record that they, with great tact, ensured loyal co-operation in the changes by creating the impression that the Superintendents, and not the Assistant Traffic Managers, were responsible for the innovations.

Stuart Jones, Lee, Purves and the late A. W. Martin visited the United States in 1911, and their combined reports on practical automatic working form the keystone of the automatic systems in this country.

Stuart Jones was the living force behind the working of the Air Raid Warning Scheme during the Great War, and, incidentally, enjoyed—or rather endured—the somewhat unique experience of lecturing the assembled chief constables in the Conference Room at the Home Office. For the service—and not the lecture—he received the M.B.E.

His abilities and solid qualities make him a worthy follower of his brilliant and mercurial predecessor—John Lee—although there is a distinct contrast in temperaments.

GERMANY'S TRAIN TELEGRAPHS AND TELEPHONES.

IT has long been an established fact that wireless programmes can be received on moving trains, and that telegraph and telephone services could be provided on trains if required by means of wireless links. The tests to establish that fact have generally been made direct by wireless between the fixed stations and the moving trains, and the only real difficulty arose from the fading effects which were experienced in tunnels and under bridges in consequence of the absorption of the wireless signals. There are grave doubts whether there is any real demand for ordinary telegraphic and telephonic facilities on trains, and capitalists generally seem somewhat shy at incurring the heavy expenditure involved on the somewhat uncertain possibility of its being practicable to create such a demand.

In Germany, however, the circumstances are somewhat different. The railway, telegraph, telephone and broadcasting services are the property of the State, and the main lines of telegraphs follow and are often on the railway routes. It is therefore possible, by using the parallel wires to reduce the gap to be bridged by wireless to a few yards, and to overcome the fading effects in tunnels. The demand for the telegraph services is, however, small, though possibly influential; and the State has therefore wisely decided that, as the business is of a speculative nature, the risks should be undertaken by the private interests concerned. A private company has therefore been formed, under licence from the State, and have provided installations which are at present working only on the Berlin-Hamburg line of railway. They afford the following services :—

(i) telegraph service to and from any destination ;

(ii) telephonic intercommunication with subscribers in Berlin, Hamburg and Wittenberge only ; and

(iii) telephonic reception of broadcast programmes of entertainment, commercial and press matter, &c.

The distance between Berlin and Hamburg is approximately 187 miles and the travelling time of an express train is between 3½ and four hours. Three fixed wireless communicating stations have been provided—one at Spandau, one at Bergedorf, and one at Wittenberge, and these are provided with facilities for transmission of high frequency currents from wires running parallel with the railway track throughout the whole distance, to the receiving apparatus on the moving train, the gap being bridged by wireless. Similar transmissions from the train are received by the parallel wires and conveyed to the fixed stations. The Spandau and Bergedorf stations are connected by wire with the Berlin and Hamburg telegraph and telephone offices respectively, whilst the station in the middle of the route, that at Wittenberge, is connected with both Berlin and Hamburg, and can work on both channels simultaneously. It is understood that technical considerations prevent telephonic conversations over a more extended area ; but the German technical staff consider that these difficulties will soon be overcome and they are at present contemplating the provision of a similar restricted service on the Berlin-Munich main railway route.

The wavelengths assigned for the four traffic channels between train and train exchanges are as follows :—

Transmission by train exchanges and reception by trains	3,820	metres.
	5,710	,,
	4,580	,,
	3,270	,,
Transmission from trains and reception at train exchanges ...	2,140	metres.
	2,015	,,
	1,750	,,
	1,830	,,

and the power used is apparently only 20 watts, which is presumably sufficient to bridge the short gap between train and parallel wires.

On the train itself one corridor coach is allotted to the concessionaire solely as accommodation for apparatus, operators, silent compartments &c. The concessionaire is licensed to equip the special corridor coaches, to erect fixed stations on Government land (or to rent space accommodation in Government buildings), to erect connecting wires on railway property, and to share the use of the railway and telegraph wires for high frequency transmission ; but he must pay all costs involved and provide and pay the working staff—which must be solely of German nationality. All communications are subject to a special train charge in addition to full charges at the current tariff for the telegraph or telephone service concerned. This train charge is fixed by the concessionaire, subject to veto if the State regards the amount as too much, and less 20% is retained by him as a return on his outlay. The 20% deduction with a minimum payment as for two train charges in respect of each train journey is payable to the State as royalty. The post office charges collected by the concessionaire for that part of the service from the train exchanges onwards to destination are payable in full to the post office, which in the case of foreign telegrams passes on the appropriate portion of the fees to the other administration or administrations concerned.

The licence contains, in addition, a large number of precautionary clauses and reservations such as are to be commonly found in most legal documents.

In conclusion, it may be stated that the details of the arrangements have been worked out with characteristic thoroughness by the German engineers and that full publicity is given to the arrangements by attractive pamphlets, the illustrations in which are unfortunately not suitable for reproduction in the pages of this *Journal*.

TELEGRAPHIC MEMORABILIA.

ARGENTINA.—The Sociedad Radio Argentina recently secured a concession from the Spanish Government for the establishment of a wireless-telegraph service between Spain and Argentina.

The *Financial Times* says that the primary object of the Executive Power during the past year has been to obtain the perfect operation of the postal and telegraph services. This important public service has been carried on regularly notwithstanding its extraordinary growth and the shortage of *personnel*, each day more apparent. On July 12 last was inaugurated the Library and Museum of Posts and Telegraphs, as also the Philatelic Section as a part of the same. An arrangement made with the Union Telephone Company, in the Federal Capital, and the Telephone Company in Tucumán, has enabled the Executive Power to endow both localities with the service known as "telephone-grams." During the year 1926 there was a great increase in the movement of internal postal and telegraphic drafts amounting to 2,176,499 items for a total of $78,601,612.63 m/n. and in that of telegraphic orders 137,944 items for a sum of $9,026,132.43 m/n. The total of declared values received was 413,844 items for a sum of $57,958,382.06 m/n., the dispatches being 472,193 for $64,974,290.49 m/n. The telegraph lines on Dec. 31 last amounted to 44,248 kilometres in extent and to 114,318 kilometres of development.

AUSTRALIA.—Reuter's Trade Service informs us that some time ago a sub-committee was appointed by the New South Wales Cabinet to inquire into a proposal for the erection of a Goverument super-power wireless station near Sydney and six relay broadcasting stations in country areas. It is said that the sub-committee's report is favourable to the scheme, which is receiving Cabinet consideration.

According to the *Electrical Engineer of Australia and New Zealand*, the total number of wireless receiving licences in force throughout the Commonwealth at the end of April was 206,534, of which 108,732 were held in Victoria, 54,581 in New South Wales, 21,335 in Queensland, 15,738 in South Australia, 3,890 in Western Australia, and 2,259 in Tasmania. During the month 2,317 licences were cancelled in Victoria, but 4,968 new ones were issued.

CANADA.—The production of all radio apparatus and accessories in Canada during 1926, says Reuter's Trade Service in Ottawa, was valued at

$6,277,544, f.o.b. factory, in addition to which furniture manufacturers sold wireless cabinets to the value of $708,658. The details of the production were :—

	1926. $	1925. $
Batteries	2,276,747	2,238,169
Condensers	13,281	41,626
Panels, dials and switches ...	29,895	88,103
Microphones, loudspeakers	146,074	412,556
Transformers	26,855	36,816
Valves	1,261,803	1,299,684
Complete sets	2,253,098	2,667,999
Miscellaneous	269,791	325,675
Total	$6,277,544	$7,110,628

Wireless receiving licences issued during 1926 numbered 207,328, compared with 134,486 in 1925, and broadcasting licences issued rose from 55 to 96. Imports of wireless apparatus from the United States amounted in value to $2,872,991.

CHILI.—It was announced from Santiago a week or two ago that the sole ownership of the Chile Telephone Company had been acquired by the American International Telephone and Telegraph Corporation as the result of negotiations in London. The American International Telephone and Telegraph Corporation is a keen buyer of telephone companies throughout South America, and not long ago acquired control of the Montevideo company.

CZECHO-SLOVAKIA.—Reuter's Agency, Prague, states that the balance sheet of the Czecho-Slovakia broadcasting organisation, which had 215,000 subscribers in 1926, shows receipts amounting to 7½ million crowns (£46,000) and an expenditure of 5½ millions (£33,500).

FARSAN ISLANDS.—As may not generally be known, the Farsan Islands is a lonely group of islands in the Red Sea and the Oil prospectors at present living on this group of islets are the latest of the world's isolated communities to adopt wireless as a means of communication. These islands, in the Farsan group, are being prospected by the Red Sea Petroleum Company, and are about 400 miles north of Aden and the same distance south-east of Port Sudan, these being the nearest British territories, while the Italian port of Massaua in Erythrea is across the Red Sea about 200 miles away. Through these ports and the large number of ships passing up and down the Red Sea within wireless range, the prospectors will be able to communicate with their headquarters and to link up with main telegraph circuits. The installation will consist of a standard Marconi 1½-kilowatt quenched-spark transmitter, together with emergency gear and receiving apparatus, as used on board ship.

FRANCE.—The French telegraph service has decided to inaugurate a system by which urgent telegrams may be sent to passengers travelling by certain express trains on the P.L.M., Paris-Orleans, and Est railways.

The *Compagnie Générale de Télégraphie sans Fil* has paid a dividend of 50 fr. per share out of net profits of 8,507,000 fr. in 1926.

The *Compagnie Française des Cables Télégraphiques* reports gross profits of 7,382,000 fr. for 1926, as against 5,338,000 fr. in 1925. It is proposed to increase the dividend on the ordinary shares from 30.05 fr. to 35 fr.

GREAT BRITAIN.—The *Electrical Review* states that " it is understood that Mr. G. Marcuse has offered to carry out preliminary Empire broadcasting experiments from his well-known station (2NM) at Caterham. The Postmaster-General has provisionally approved of the scheme, which will be purely experimental, with a view to determining whether or not a regular broadcast service to the Dominions can be maintained regularly and efficiently. The wavelengths to be used will be 23 and 33 metres, and the transmitter itself has recently been rebuilt, a new power supply system having been installed. Marconi rectifying and transmitting valves will be used. It is probable that the experiments will commence on or about Aug. 15." (The scheme is subject to the approval of the P.M.G.—ED., *T. & T. J.*)

The Board of Trade, after consultation with the Postmaster-General, has made new rules relating to wireless telegraphy on ships, mainly in view of the probable early approval of automatic alarm apparatus designed to receive a distress call, and the need for regulating the use of such apparatus. The new rules define the " alarm signal " which is to be used to operate the automatic apparatus, and prescribe the conditions to be complied with by such apparatus. They require class 2 ships, after a certain delay, to fit such apparatus in lieu of carrying " watchers," and give certain relief to other ships fitted with the apparatus. All ships are required to have a clock in the wireless room with a seconds hand, to enable the operator to send the " alarm signal " correctly. The new rules come into force on Oct. 1 next; they are to be provisional to the extent that they may require amendment as the result of decisions at the Washington Radio-telegraph Conference, or at a subsequent conference on safety of life at sea.

Parliamentary Questions, &c.—On June 21, Mr. Hore-Belisha asked the Postmaster-General whether it was the intention of his department to issue instructions that, wherever possible, telephone wires should not be run across, either above or below, wireless receiving aerials.

Sir W. Mitchell-Thomson said there was already a standing instruction which provided for the alteration of telephone wires on private property which interfered with wireless reception, and he did not consider that further instructions were necessary. If the hon. member would furnish him with particulars of any cases in which reception was hampered, he would see whether steps could be taken to remedy matters without incurring undue expense.

On the same occasion it was also announced by Sir W. Mitchell-Thomson that the total number of telephone calls since the opening of the Transatlantic Radio-telephone Service that had passed from Great Britain to the United States was 485, a daily average of three. The total number of calls from the United States was 612, a daily average of 4. The number of calls originating from London was 435, and the number from the provinces 47. The question of charges would undoubtedly receive consideration in the future, but some of the calls were of considerable duration—a quarter of an hour or more. The service covered working expenses.

On June 28, Mr. Grotrian asked the Postmaster-General whether, in view of the great advantage to the fishing fleet, it was permissible for private individuals to establish a wireless telephone service with the trawlers and other vessels with which they were connected.

Sir W. Mitchell-Thomson said that in view of the risk of interference it was not practicable to permit the establishment of private wireless stations for communication with ships at sea. Vessels fitted with wireless-telegraph apparatus could send and receive messages through any of the Post Office coast stations ; and in order to meet the needs of a number of trawlers which had recently been fitted with wireless telephone apparatus, arrangements were being made to equip the new coast station now in course of construction at Mablethorpe with suitable apparatus for the exchange of messages with those vessels by wireless telephony.

Under the title of Community Radio, Ltd., a company, the first of its kind in the country, is to supply wireless to houses in Lytham St. Anne's in a similar manner to water and gas services. The fee of 2*s.* a week covers everything, and programme items are to be available every day from noon to midnight.

According to *The Times*, the company, which already has 40 subscribers, spread over a wide area at St. Annes, has had inquiries from other towns, including Blackpool and Lytham St. Anne's. Mr. H. Holmes originated the idea of a subscribers' service, on payment of 2*s.* a week, with the licence included. For this sum, a wire will be run from the central receiving station to the house, and a loudspeaker will be provided for reproducing the Daventry programme. The subscriber will merely switch on or off in the same way as he does the electric light. Plans have been prepared for a bigger receiving station in the open country, and lines will be run into the town. The service will be opened wherever it is demanded, and there will soon be a dual service with the choice of two programmes. From the public press it is understood that the company was registered on June 29 last. The nominal capital is £2,000 in £1 shares.

According to the *Western Mail*, Newport Mon.'s newest suburb at Malpas is to be an up-to-date electrical one, for " wireless masts, aerials, leads and even earthing switches are ' fixtures ' of every one of the 300 houses which have been erected by subsidised private enterprise in Newport's newest suburb at a rent of 16*s.* 6*d.* per week, inclusive of rates. The building company which owns the estate has provided the masts and aerials in order that they shall be erected in a uniform manner."

GREECE.—His Majesty's Consul-General at Salonica (Mr. F. E. Crow) reports that the Wireless Telegraphy Board in Athens has decided to allow the use of radio-receiving sets in Salonica and Cavalla. The necessary licences for the installation of receivers must be obtained from the Wireless Department of the Post Office in Athens. For the time being permission will only be granted to Greek subjects, but it is thought that the privilege will shortly be extended also to foreigners. Macedonia is a virgin market for the sale of wireless apparatus. British manufacturers wishing to do business there should therefore communicate at once with local dealers and agents, quoting prices and sending illustrated catalogues in French, if possible, as well as English. The names of the principal dealers in electrical goods, also those of small dealers in wireless apparatus, can be furnished on application to the Department of Overseas Trade, Whitehall, London, S.W.

INDIA.—As has already been announced, the Bombay station of the Indian Broadcasting Co. is to be inaugurated at 5 p.m. on July 23 by Lord Irwin, the Viceroy. According to *World Radio*, the stations have been allotted call signs and wavelengths as follows :—Bombay, 7BY, 357.1 metres ; Calcutta, 7CA, 370.4 metres ; other stations are to be established later.

The correspondent of the *Electrical Review* in India reports that the imports of wireless apparatus into India in 1926-27 amounted in value to Rs. 5 lakhs, as against Rs. 6 lakhs in the previous year. The imports came principally from the United Kingdom.

MALAYA.—The *Straits Times* announces that a company is being formed in Ipoh, Perak, for the purpose of broadcasting from Kuala Lumpur. Its capital is to be $4,000,000 (£46,660), and it is estimated that the most modern equipment will cost $135,000 (£15,750). The site at Kuala Lumpur has already been applied for, and the intention is to have daily programmes, so that a considerable income from advertising is anticipated. The upkeep has been estimated at approximately $150,000 (£17,600) per annum. Mr. Leslie Cant is the promoter.

PORTUGUESE EAST AFRICA.—A Department of Overseas Trade report on the economic and financial condition of Mozambique is an interesting document. It reminds us that the province forms part of the South African Postal Union and communication is regular. In the district of Lourenço Marques there are over 600 telephones; telephones also exist at Beira and most of the coast towns, as well as on the estates of the large agricultural companies and the railways. Telegraph lines belong to the State, the chartered companies, the cable companies, and private concessionnaires: 14,000 miles of line exist, of which about 7,500 miles belong to the State and 3,750 miles to British enterprises: over 1,000 miles are within the territory of the Mozambique Company, and nearly 250 miles belong to the Niassa Company. Wireless stations exist at Lourenço Marques, Inhambane, Beira, Quelimane, and Mossuril, near the Island of Mozambique: they are equipped with plant used during the war, either by the Portuguese forces or seized on German ships, and are used for the provincial service and for communication with shipping (official and private). In addition, a standard 6-kw. Marconi station has been completed at Lourenço Marques, and a 1.5-kw. station at Beira; they are being used for communication with the other provincial stations and similar stations are to be erected at Tete and Mozambique, to be followed later by subsidiaries at Chai-Chai, Porto Amelia and other points of importance. Marconi's Company has erected at Lourenço Marques, for the Companhia Portuguesa Radio-Marconi, a "beam" station for communicating with Lisbon and the other colonies. The concession of the Portuguese company is for forty years, and similar stations are planned for Madeira, the Azores, Cape Verde and Angola.

SOUTH AFRICA.—The seven-days' official test by the General Post Office of the "beam" wireless service with South Africa commenced on Friday morning, June 17, and was completed at 10 o'clock on June 24, as was mentioned in the July number of the *T. and T. Journal*. The results proved satisfactory—"eminently satisfactory" might be added, judging by subsequent experience with actual traffic.

The first experimental tests, says the *Electrical Review*, showed that communication between England and South Africa could be maintained for a longer period than the 11 hours required under the conditions of the Marconi guarantee to the Post Office, but it became clear that the wavelength originally selected was too long to give the maximum of communication during daylight hours, and the change of wavelength necessitated certain modifications not only in the transmitter itself, but also in the aerial and feeder systems. The stations use two wavelengths, one for daylight and the other for night communication. The standard time of the Union of South Africa is only two hours fast of Greenwich mean time, and sunrise and sunset in both countries therefore occur at nearly the same time; thus the signals in the path of the beam between the two countries travel almost completely in darkness or in daylight.

The intention of the Minister of Posts and Telegraphs to reduce "piracy" is crystallised into a very important amendment to the Radio Act now before the Union House of Assembly for consideration. According to *World Radio*, it reads: "Any person who sells, gives, or in any manner whatever supplies any valve, loudspeaker, or telephone receiver for radio to any person who is not a licensed listener shall within seven days after such supply notify the Postmaster-General thereof by written notice, setting out the name and address of the person so supplied. Failure to comply with the provisions of this sub-section shall constitute an offence." Objection is expected to this provision, and it is probable that wireless dealers will be registered, and they will have to record their sales of valves, telephones and loudspeakers.

The *Electrical Review* states that the recently-formed South African Broadcasting Co., after having taken over and resuscitated the Johannesburg station, has since also purchased the Cape Town station and entered into an agreement with the Durban Town Council to take over its station, which is unique in South Africa in being owned by the municipality, and the transfer takes place on July 1 next. With all the South African broadcasting stations now under one management, it is intended to interconnect them all with land lines and take full advantage of relaying, and it is hoped, by establishing further relay stations, to enable the small crystal user to benefit in various parts of the country. The new company, being also interested in the African Theatres Trust, intends to transmit items from various theatres with greater variety of artistes than is possible under present arrangements.

TURKEY.—An agreement with the Eastern Telegraph Company has now been ratified by the Turkish Parliament, says the London *Daily Telegraph*, under which the company has been granted a cable concession for a period of 30 years.

Turkey will once more be placed in direct communication with the rest of Europe and the world.

A cable ship is now actually engaged in restoring the Odessa-Constantinople cable.

This agreement, or convention, it will be recalled by readers of the *T. and T. Journal*, was actually signed on May 1 of this year.

U.S.A.—The United States Trade Commissioner at Ottawa has reported to the Dominion Bureau of Statistics that the exports to Canada of radio sets and parts from the United States during the calendar year 1926 amounted in value to £2,872,991, and included the following items: 32,768 receiving sets, worth £1,238,680; 96,059 valves, valued at £113,837; and £1,520,474 worth of parts and accessories.

Radiophone communication between the engineer in the locomotive cab and a brakeman in the "caboose" of a freight train a mile and a quarter long has been demonstrated satisfactorily by the American General Electric Company. The locomotive and "caboose" had identical equipment, consisting of two antennæ, one for transmitting and the other for receiving, a transmitter operating on a short wave so as not to interfere with regular broadcasting, and a receiving set.—Reuter's Trade Service (Schenectady).

The departure of Mr. John Lee from the C.T.O. was adequately and uniquely dealt with in the excellent international symposium of the July number of the *T. & T. J.*, and it is only referred to again in these columns in order to quote the following from *Supervising* regarding the successors to the respective posts of Controller and Deputy Controller of the C.T.O.: "We welcomed Mr. Stuart Jones "to the C.T.O. almost twelve months ago, and the favourable impression "then gained has been enhanced by association and observation. Mr. Stuart "Jones has become 'one of us' and he can rest assured that he leads and "controls a fully co-operating Supervising staff. Mr. D. M. Ford, on mounting "a step higher in the ranks of the office within whose walls his official life "has been spent, does not need any assurances of loyalty from a staff which "knows him so well."

The flight of time has indeed recently been particularly marked in the C.T.O. by the lengthy list of retirements and the sequential steppings-up. Thus, while congratulating Mr. W. E. Jones upon safely and happily reaching the retiring age in the capacity of Superintendent and passing out of the Service with the best of wishes behind him of a host of friends and colleagues who appreciate the straightforwardness of his character and the cheerfulness of his sunny temperament, congratulations are proffered to Mr. H. A. Bolton a most worthy successor to the vacancy.

The well-known Mr. C. E. Daggett, overseer, of musical fame, replaces Mr. J. W. Charter, Assistant Superintendent, already referred to in these columns, while the following Overseers, Messrs. E. Veale, C. Heywood and R. Suters, replace respectively Messrs. A. F. Bullard, A. F. Simmons and F. J. Palmer (retired), Mr. G. H. Major replacing Mr. C. W. Sparkes, some time since promoted to Superintendent. The following eight Telegraphists are likewise promoted to the Overseer class, consequent upon the above or other retirements, among which latter is noted with deep regret that of Mr. C. Pond, due to ill-health. The promotees are: Messrs. A. C. Bull, E. J. Willis, H. H. Carpenter, A. W. Randall, S. Parker, A J. Medland, F. H. Brown and A. B. Hulls, to whom the usual felicitations.

The above refers especially to the Inland portion of the C.T.O. To these names must, however, be added those of Mr. F. S. Gullan and A. R. Clark, of the Foreign Cables and Wireless Department, to whom reference was duly made in our June issue. Their respective appointments are to the posts of Assistant Superintendent and Overseer, Cable Room Establishment, are additional, and are due to the expansion of the Cable and Wireless activities centred in the C.T.O.

A propos of this particular department it is gratifying to note that despite the abnormal pressure, "The Room" has so far given a particularly good account of itself in the Cricket contests this season.

Although the Editor has warned me to "cut down" this month, space must be found to note that the Second Exhibition of the C.T.O. Art Society was as successful as the preceding one. Yet again Sir William Orpen honoured the exhibition by his attendance and by giving his services as adjudicator. Sir William's prize of five guineas for competition in the Art Section was awarded to Mr. Ginger for a study of "Tulips."

Mr. F. C. Osborne dominated the Black and White Section, and drew appreciatory notice from the Judge.

Much more could be written, but the editor is adamant!

At the Annual Inspection of the National Physical Laboratory by the General Board at the end of June among the many interesting exhibits which comprised such items as the analysis of various gases, sound-pulse photography, high-frequency furnaces, X-ray spectography, &c., one singles out in the Wireless Division of the Electricity Department, and as specially appropriate to mention in these columns, (*a*) apparatus for the transmission and reception of waves as short as two metres, (*b*) an audio-frequency amplifier to demonstrate the insensitivity of the human ear to changes of sound intensity, and (*c*) apparatus for studying the behaviour of aerials in transmission and reception. From the observations on this latter apparatus, made by an electrical expert, it appears that "the difficulty of this work is that the only way to measure the current at different points in an aerial without changing the behaviour of the aerial is to put the measuring instruments actually *inside* the aerial wire. In the field outside the wireless hut is a special experimental tubular aerial built to enable this to be done, and the instruments are read with a telescope from the foot of the aerial."

Heredity.—"Heredity is far too serious a matter to lose importance through the futile things that are currently said of it. . . . It is taken for granted that women derive exclusively from their mothers and grandmothers, and men from their fathers and grandfathers. . . . A man to-day, we are told, is a little balder than his father, who was a little balder than his grandfather. The hair of his mother and his grandmother does not affect him—we may suppose—because it is all used up in supplying the heritage of his sister!—"Daughters of Men," by Alice Meynell.

J.J.T.

AUTOMATIC TELEPHONY.

BY C. W. BROWN.

(IV—*Continued from page* 197.)

The caller is extended to a final selector, the facilities afforded by which are :—

1. The wipers are stepped vertically by the tens digit impulses and in a rotary direction by the units digit impulses.
2. Returns an earth over the P wire to hold the preceding switches.

The circuit of the final selector using booster metering is given in Fig. 1, the full operation being as follows :—

Caller extended from a group selector. Relay A is energised round the calling loop from : Negative, A200, D4, — line, calling loop, + line, D5, A200, G3, positive (earth).

Relay A has one contact.

A1 completes a circuit for relay B from : Negative, B700, A1 operated, positive (earth). Relay B thus operates.

Relay B has five contacts.

B1 prepares the V magnet circuit in preparation for the receipt of the tens digit.

B2 earths the P wire from the preceding switches from earth, D3, B2 operated, private wire.

B3 connects positive (earth) to the private wire of the P wiper for use when the call matures and to hold the switching relays or busy relays when operated.

B4 completes a circuit for relay J from : Negative, relay J, F5, B4, positive (earth).

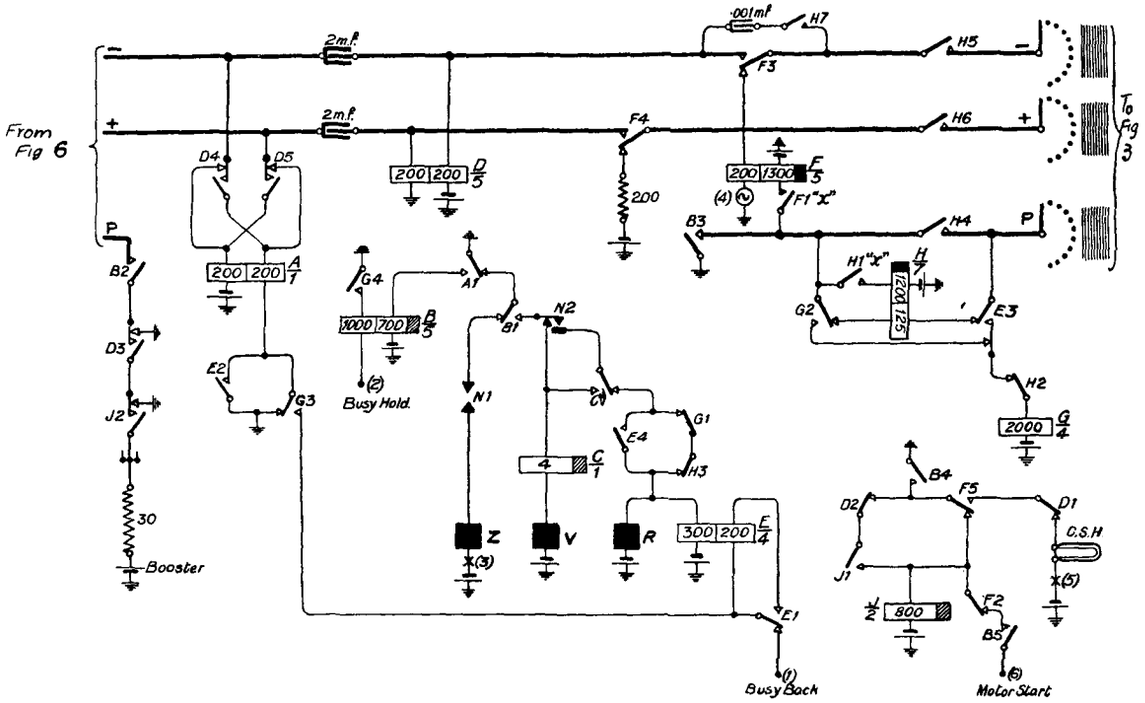


FIG. 1.

3. If required starts up the ringing motor.
4. Tests the called subscribers' line ; if engaged transmits a busy signal and busy flash. If disengaged, transmits ringing current to the called line and ringing signal to the calling line.
5. Disconnects the ringing motor (if required) when the called subscriber lifts the receiver.
6. Provides talking current for both calling and called subscribers.
7. Connects the metering condition to the calling subscribers' meter.
8. Provides switchhook supervision to an operator on calls from manual positions.
9. Provides a visual and audible signal should the called line be held after the receiver has been replaced.
10. Releases itself and all preceding switches when the calling subscriber replaces the receiver.
11. Provides a signal if the shaft fails to restore.

B5 connects positive to the motor start wire (point 6).

Relay J consequently operates and the ringer is started up.

Relay J has two contacts.

J1 provides an alternative circuit for holding the relay operated via D2 and B4, thus relay J will be controlled by relay D.

J2 connects the booster voltage—50—to contact D3 so that when relay D is energised (upon the removal of the called subscriber's receiver—*see* later—) this voltage is connected to the private wire from the line switch.

Tens digit dialled.

The impulses are directed to magnet V over the circuit already prepared, but with the first impulse of the train, relay C energises, and remains operated while the whole of the tens train is passing. Also with the first upward step of the shaft, the mechanically operated contacts N1 and N2 change over.

N1 prepares the Z magnet circuit in readiness for release conditions.

N2 prepares the circuit for the reception of the units train of impulses.

The vertical impulsing circuit can now be traced as follows :—

The first impulse : Negative, magnet V, relay C, N2, B1 operated, A1 impulsing, positive (earth).

The remainder of the impulses : Negative, magnet V, relay C, C1 operated, N2 operated, B1 operated, A1 impulsing, positive (earth).

The wipers are therefore raised to the level in which the required line is located.

Relay C restores because of the comparatively long pause that occurs between the dialling of digits. The relay cannot again be operated for the call prevailing, because the circuit is broken at N2 operated.

Units digit dialled.

These impulses are received by magnet R over the following circuit : Negative, magnet R, H3, G1, C1, N2 operated, B1 operated, A1 impulsing, positive (earth).

Relay E being connected in parallel with magnet R will be energised while impulses are passing. The relay is rendered slow to release by placing a short circuit across one of its windings, so that the relay remains energised while impulses are passing and remains operated for a short period *after* the last impulse is received.

Relay E has four contacts.

E1 short circuits one of the relay windings for the reason already indicated. E2 provides an alternative path for the positive (earth) connexion of relay A, in event of relay G operating while the wipers are moving to the desired contact—this happens when engaged lines are passed by the wipers and also if the required line is engaged.

E3 connects relay G to the private wiper of the switch in readiness for testing the called subscriber's line.

E4 provides an alternative path for magnet R in event of relay G operating while the wipers are moving to the required contact, thus ensuring the continuity of the rotary impulsing circuit under such condition.

The wipers reach the bank contacts of the required line and

Assuming that the line is engaged, an earth will be encountered on the private bank contact, as relay E does not restore immediately, relay G is energised over the path : Negative, H2, E3, P wiper and bank contact, positive (earth).

Relay G has four contacts.

G1 opens the circuit of magnet R, to prevent any further movement of the shaft should the caller dial or in event of the switchook being agitated.

G2 holds relay G operated over the path : Negative, relay G, H2, E3 (this contact is now at normal because the relay—E—has by this time de-energised), G2 operated, B3 operated, positive (earth).

G3 connects the busy tone to the calling loop.

G4 holds relay B during the busy flash period as explained for the group selector.

The circuit remains in this condition until the caller replaces the receiver.

Assuming that the called line is disengaged, there is no earth on the private bank contact, hence relay G does not operate, and upon the restoration of relay E, a circuit is established as follows :—

Negative, DM, dm, relay K, private wire and bank contact of subscriber's line (*see* Fig. 3 of last instalment for this portion of the circuit), P wiper, E3, relay H 125, G2, B3, positive (earth).

Relay K of line switch operates and removes relay L of line switch from the circuit.

Relay H only operates partially, as the current value is too small to fully energise it. Contact H1 only operates at this stage, the fact being indicated in Fig. 1 by the letter X against the contact. The contact establishes a local circuit for the other winding of relay H, thus the relay now becomes fully energised. The relay is rendered slow to operate by fixing a copper slug at the armature end, so that a margin of time occurs between the full operation of relay K (Fig. 3 of last instalment), and the full operation of relay H. This is to ensure that relay L is removed from the circuit before the ringing current is passed out, otherwise would be removed prematurely.

Relay H has seven contacts.

H1 has been explained above.

H2 disconnects relay G to prevent that relay remaining energised via G2 should it become operated from any cause after the called line has been tested and found to be disengaged the irregular application of Busy signal is thus guarded against.

H3 disconnects the circuit of magnet R to prevent any further movement of the shaft, due to the calling subscriber's dial operations or any movement of the switchook.

H4 connects a full earth to the private wiper and consequently to the private bank contact of the called line to satisfy the normal busy condition.

H5 and H6 complete the ringing circuit as follows : Positive, ringing alternations, relay F200, F3, H5 operated,—line, condenser and bell of called line, + line, H6 operated, F4, 200 ohms, negative.

Relay F does not operate under this condition as the amount of current is small and the relay is designed not to operate with the passage of alternating current of the ringing frequency.

H7 completes the circuit for ringing signal to the calling line over the path : — ringing lead, F2, H7 operated, .001 m.f. condenser, 2 m.f. condenser in the negative line, calling loop, + line, D5, A200, G3, positive. As the ringing lead has a tone of 133 periods per second superposed, a tone interrupted at the same frequency as the ringing current, is heard by the calling subscriber, only when the ringing condition has actually been set up.

The called subscriber lifts the receiver. When this occurs, the resistance of the called line is reduced by cutting out the condenser and bell, thus relay F will energise. Actually the relay " trips."

Relay has five contacts.

F1 closes first (contact marked X) and holds the relay from : Negative, relay F1,300, F1 operated, B3, positive (earth).

F2 opens the circuit of the ringing motor, which therefore stops.

F3 and F4 extend the called line to the transmission bridge —relay D—.

F5 disconnects the original circuit of relay J, which however is still held via D2.

The called line having been extended to relay D, that relay operates over the path : Negative, D200, F3 operated, H5 operated, — line, called subscriber's loop, + line, H6 operated, F4 operated, D200, positive (earth).

Relay D has five contacts.

D1 disconnects the " called subscriber held " lamp as this is not required.

D2 releases relay J which does not immediately restore.

D3 extends the booster voltage to the private wire towards the line switch, so that the meter of the calling line operates, but as relay J is releasing, the booster voltage is only connected to the meter until relay J restores to normal (approximately 300 milliseconds after it is disconnected by the action of D2), after which it is replaced by an earth at J2. The booster current is fed through a heat coil—shown as 30 ohms in the fig.—this provides a protection against the abnormal application of the extra current, as the heat coil will " blow " if the application of the current is abnormally prolonged.

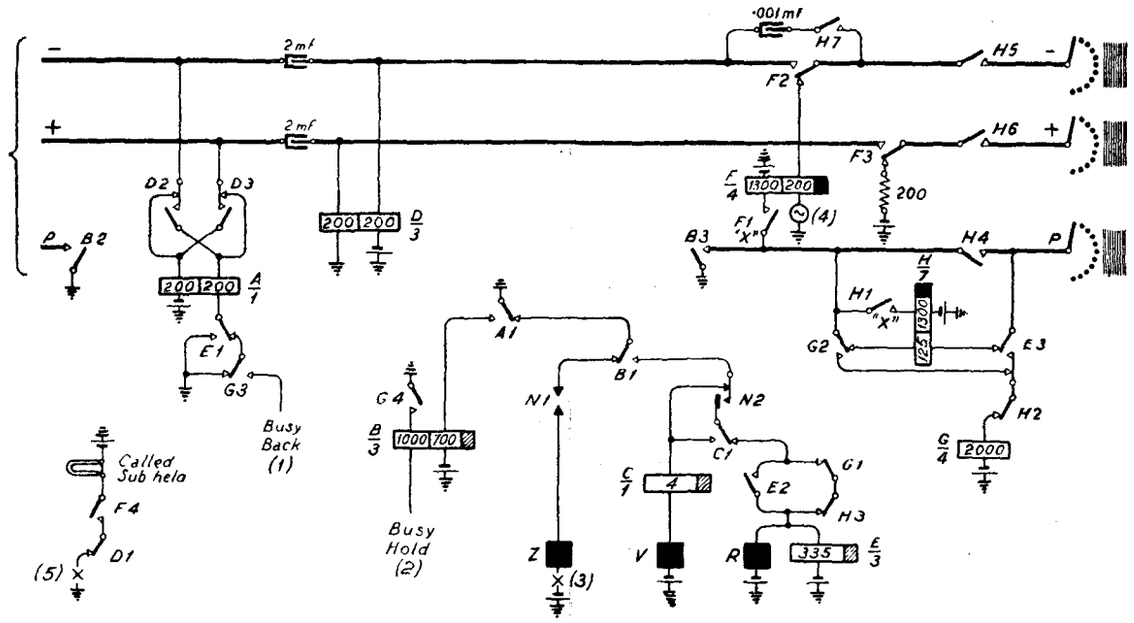


FIG. 2.

D4 and D5 reverse the potential towards the calling line, thus, if the call has originated from a manual position, the cord circuit supervisory conditions are satisfied.

Talking conditions are now set up. The potential for the transmitter of the calling subscriber is derived via relay A and for the called subscriber from relay D, the two 2-m.f. condensers in the — and + lines providing the link between the subscribers.

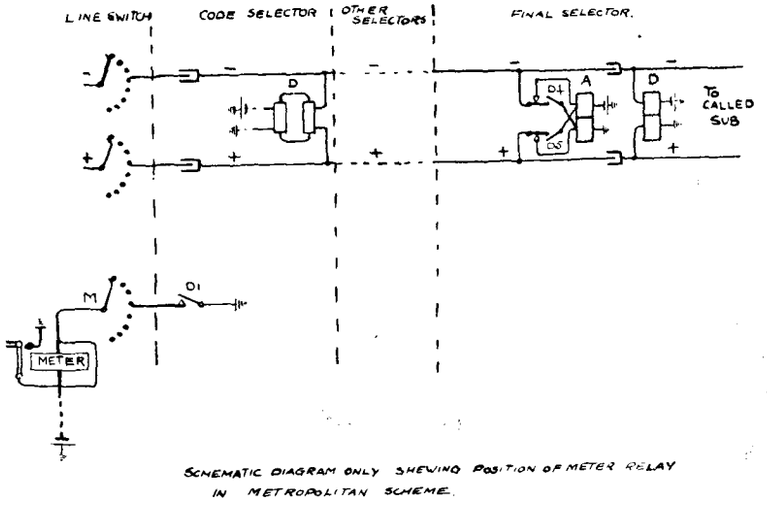


FIG. 3.

The calling subscriber replaces the receiver.

Relay A is released.

A1 disconnects the circuit of relay B, which releases.

B1 completes the circuit of magnet Z from : Negative (point 3), N1 operated (until the shaft reaches the normal position), B1, A1, positive (earth). The switch is therefore released.

B2 disconnects the P wire towards the calling line, hence the H relays of group selectors (*see* Fig. 6 of last instalment) and the K relay of the line switch (*see* Fig. 3 of last instalment) are disconnected and the whole connexion is restored.

B3 having restored, relays H and F are released.

If the called replaces the receiver first—

Relay D only will be released and a circuit will be established over the path : Negative (point 5), C.S.H. (called subscriber held) lamp, D1, F5 operated, B4 operated, positive (earth).

A signal is therefore given to indicate the existence of the abnormal condition and as previously mentioned, the attendant releases the connexion by hand.

Fig. 2 is the final selector circuit used in metropolitan areas, the essential differences between Figs. 1 and 2 being the absence, in the latter case, of relay J and the relative booster voltage. Otherwise, the circuits are similar.

The reversal of potential that occurs when the called subscriber lifts the receiver (operation of relay D) in Fig 2 changes the direction of current flowing through the metering relay located in the special selector (code selector) from which the call has been routed. The operation of this relay places a positive (earth) on the meter wire, thence over the M wiper to the meter (Fig. 4 of last instalment).

Fig. 3 is a schematic diagram showing the link.

V.

IT has been assumed that the subscribers concerned in the switching scheme already discussed have but a single line. It is necessary now to indicate the manner in which the requirements of subscribers having more than one line are catered for under automatic conditions.

A reference to the manual method of dealing with such cases will be useful at this stage. Generally the lines to the subscribers' premises are terminated on a switchboard known as a P.B.X. (Private Branch Exchange). Although not entirely necessary, it is desirable that the exchange numbers allocated to the subscriber should be consecutive, to permit the use of consecutive multiple jacks at the exchange and thus to facilitate the handling of incoming traffic.

As a rule, one number only is advertised in the telephone directory, the multiple jacks of all the lines being suitably marked to indicate the commencement and the end of the group of lines. The directory number is the first of the jacks, so that a coloured line may be painted along the jacks for the purpose of the identification

mentioned. Calls for the required subscriber will therefore mature if a free line exists, busy conditions only being given when all lines have been tested and found to be engaged.

In the case of very large groups of lines requiring several strips of multiple jacks, a "group busy" scheme may be necessary to reduce the number of tests to be made when a free line is being sought.

As P.B.X. lines are invariably required for bothway traffic, calling equipment is provided in the normal manner.

Under automatic conditions the intelligent anticipation available under manual conditions is absent, but the facilities provided and afforded to subscribers must not suffer, hence it is necessary to modify, without substantially altering, the switching arrangements for dealing with the P.B.X. subscriber.

Many different schemes exist for dealing with the problem; to discuss and of necessity explain them is not the intention of the writer now, but rather to concentrate upon the schemes that are used by the Post Office.

At the moment three schemes have been tentatively standardised, they are:—

Scheme 1. For subscribers with fewer than 11 lines.
Scheme 2. For subscribers with fewer than 21 lines.
Scheme 3. For subscribers with more than 20 lines.

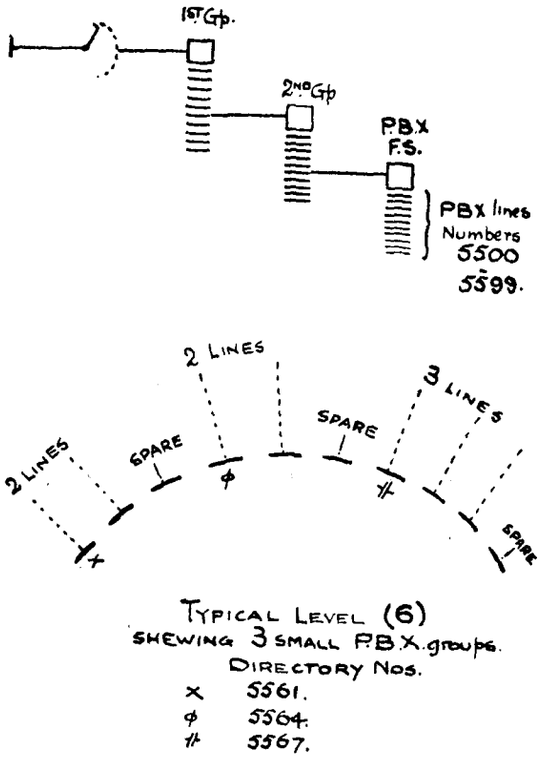


FIG. 4.

The schemes differ in the type of final selector used because (*a*) incoming traffic only is involved and (*b*) because the final selector used for subscribers having a single line, requires dialled impulses to direct the wipers to *each* of the contacts in the bank, also the number of lines in the levels is limited to 10.

As the result of the use of special final selectors, separate blocks of numbers are allocated for each of the schemes, but in order to prevent congestion of traffic in particular channels, the numbers are spread over the exchange. The predominant type of P.B.X. is that having fewer than 11 lines, the number having over 20 lines being small.

In reviewing the facilities afforded by each of the schemes mentioned it will be appreciated that as one number only is advertised in the telephone directory, the switches (final selectors) concerned must be capable of testing the whole of the lines when the number is dialled, and that a busy signal must not be transmitted

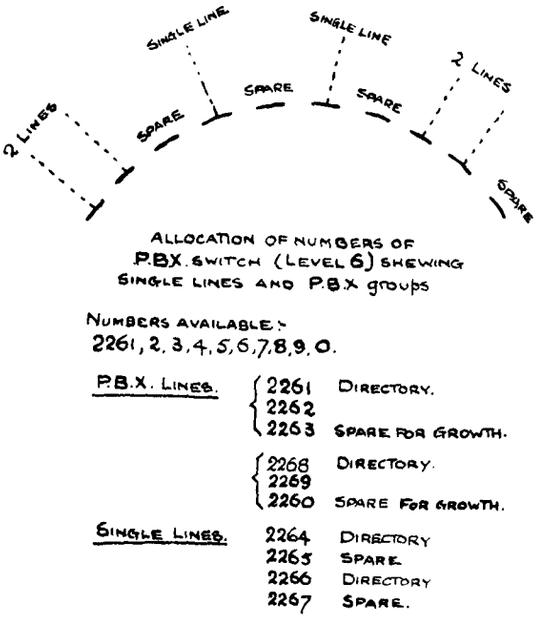


FIG. 5.

to a caller until all the lines have been tested and found to be engaged. Thus there is the proviso that in each of the schemes the lines to the P.B.X. must be consecutive. This proviso enables much simplification in circuit design, a commendable feature. In order to meet reasonable development, it is desirable that spare positions should be left at the end of each group of lines, otherwise if growth occurs, the subscribers' number must be changed. The forecasting for this type of subscriber must be carried out with great care, for not only are number changes irritating to subscribers, but the Post Office is involved in intercepting the old number, which cannot be used until a subsequent issue of the telephone directory, thus temporarily reducing the exchange capacity and involving additional expense for operating staff.

It will be convenient to take each of the schemes *seriatim*. The figs. given as illustrations refer to a 4-digit (10,000-line) system.

Scheme 1.

In this case, several small P.B.X. groups may be accommodated in one level, provided that the total number of lines does not exceed 10. Fig. 4 shows such an arrangement. The dialling of the directory number directs the wipers to the requisite contact, if the line be engaged the wipers step automatically to the next contact, this process is repeated if necessary until the last line is reached, and if this is engaged, the wipers halt on the contact and the standard busy signal is transmitted to the caller. Thus the final selector is arranged for both dial control and hunting, but hunting conditions are only set up if the first line is dialled and found to be engaged. Therefore, if a number *other than the first* (the directory number) is dialled, the automatic hunting condition is not introduced; the final selector then functions as an ordinary dial controlled switch and consequently subscribers' having *single* lines may also be

accommodated in a level as indicated in Fig. 5. This is a useful feature that enables potential P.B.X. subscribers to be given a number that will not require altering when the additional line or lines mature.

Figs. 4 and 5 show only one level of a P.B.X. final selector, but of course the same conditions apply to the remaining levels. It will be observed that directory numbers which finish with 0 cannot be used with this scheme.

The question of special night service is an important one, particularly to the subscriber with a few lines; the single line feature mentioned is extremely useful for meeting the need, the numbers to be dialled at night being specially advertised. The directory number cannot be used for special night service purposes, because if it were already engaged a caller upon reaching it after dialling the number would be passed on to another line (hunting is set up if the directory number is dialled and found to be engaged) and consequently to a wrong extension.

If a spare contact is not available at the end of the group, and the line connected to the directory number is required for night extension purposes, then it is necessary to "tee" it to a spare number in the regular number (non-P.B.X.) series, and the spare number advertised for night service calls. The number selected cannot be allocated for other purposes, hence the arrangement results in an encroachment upon the multiple capacity of the exchange.

If a spare contact is available at the end of the group, it may be "teed" to the line connected to the directory number, thus the night numbers will all be within the group. The scheme will be seen in Fig. 6.

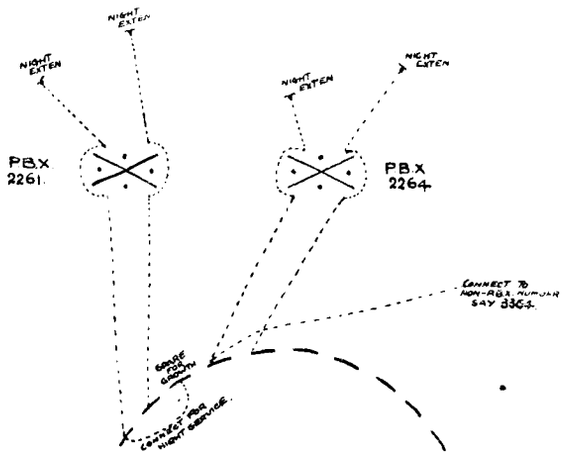


FIG. 6.

It will be clear that an increase in the number of lines in excess of 10 brings the small P.B.X. into Scheme 2 or 3. As separate numbers are involved with each scheme, the transfer from one scheme to another necessitates a number change; to avoid this, when the increase is limited to one or two lines, facilities are provided in the wiring arrangements which enable the addition of lines in excess of 10 without transferring the subscriber to another group.

The arrangement is outlined in Fig. 7. The final selector multiple is cabled to the access points (terminals) in two sections, i.e., the multiple is divided. In some literature on the subject the arrangement is referred to as a double appearance multiple. When the P.B.X. lines do not exceed ten, the two sets of terminals are connected—connections A in the fig.—so that the ten lines are available from all the final selectors. If it be assumed that an additional line is required for a subscriber having 10 lines already, clearly a number must be given to the line for identification purposes, hence it becomes auxiliary to the normal numbers. A block of auxiliary numbers is necessary for the requirements of Schemes

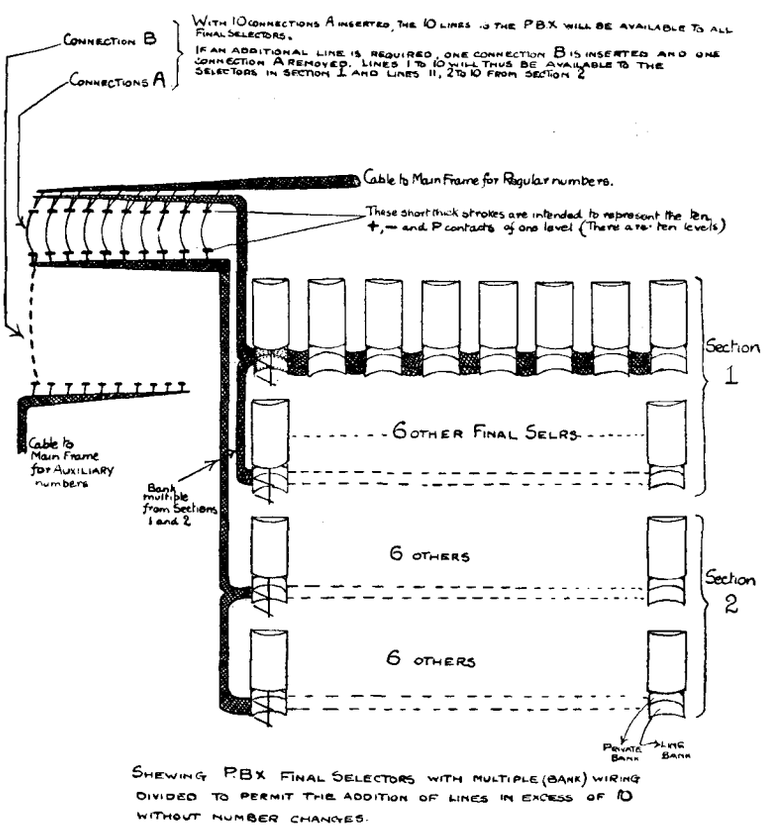


FIG. 7.

2 and 3 as will be explained, consequently, in order to accommodate the extra line, connection A of one of the existing lines is cut away and the auxiliary line joined in by means of connexion B (we may call this line No. 11 for the purpose of this explanation) so that lines 1 to 10 are available from the selectors forming Section 1 and lines 11, 2 to 10 from Section 2. Full availability is not therefore given, as only 10 lines are available from each section of the final selectors but the number of lines to the P.B.X. is 11, and busy conditions will be given when the 10 lines concerned are engaged. For this reason it has been found desirable to restrict the number of additional lines to three.

In the fig. the arrangement shown is typical only. In practice the additional circuits are not necessarily added at the commencement of the level.

(To be continued.)

PRESENTATION TO MR. J. NORWOOD.

A PLEASING ceremony took place at the Cornwallis Road Depot of the Engineering Department, London, when the Sectional Engineer, Mr. Steed, made a presentation of a Gold Watch to Mr. J. Norwood, a tradesman, upon his retirement at the age of 70, after 38 years' service. A large number of the staff witnessed the ceremony.

"WHEN WE GET TANDEM."

BY J. W. SHEPHERD (*Traffic Superintendent, Tandem Exchange*).

To all Traffic people in London, the name "Tandem" has been one to conjure with for the past two years or so. The expression chosen as the title of this article has been in as constant circulation as coin of the realm, and, so far as the writer is concerned, has been observed in far wider use than that commodity—probably by reason of greater availability of supply. Be this as it may, the fact is that, whether in Headquarters, District, Section, or Exchange, provided that "shop" was the topic of conversation, your gambler would regard it a safe wager that, sooner or later, the remark would be made "When we get Tandem." Truly it would be made with different expression and, according to the degree of optimism of the utterer, so would vary the degree of emphasis laid on the initial word.

In order to demonstrate the important changes that will occur when we get Tandem, it is necessary to consider briefly the functions of the Exchange. First and last, of course, Tandem is a junction centre. Its daily life will be spent in completing calls between Exchanges that have no direct junction communication with each other. Although at the outset Tandem will perform this office wholly for manual Exchanges, it will form an equally important and similar link as Automatic Exchanges are opened.

To get a clear conception of the functions of Tandem, it is important to realise the fundamental fact that calls can be completed to any Exchange within the London 10-mile circle, i.e. within the boundary of London's Automatic Exchange area. Indirect traffic to Exchanges beyond the London 10-mile circle, although within the London Telephone Area, will be dealt with by the Toll Exchange.

Tandem will form a link between Manual and Automatic Exchanges alike and can best be considered as having its incoming side divided into two distinct portions:—

(1) Manual Tandem, at which calls from Manual Exchanges will be dealt with on Tandem "B" positions.

(2) Automatic Tandem, through the apparatus of which indirect calls originating at Automatic Exchanges will pass.

Every call outgoing from Tandem will be dispatched over automatic switches and will be received automatically at the Exchange of destination. Where the distant Exchange is Automatic, the receiving switches will, of course, be installed as a part of the Exchange equipment. Where the distant Exchange is manual, apparatus in the form of Coder Call Indicator equipment must be fitted for the reception of Tandem calls. It should be mentioned in passing that this same apparatus at the Manual Exchange will be used to receive calls direct from Automatic Exchanges, so that, ultimately, a mixture of calls from Tandem and Automatic Exchanges will be received at Coder Call Indicator positions.

The Manual portion of the Tandem Exchange, which of course forms the main subject of this article, comprises 108 Key Sender "B" positions and a 10-position Information Desk. Each Tandem Key Sender "B" position is equipped for 30 incoming junctions, and is fitted with a "Key-Sender" set which is, in effect, an automatic telephone dial arranged in Key form as shown below.

Upon receiving the required Exchange name and number by order-wire from the "A" telephonist at the originating Exchange, the Tandem telephonist allots a junction and, at the same time, depresses the relative Junction Assignment Key. The depression of this Key associates the allotted incoming junction with the position Key-Sender Set, and the Tandem telephonist proceeds to set up the demand by successive depressions on the corresponding Seven Keys, i.e. the first three letters of the required Exchange name, and then the four figures of the number required. The depression of the first three keys corresponding to the code of the required Exchange results in the selection of an outgoing Tandem junction, and the preparation of a path to the receiving Coder Call Indicator apparatus at the distant Exchange. The depression of the four keys corresponding to the required number causes electrical impulses to be sent over the prepared path, and results in the display of the number on the Coder Call Indicator position at the required Exchange, where the call is completed silently in the multiple by the Coder Call Indicator telephonist. Should the Tandem telephonist mis-key, and realise her mistake before she has depressed the seventh key of the call, she can, by means of a "Cancel" key, erase what she has sent, and can re-commence without any reassignment of the junction. Should she, however, not realise an error in keying until after she has depressed the seventh key, she can obliterate everything that has been sent on the outgoing junction by operating the appropriate "Junction Disconnect" key. If she still remembers the Exchange and number demanded, she again depresses the Junction Asisgnment Key as before and keys up the Exchange code and number afresh. So far as the "A" telephonist at the originating Exchange is concerned, the call is completed regularly. If, however, the Tandem telephonist has forgotten the demand she should have keyed up, she obliterates the error as before by operating the "Junction Disconnect" Key and, again depressing the "Junction Assignment" Key of the junction originally allotted, sets up the code "INF," thus transferring the call to the Tandem Information Desk. This last operation is, in fact, the means by which the Tandem telephonist can dispose of any irregular demand which she has accepted in error and which she is unable to complete, e.g., a request for a number on an Exchange beyond the London 10-mile circle. Requests for "Trunks" (Records), "Telegrams," "Directory Enquiry" and "Toll" can be complied with by keying-up "TRU," "TEL," "DIR" or "TOL" respectively. This, in brief, is the outline of procedure in operating the various types of call via Tandem.

It is not the intention here to deal at length with the operating procedure, but rather to review broadly the effect of the Tandem Exchange upon existing arrangements. It may, however, be of interest to record that all incoming order-wires to Tandem will be fitted with a "guarding tone" device. This tone is produced on the order-wire immediately the junction is allotted by the Tandem telephonist, and continues for a period of about 2.5 secs.—the length of time taken to operate the seven keys for the completion of a call on a Tandem Key Sender "B" position. Its purpose is to safeguard the Tandem telephonist from interruption on the order-wire during the process of keying-up a call.

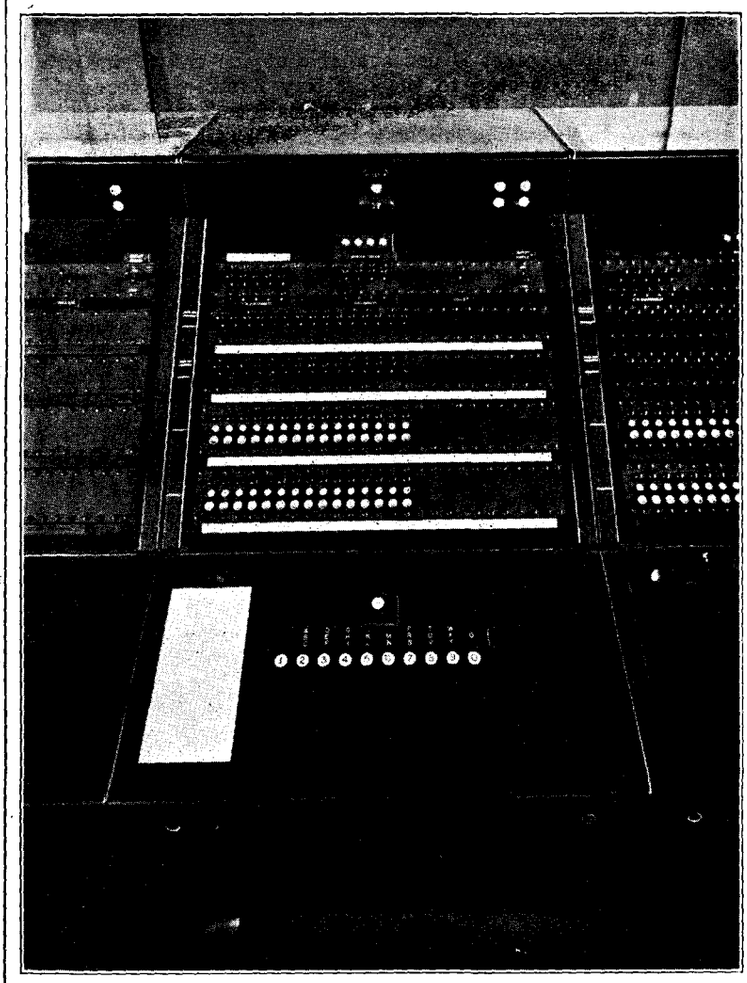


FIG. 1.

First two rows of keys: JUNCTION DISCONNECT KEYS.
Second two rows of keys: JUNCTION ASSIGNMENT LAMPS.
Below: CANCEL KEY AND KEY SENDER SET.

The most obvious achievement of Tandem will be the substitution of one order-wire working junction centre for the London 10-mile circle in place of the existing six. Whatever policy is determined as to the area to be served incoming by Tandem, every Exchange within the London 10-mile circle, at least, will have its own order-wire group to Tandem, and by means of it can obtain access to any Exchange within that area to which it has no direct junction communication. Thus all existing lending groups will be abolished and with them the often tiresome process of obtaining a junction to a distant Exchange, via a junction centre and waiting, for a variety of reasons, until the distant Exchange answers. This will be particularly evident during late evening, night, Saturday afternoon and Sunday periods.

Next in order of extinction will be the signal junctions, both plug and jack-ended. The great majority of these will disappear when Tandem becomes fully operative. The few that will remain have been retained temporarily for economic reasons, but these will be superseded as opportunity serves. How many Supervisors will view with satisfaction the passing of the jack-ended junction.

Whatever may be the many shades of opinion upon signal junction working generally, all Traffic people will agree that the service will be improved by its substitution in favour of one large order-wire junction group per Exchange, over which all demands for the "odds and ends" of traffic may be met.

FIG. 2.

Many existing small direct order-wire groups also will be recovered in favour of Tandem working. This step may not receive universal favour at the outset, but a brief consideration of the ideal at which Tandem will aim may modify dissenting opinion. Originally, it was hoped that all groups of junctions over which less than 43 calls were passed in the busy hour could be recovered in favour of Tandem working as soon as the Exchange became fully operative. Subsequent considerations, e.g., unexpectedly high development in Exchange lines, have necessitated the lowering of that standard temporarily to a figure of approximately 25 calls. But even under these circumstances, the efficiency of Exchanges in general, and of those between the 7½-10 mile London circles in particular, must be increased by the improved facilities for effecting, via the Tandem order-wire, all that traffic now passed either by borrowed or direct Signal junctions or by an order-wire shared with several other Exchanges. It is interesting to note that a large proportion of order-wires to Tandem will be worked on a "straight" basis. Thus, many Exchanges that now have to depend upon their junction centres and signal junctions for a considerable portion of their junction traffic will find one Tandem position entirely at their service for traffic to any Exchange within the London 10-mile circle to which they have no direct junctions. Tandem, in fact, will trim the ragged edges of telephone operating. In these edges indoubtedly lies an appreciable amount of inefficiency, born of facilities which are below the general standard and requirements of an ever-increasing service.

The Automatic portion of Tandem, referred to earlier as a separate part of the incoming side of the Exchange, will commence to function with the opening of the first Automatic Exchange, and will become increasingly operative as the London Automatic telephone system grows. Just as Manual Exchanges cannot, for economic reasons alone, be provided with direct junctions to all other Exchanges within the London 10-mile circle, so must a certain proportion of Automatic Exchange traffic be dealt with over indirect routes. Subscribers served by Automatic Exchanges will obtain access, without verbal interception, to any other subscriber within the London 10-mile circle by dialling the first three letters of the required Exchange name, followed by the number. In the case of Exchanges (Manual or Automatic) to which direct junctions are provided, calls will take the direct path to the Coder Call Indicator apparatus or to the Subscriber respectively. But where the call is made by a subscriber on an Automatic Exchange to an Exchange (either Manual or Automatic) to which direct junction communication is not provided, that call finds its way to the distant Exchange indirectly, i.e., via the Automatic Tandem Switches.

The thought may occur to the reader that, as more and more Automatic Exchanges are opened, the Automatic side of Tandem will increase, and the Manual side decrease correspondingly. This is so, and advantage will be taken of the relief given by the Automatic to the Manual side, gradually to effect the conversion of more and more existing small direct routes to Tandem working, and so to raise the standard of direct routes accordingly—at least to a point at which a direct junction route carrying less than 43 calls in the Exchange busy hour will be an exception.

It is not difficult to realise that the opening of Tandem involves considerable changes in the layout of Exchange "B" boards—particularly in the case of medium size and small Exchanges. Data which have been circulated to the Traffic Districts shows that a large number of existing junction groups will be recovered when Tandem is fully operative. The traffic now carried on these junctions (about 31,000 calls) will be dealt with at Tandem in its busy hour, and a large proportion of the traffic of many suburban Exchanges will then circulate via Tandem and Coder Call Indicator equipment. Some 6,000 junctions in all have been provided to and from the Tandem Exchange for the indirect traffic of Manual Exchanges within the London 10-mile circle.

Coder Call Indicator equipment will be installed at all the Manual Exchanges within the London 10-mile circle, with the exception of Hendon and Edgware.

The Traffic side commenced to co-operate with the Engineers in testing out the Tandem and Coder Call Indicator equipment some time ago; the work has been increasing in intensity, and during the period mentioned, about 1,250,000 test calls have been made. This number represents the calls sent *into* the Exchange. During the early stages of testing, an appreciable number of calls did not succeed in getting out again—they were lost in the maze of intricacy known as the Tandem switching equipment. Calls there were, also, that evinced a desire (sometimes with success) to reach an Exchange other than that to which they were sent, and there have even been cases in which the apparatus has sent fives for nines—a sure proof that it has absorbed the telephone environment! It is good, however, to be able to record that, at this time, a high and increasing percentage of the calls passed arrive correctly at the Exchanges to which they are sent.

At the time of writing (early July), Tandem is passing test traffic to Coder Call Indicator equipment at forty Exchanges. At three of these—Addiscombe, Croydon and Thornton Heath—a measure of public traffic is being passed experimentally throughout the day, and within a short time, a further eight Exchanges (i.e., those having East as their junction centre) also will be passing experimental public traffic in the same way.

Thus it can be said that the expression, "When we get Tandem," will soon apply only to the past. It requires little imagination on the part of the reader to realise that only the fringe of the effects of Tandem upon the routing arrangements of to-day has been touched in the foregoing. The theme is worthy of expansion by individual thought; consideration alone of the possibilities of concentration of traffic via Tandem at other than normal hours forms a subject peculiarly applicable to all local Exchange officers. It is not a fantastic supposition that the whole of the incoming traffic of many London Exchanges in the late evening, night and early morning hours could be received via Tandem, during which time the direct junction routes would be inoperative and only Coder Call Indicator positions would be staffed. Truly a fascinating subject is offered to the agile and inventive mind in the future effect of Tandem upon the telephone service of to-day. These are new lands awaiting exploration, and few better ports exist from which to embark than the Exchanges at which Coder Call Indicator equipment is installed.

Many and varied modifications will inevitably be necessary in the course of time, but, in such an entirely new departure as Tandem working in conjunction with London's Automatic System, a little foresight will be invaluable for some time to come, until experience of the new conditions has been gained. Now is the time for Exchanges to build their machinery for the transition period and to gather, from every available source, a stock of that extremely effective lubricant known as "seeing' forrard."

MANCHESTER NOTES.

SOME few members of the District Manager's Office, Manchester, spent a very pleasant afternoon on the 2nd instant when they journeyed to Bakewell, Derbyshire, by motor coach. The party, numbering about thirty-five, were fortunate in their selection of date as the day turned out to be one of the finest experienced so far this summer.

After a splendid drive through the hills and dales of Derbyshire, high tea was served at the Wheat Sheaf Hotel; visits were paid to the points of interest (which are many, varied and historical) in the neighbourhood. The return journey through the Peak District was delightful, Manchester being reached at about 10.30.

Marriages:—Miss F. HORNE, Writing Assistant, was presented by the staff of the District Manager's Office with a case of cutlery, and a brass rose bowl by her colleagues in the Cash Office, besides many personal gifts on resignation on account of marriage; Miss M. B. HITCHEN, Writing Assistant, also received a similar gift from the District Manager's Office Staff, and a cut glass cruet from the Cash Office Staff, together with many other gifts from personal friends when she left the service to be married; Mr. J. S. MCFADDEN, Clerical Officer, Traffic Section, who is the elder son of Mr. S. McFadden, Traffic Superintendent, Class II, North Midland District, has resigned his bachelor status, and as a result was presented by his colleagues in the District Manager's Office, Manchester, with a canteen of cutlery. Mr. Parry, Traffic Superintendent, made the presentation in a happy speech and Mr. McFadden suitably responded.

The
Telegraph and Telephone Journal.

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Managing Editor - - - 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.*

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MR. DALZELL'S RETIREMENT.

WITH Mr. Dalzell's retirement the Post Office loses one who was in a very real sense a telephone pioneer. He joined the Globe Telephone Company so long ago as 1881—only 5 years after Graham Bell's invention of the telephone—and, even before that date, he had been studying electrical engineering and telegraphy professionally. In one of his early posts, as electrician, he was occupied in designing apparatus to meet the changing and rapidly developing systems of infantile and juvenile telephony. Later he carried out extensive trunk construction and reconstruction works. He served in four or five different telephone companies, was successively Manager of more than one provincial Telephone District, District Manager West London Area, and Assistant Superintendent for London. At the time of the transfer to the Post Office he was Superintendent of the West of England Province. In 1916 he was appointed Inspector of Telegraph & Telephone Traffic, in 1919 Chief Inspector, and in 1922 Director of Telegraphs and Telephones, thus in turn adding to the scope of his responsibilities inland telegraphs and overseas communications, both cable and wireless.

Mr. Dalzell's continuous and intimate contact with so many phases—engineering, traffic and managerial—of the developing telephone service largely explains his broad outlook, his wide and deep knowledge, and the impressive ease with which he moved amidst the intricate details of telephone questions—an ease which was perhaps the more striking as there was no parade of knowledge, pretention or assertiveness such as too often mar the deportment of men of expert knowledge.

In 1919-20 he visited the U.S.A. to study American telegraph and telephone practice, and he was a member of the Departmental Committee entrusted with the task of revising telephone rates. He has served on important Imperial Committees in more recent times. His Committee work best known to colleagues of Company days, however, is perhaps that associated with his selection by them to give evidence on their behalf before the Select Committee on the Post Office Telephone Agreement—with good results to his constituents.

Among the more important matters which have occupied him in recent years must be recorded the widespread development of automatic telephony in the Provinces, the stupendous task of preparing for automatic working in London, Anglo-European telephony, and the enlargement of wireless telegraphic and telephonic communication to inter-Continental range. It is a personal romance as well as an index of the rapidity of scientific progress in modern times that one whose early service was concerned with overcoming the difficulties of speech between adjoining streets should, in his later official days, have a large share in making it a matter of everyday occurrence that subscribers in Great Britain should be able to hold easy conversation with their fellows on the shore of the Pacific Ocean. Mr. Dalzell is generally credited with a considerable measure of ambition. He has achieved such success as falls to the lot of few.

He is possessed of shrewdness, caution and strong common sense, and these qualities, coupled with his extensive knowledge and experience, have rendered his judgment very sound. He generally knows his own mind, and gives decisions rapidly—a most valuable attribute, for in Civil Service affairs, as in those outside, it is often at least as important to decide quickly as to come to the best decision. He displayed powers of rapid and effective assimilation, and also initiative and energy, which were the more remarkable as he has not been blessed with altogether robust health. If he sometimes appeared unconvinced of the wisdom contained in the homely adage, "Too many cooks spoil the broth," it must be admitted that he saw to it that the quality of the soup did not really suffer, while his conviction as to the soundness of the somewhat antithetical declaration, "In the multitude of counsellors there is wisdom," produced valuable results.

Interest in organisation was not, perhaps, very prominently displayed, and a preference was shown for using individuals, including himself, rather than the machine. It may be claimed that such a preference has high warrant as a theory of management and many eminent supporters in practice. Equal use of all available resources is, indeed, probably an ideal impracticable of achievement, and on the whole an efficient manager is most likely to get the best results by following his own ways. It is also probably a good thing for a large-scale service that all its leaders should not manifest entirely the same qualities and follow precisely similar methods.

Mr. Dalzell's resource, dexterity, suppleness, practical sagacity and drive enabled him to get things done. Indeed, he was something of a hustler.

To the staff he was courteous, kindly and extremely accessible.

Mr. Dalzell had a profound conviction of the importance of the part which should be played by the public in telephony, and he always showed himself sympathetic towards representations and complaints. He would much rather meet an application than refuse it. This attitude was not due solely to general ideas as to the proper methods of administration and as to the expediency and value of tact, but rather to his sincere belief in "service" to the community and to his profound sense of the importance of telephony in the domestic, social and commercial life of the nation. He ever aimed at the highest possible standard of usefulness to the public, at maximum efficiency for the service and also at making the staff feel the great importance of their share in the organisation; and he bent every effort to achieve all these objects.

Among Mr. Dalzell's recreations are gardening, golf and motoring, but his official duties have been his main interest. Indeed, his devotion to duty has been such that he could not bring himself to allow his body adequate convalescence after illness. Let those who may be disposed to question the wisdom of such absorption in official affairs reflect how great is the aggregate happiness enjoyed by one who finds true satisfaction in congenial work, and how large the increasing need of the modern world for public servants, of both high and low estate, who will devote themselves wholeheartedly to furtherance of the common weal.

F. H. S. G.

HIC ET UBIQUE.

THE *Morning Post* says: "The River Plate Telephone Company—which, thank goodness, is a British concern, connected up 158,088 telephones during the year 1926. This must cause the London Telephone authorities—also British—some uneasy qualms. Argentina's ability to set such an example may, or may not be, due to the fact that the telephones there are a private enterprise. But, in any case, how would it do to invite the gentleman responsible to pay us a visit and show us how to do it? But it would be a scurvy trick if, in return for his bringing us the business-like methods of Argentina we infected him with the British facility in finding excuses for not getting on with the job."

The 158,088 are, however, not a year's increase, but the total number of telephones on the United River Plate Co.'s system. It would seem desirable, before preaching a sermon, to verify your text.

The Arabic for devil is Iblis (pronounced Iblese, with the accent on the "blese"). Our Jerusalem correspondent sends us the following:—

"Jerusalem telephonist (politely and with rising inflection, &c.): Number, please?

"Arab subscriber (catching only the last two syllables): Shu! Inti iblis. (What! Devil yourself!)"

Out of 7,902 girl telephone operators, according to the *Telegraph and Telephone Journal*, 350 get married every year. We can only hope that this is the right number.

Thus our contemporary, *Punch*, which in its eagerness to work in the wrong number joke once again, overlooks priceless opportunities to refer to "numbers engaged" and the giving of "rings."

From a report of the *Manitoba Government Telephone* we learn that the three outstanding events for 1926 throughout the province were: the inauguration of full automatic service in Winnipeg (Strowger system); the opening up of telephone communication to the Lake Head cities, and the erection of a direct telephone circuit between Chicago and Winnipeg.

Communication was opened up to 57 new districts.

Telephone service was opened on July 15 between Great Britain and Denmark, limited at the outset to communication between London and Copenhagen. The charge for a day call of 3 minutes is 18*s*. 6*d*., and for a night call (9 p.m. to 8 a.m.) 11*s*. 1*d*.

Our Preston correspondent sends us a copy of the following letter from the Mayor of Wigan to the District Manager of Telephones, with the remark that it may do something to correct the erroneous impression that Wigan is famed only for its "pier":—

"The duties of my office have, during the past few months, been extremely heavy. The volume of work imposed upon the Mayor of such a town as Wigan is, indeed, very great. I am writing to you to say how much I have been helped by the kindly and spontaneous co-operation of the girls in the Exchange at Wigan. My letter of thanks is very brief, but it is none the less sincere. These ladies seem almost to anticipate the Mayor's requirements and by their bright and willing service have made my task very much more easy than it otherwise would have been.

Will you please convey to these unseen workers the expression of my sincere thanks.

Yours faithfully,

ROBERT ALSTEAD,
Mayor.

THE C.T.O. PENSIONERS AT KEW.

SHOULD the reader imagine the annual gathering of the retired supervisory staff of the C.T.O. at Kew Gardens as a meeting of elderly ladies and gentlemen basking in the sun with conversation limited to the long, long past, and walking in that last stage, "leaning upon a stick," he or she would be much mistaken. True, on June 8 the weather was particularly kind, the gardens were at their best, and Tea on the Terrace, with the more or less silvery Thames flowing placidly by, would have rejuvenated a much older-hearted assembly, despite the fact that ten, fifteen and nearly twenty years of pensioned service was individually represented.

One hundred and thirty sat down to tea, and Charlie Keen and Harry Adams are to be congratulated upon the excellent organisation. A little more masculine among the rebellious clans frae th' North, and the next affair should prove perfection!

Among the new recruits, one may mention Miss Shacklock, bright and alert as ever, if not even more so, Mr. A. W. Edwards troubling no more over his O.B.E. than his elder "brother" Jim Bailey concerning his I.S.O., G. T. Bennett, W. G. Wood, C. S. Docwra, A. T. Jacobs and Jack Mansell, while of those whose experience of pensioned life has by this time become absolutely matured note may perhaps be taken of the presence of Miss Mayersbach and Messrs. Donaldson, Didden, Hilton, Peter King, Adam Gordon, Sadler MacEwan, Tinson, and last but not least, Mr. and Mrs. S. J. Treby.

Should space permit, the complete list of those present will follow. The writer of these stray lines is confident, however, that should this not prove possible in the present case it will only be so if the insertion of the full list proves to be a physical impossibility.

One charming incident was the mention of a letter received by Mr. Keen from Miss M. A. Watts, a lady of 84, whose handwriting is not only easily read but even under a strong magnifying glass shows not the slightest unsteadiness. What is the secret of this preservation of the freshness of life? The key is to be found in Mary's broad and kindly outlook. One sentence in her letter gives it. Thus: "How lovely everything is looking! Even round here (Parson's Green) the trees and flowers are a sight and the flower beds in Hyde Park are worth a journey to see."

J. J. T.

R. A. DALZELL, C.B., C.B.E.

BY JOHN SCOTT.

WHEREVER ex-National men and women foregather the talk tends to become reminiscent, and more often than not expression is given to a wistful regret that the Company ceased to exist. It may be that kindly memory in this as in other of life's experiences emphasises the pleasant things and relegates the others to a shadowy background. We had our grievances of pay, of promotion and of discipline, but in retrospect these hardly count against the stirring memories of comradeship in strenuous fights among rival companies, in competition with the Post Office and Municipal Authorities;

MR. R. A. DALZELL.

all the time extending and improving the service and that without any compulsory wayleave powers. The consecutive changes from iron to copper and then to bronze for overhead wires, the transfer to underground, introduction of paper insulated cables and loading coils, the passing of the old Blake transmitter, the evolution of the test and switchboards to C.B. and automatics are among the things that stir the blood of those who had a part in the changes.

There are splendid friendships and loyalties in the Post Office, and incomers like ourselves would be churls not to acknowledge these gratefully. But, letting memory run away with us without let or hindrance, were there ever such loyalties and friendships as among the N.T. Company's staff? From General Manager to pot boy there was an eager enthusiasm that caught us all in its grip.

Names of chiefs and colleagues spring to the mind sufficient in number to occupy the available space, but each must recall these for himself.

At the moment the purpose of these reflections is to provide a setting for a tribute to R. A. Dalzell who in the sixty-second year of his youth and after forty-seven years Telephone service has retired from his post of Director of Telegraph and Telephone services.

His retirement is not only notable as that of a pioneer but marks the end of an epoch in Telephone Administration. His experience covered all the scientific and engineering developments of the Telephone Service as well as the administrative changes which kept pace with them, and he was the senior of the small band who carried the specialised knowledge and experience of the N.T. Company's telephone administration into the Post Office and helped to adapt it to the new conditions. Latterly, as Director since July 1, 1922, he has been the Secretary's chief adviser on Telegraph and Telephone administration.

When Mr. Dalzell entered the service there was no long-distance communication except by telegraph cable—now the trunk service throughout the country is stable and rapid, communication with the continent of Europe is good to many centres and is rapidly extending, and by means of the Transatlantic wireless service satisfactory speech is possible with San Francisco. On the Telegraph side the wireless service from Rugby covers the world and the Beam services link up the Dominions. In every stage of this development Mr. Dalzell has played his part.

Reverting to local telephone service and development, it is worthy of record that for over twenty years Mr. Dalzell's work and experience lay more on the engineering side than the administrative, although there never was so clear cut a division between the two under the Company as in the Post Office. He had all the pride of a craftsman in his engineering work, and no achievement probably gave him greater pleasure than the successful completion of what were in 1891-5 first-rate overhead trunk routes linking up Leeds and Bradford with Hull, Grimsby, York, Northallerton, Manchester and Sheffield.

The perfect alignment of poles on straight stretches of road, the proper setting of struts and stays, well fitted arms and nicely adjusted open wires have a beauty which appeals to the initiated, and give room for legitimate pride to those who are responsible for them—Mr. Dalzell has had many occasions for such pride.

The variety of his service was great and with companies whose names are now only remembered by few.

His first love, as a student, was telegraphy, and he never lost the ability to send and receive by Morse. His first job with the Globe Telephony Company was fitting up new switchboards in 1881. Three years later the Globe was taken over by its rival Company, the United. Thereafter Mr. Dalzell's service was given in the Northern District Telephone Company's area with headquarters at Newcastle. This was a first-rate training ground because it was there that, under the inspiration of Mr. Heaviside, the Post Office put up the best opposition to the Telephone Companies in these early days.

Thereafter service in Yorkshire with the National Company and in Lancashire with the Lancashire & Cheshire Company, widened his experience till in 1895 he returned to London as Manager of the Western District. In that period Mr. Dalzell submitted a scheme for the reorganisation of the London Telephone Service, on functional instead of territorial lines. The idea was adopted and in 1903 he was appointed Assistant Metropolitan Superintendent for Service and Traffic. In 1905 he became Provincial Superintendent for the Western Province, and on the transfer to the Post Office in 1912 was one of three Provincial Superintendents attached to the Secretary's Office. His two colleagues found outlets in other directions, and after a period during which he was Chief Inspector of Telephone and Telegraph Traffic, he became Director on July 1, 1922. His years of service with the Post Office, covering the transition from Company to State control, the period of the war,

the aftermath of shortage of plant, the preparation and construction of automatics, the continued growth of machine telegraphy, have been not the least strenuous in his career. His ideals for both the Telegraph and Telephone services have been high. As he himself has put it the ends he has striven to attain are "Service, sufficient and efficient, specialisation in bringing these about, co-operation between administration and staff and public."

It is not too much to claim that he has made a considerable and helpful contribution towards telephone service and development in this country and has left his mark in several important directions, and all who have been associated with him feel genuine regret at his passing from active participation in telegraph and telephone affairs.

Always a hard worker himself he appreciated that quality in others. To the numerous questions, technical and human, which were the day-by-day concern of the Provincial Superintendent and latterly of the Director, he brought his equipment of practical common sense to bear.

There was a curious shy bit in his nature which revealed itself to his colleagues occasionally.

Were this a critical essay it might be appropriate to attempt to strike a balance of Dalzell's qualities of heart and head, but when one's friend and colleague is in the eclipse of retirement it is the corona of his life which claims our attention.

The workers pass but the work goes on. Happy are they who enter into the inheritance of good pioneer work well done, and equally happy they who pass, with the assurance that their successors will carry on the good work till they in turn must rest. It is with this assurance that Mr. Dalzell bids farewell to the scene of his labours.

That he may be spared to enjoy his leisure and mayhap see some of the schemes in which he has been interested come to fruition is the sincere wish of all his friends.

THE LONDON POSTAL SERVICE.*

BY LT.-COL. W. T. BRAIN.

(*Continued from page* 210.)

Inland and Parcel Sections.—The Inland and Parcel Sections, under the charge of an Assistant Controller, are situated at Mount Pleasant on the site of the old Coldbath Fields Prison and the House of Detention.

The Inland Section deals entirely with provincial correspondence. Into it is collected all the "Country" work from the City and W.C. dual posting boxes. In addition, it acts as a Forwarding Office and general Clearing House for provincial work originating not only in London but anywhere. At the "Primary" sorting the letters are first split up into certain Divisions or Groups of countries. Fig. 5 shows these groupings. The Midland Division (North), for example, is comprised of the counties of Northumberland, Durham and Yorkshire, whilst the Midland Division (South) consists of Derby, Notts, Lincs, Leicestershire and Rutland.

The South-Western Division consists of Dorset, Hants and a portion of Surrey.

The numbers on the map represent the "Roads" in these Divisions.

Having been thus generally divided the letters are cleared from the Primary Sorting Tables into the appropriate Divisions for sub-division. You will see from the following plan of the South-Western Division (Fig. 6), which is typical, that a good deal has been done to make this second sorting the final one, but there are certain places for which there is not enough correspondence to justify a special "Selection" and the work for them is therefore sent to a Residue "Road" for despatch. In order to relieve the Inland Section it has been arranged that certain District Offices shall act as "Divisional" Offices and take and dispose of the Residue work for particular Divisions which is posted throughout London, excluding the E.C. and W.C. Thus, the South-Western District Office is the Divisional Office for correspondence for the S.W. Division, and Paddington D.O. for the Western Division. It should be noticed that I say "Residue" work, because in many cases a District Office has sufficient locally posted, or locally collected, correspondence to warrant making up a direct bag for some of the larger towns in a Division.

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

As may be supposed, the new Inland Section is quite up to date in labour saving mechanical aids.

The *Parcel Section* at Mount Pleasant is the largest Parcel Office in the country. It deals not only with parcels for London and the provinces, but also those for and from abroad. The method of sorting is somewhat similar to that for letters, except that the Inland Divisions are on a Railway basis, e.g., Euston, King's Cross, Liverpool Street, &c., to take parcels for towns served from the railways starting from these stations. As in the case of the Inland Letter Section, certain measures of decentralisation have been introduced for relief purposes. Despite the increase in postage charges the work has so rapidly grown that more space has had to be provided and the Parcel Section has now extended into the premises recently vacated by the Inland Letter Section.

A Surveyor of Customs and his staff are attached to the G.P.O. Parcel Office at Mount Pleasant.

Passing, in the general scheme of organisation, from the centrally situated offices we now come to the London district offices.

FIG. 5.

London Districts.—These are eight in number, each under the control of a Postmaster, viz.: E., N., N.W., Paddington, S.W., W., W.C., S.E.; Battersea is run practically as an independent unit, so far as control is concerned, under an Assistant Postmaster, who receives a special allowance.

Imagine a combination of the E.C. (town) and Inland (country) Sections as one office and you have an idea—on a smaller scale, of course—of just what a District Office is like.

Each one deals with Collected, Delivered and Forwarded work. Every Postmaster has an organising staff, and he exercises jurisdiction over the Sub-Districts in his area. (This does not apply to W.C. and W., where there are no Sub-Districts.)

It is very essential that there should be complete co-ordination between all Districts, and this has been a special feature of the Controller's organising staff during the last few years, a period of phenomenal development and growth. All the District Offices except N., W.C. and W. act as "Divisional" Offices, and it is highly necessary that each should be acquainted with the separation of correspondence carried on at the other offices, so that, as far

as possible, the dividing should be the same. For example, if N.W.D.O. has correspondence for the S.W. Division which has to be sent to S.W.D.O. for despatch, N.W.D.O. should know to which "Road" in the S.W. Division such Correspondence is sorted at S.W.D.O., the office of disposal. It can then be tied up in a bundle or sent in a bag and so reaches the appropriate "Road" at S.W.D.O. without further handling.

I will now say a word or two about *Mechanical Aids, &c.*, in Sorting Offices.

In large Sorting Offices efficient organisation of the work as well as staff is an essential. The "lay-out" must be planned in such a way that confusion and congestion are avoided as far as possible. Certain work has to be segregated, e.g., Long Letters and Packets have to be dealt with apart from short and ordinary-sized letters, as I have already described in connexion with the process of "Facing," and transporting can best be done by mechanical means.

SORTING ALPHABET.

INDICATING ARRANGEMENT OF SELECTIONS ON A 48 BOX FITTING FOR LETTERS

INLAND SECTION ~ S.W. DIVISION.

BRIDPORT	BROCKEN-HURST	COSHAM	EASTLEIGH	EMSWORTH	HAVANT	HINDHEAD	BLIND
RINGWOOD	ROMSEY	SANDOWN	SHANKLIN	SWANAGE	VENTNOR	WAREHAM	WIMBORNE
BLANDFORD	COWES	POOLE	GODAL-MING	DORCHESTER	GOSPORT	LYMING-TON	PARKSTONE
ALTON	PETERS-FIELD	NEWPORT I.O.W.	BOURNE-MOUTH	GUILDFORD	WEY-MOUTH	WOKING	BASING-STOKE
SHERBORNE	HASLEMERE	RYDE	SOUTH-AMPTON	PORTS-MOUTH	ALDERSHOT	JERSEY	WINCHESTER
CHRIST-CHURCH	FAREHAM	ANDOVER	GUERNSEY	CAMBER-LEY	FARNHAM	No 1 ROAD	No 2 ROAD

FIG. 6.

If I describe some of the mechanical aids in the E.C. Section they may be taken as types of others. There it has been designed that Packets placed on the top band conveyor of the "Facing" Tables shall automatically drop down a chute on to another under-floor conveyor which will bring them up at a point adjacent to the table, some distance away, at which they are to be hand-stamped.

To avoid congesting the gangways by trucks with full bags, under-floor conveyors take them from the Sorting Office to the Platform for despatch, the bags being dropped on to the Conveyor through holes in the Sorting Office floor. A very complete system of Conveyors, Chutes, Lifts and Elevators is being installed in connexion with the Tube Railway and at the E.C. Office there are, or will be—

(*a*) a Bag Elevator from the railway station to Ground Floor for upward mail traffic;

(*b*) a Double Spiral Chute from the Ground Floor to the railway—one Chute discharging on to the Westbound platform, the other on to the Eastbound platform. These chutes will take the downward mail traffic;

(*c*) Two large Lifts (carrying capacity 25 cwt. each)—one running to the Foreign Section on the First Floor (with openings on Ground and Sub-Ground Floor also), and the other (a reserve lift) to the Sub-Ground Floor only. These will serve for conveying Staff to and from the railway, and will also act as reserve appliances for both up and down mail traffic.

These appliances will be supplemented by Conveyors, as under:—

In Tube Railway Station.—A Conveyor under each Platform (fed through openings in Platform) to deliver bags unloaded from trains on to the Bag Elevator.

In Sorting Office.—(*a*) An Underfloor Conveyor starting from near the discharge point of the Bag Elevator to transfer District bags discharged from the Elevator to the District Bag Opening Table on the north side of the Office.

(*b*) An Underfloor Conveyor from the District Despatching Roads on the north side of the Office (fed through openings at the ends of Despatching Tables) discharging into the westbound spiral Chute to the railway, to take bags made up inside the Office which are intended for onward transmission by the railway.

(*c*) Underfloor Conveyor from the Posting Room under the Chief Office Counter (with an opening on the East Arrival Platform) discharging into the Westbound spiral Chute to railway, to take country bags made up in the Posting Room for transmission by railway to Mount Pleasant, and also bags arriving by road at the East Arrival Platform for transfer to the railway. This Conveyor will also be fed by a short band running from under the Parcel Despatching Room at the end of the Chief Office (public) Counter, to take the bags of parcels posted at the Chief Office Counter to the Parcel Section at Mount Pleasant, thus obviating the use of vans.

(*d*) A relief Conveyor to (*c*). This will be provided by having a diversion switch on the existing Conveyor running from the Posting Room to the West (despatching) Platform, so that this Conveyor can be diverted to discharge into the spiral Chute to the railway if and when required.

Mails arriving by the Tube Railway will be deposited through the openings in the platforms on to the Under-Platform Conveyors, which will discharge them into the buckets of the Bag Elevator that will in turn convey them to the Ground Floor. On arrival there E.C. bags will be trucked to the Opening Table near by; District bags deposited on to a Conveyor which will take them to the Opening Table on the north side of the Office, and bags for transfer by road to other offices will be deposited on to an existing Conveyor running to the West (despatch) Platform.

Before leaving this subject, I want to draw your attention to the fact that in the E.C. section we are still using the open shelf Tables to a large extent.

I hope that in course of time the suitability of the new 48-box fitting for "setting in" of a Postman's delivery will be demonstrated. We are experimenting in this direction.

For District News Sorting and for the E.C. News we already use adapted drop-bag fittings.

Post Office (London) Railway.—The railway is 6½ miles long and runs from Paddington District Office to the Eastern District Office, with intermediate stations at Western District Parcel Office, Western District Post Office, Western Central District Office, Mount Pleasant Sorting Office, King Edward Building Post Office and Liverpool Street Station.

Each station consists of an island platform—the stations varying in size according to the importance of the office served. The largest Station is at Mount Pleasant, where the dimensions of the platforms are 315 ft. by 12 ft. Mails are received from the Sorting Offices by Chutes or Lifts, and are transferred from the railway to the Sorting Offices by Lifts or Elevators, as already stated.

The running track consists of two 2-ft. gauge running tracks, one for Eastbound traffic and the other for Westbound traffic. The tracks run side by side in one tunnel of 9 ft. diameter, except on leaving or approaching stations, where the East and Westbound tracks are contained in separate tunnels. At most stations loop-lines are provided connecting lines running on one side of the platform with lines running in the opposite direction on the other side, so that trains finishing a journey at one platform may be easily transferred to the other platform and sent in the reverse direction; Sidings are also provided at certain Stations.

There will be no drivers, and trains will be operated by switchmen from switch cabins situated at the various stations; the switchmen will be the counterpart of the signalmen on ordinary railways, but the operation of the levers by the switchmen on the Post Office Railway will not only work the points and thereby set up paths for the trains, but will also complete electrical circuits and thereby create a supply of energy to the motors on the trains and set them in motion. The movements of the levers are so interlocked one with the other that it is impossible to send a train on to the Section which is already occupied, or which is about to be occupied by another train, and the passage of a train over one Section automatically renders it impossible for a train to occupy the Section in the rear.

The train service will be run to a definite Time-Table as is done on ordinary railways, and will operate throughout the 24 hours except on Sundays. The trains will consist of three cars which will have a capacity of approximately 60 letter mail bags. It will be possible to run trains over any part of the line at an interval of 1½ minutes.

The object of the tube is to accelerate the transit of bags of correspondence and parcels across London. Let me illustrate this by an example. The scheduled motor van "run" from Paddington to E.C. at present is 29 minutes, or if calls are made at W.C.D.O. and W.D.O., 35 minutes. The Tube will bring bags direct from Paddington to E.C. in 10 minutes.

There will, of course, be some reduction in street traffic by the use of the tube.

Conclusion.—In 40 years there have been many changes. Conditions—that general term which covers so many things—have undoubtedly improved; young officers are better trained and, in the case of juvenile manipulative entrants, their education is continued after they enter the service. The relationship between the higher and the lower ranks is decidedly happier; more attention is paid to hygiene, ventilation, sanitation, welfare and industrial psychology, all of which are now recognised as essential to efficiency. The old bureaucratic methods of government which applied to the whole Post Office service have disappeared. Even the meeting together of Post Office people to discuss their work was once forbidden; and the sweeping away of that veto on liberty has resulted in free expression of opinion, criticism and suggestions, all of which are now met in a considerate spirit. Much has been done and is being done to encourage and cultivate a better understanding between all ranks by social intercourse and in the world of Sport. I think I may claim that the L.P.S. has always been in the forefront in bringing about this changed orientation, and it remains, as it has long been, not only an efficient machine, but a virile and definitely articulate factor in Post Office affairs.

TELEGRAPH & TELEPHONE DEVELOPMENT IN AUSTRALIA.

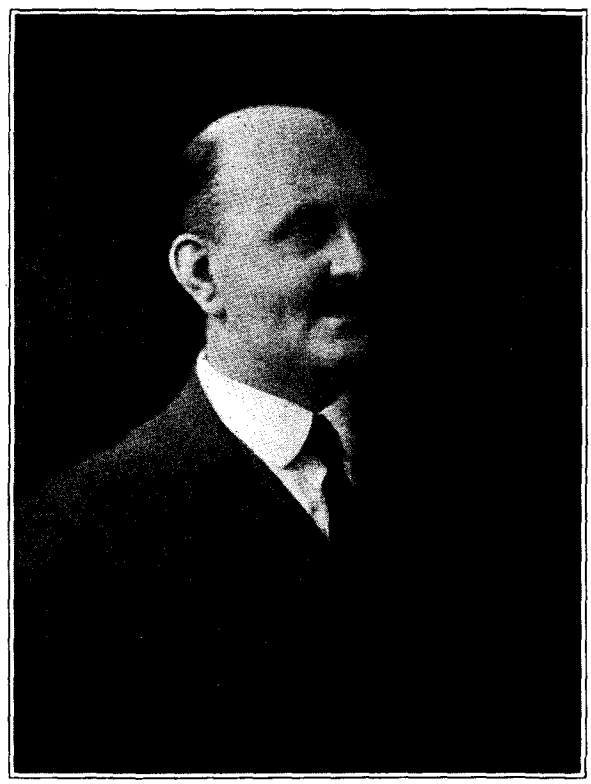
BY H. P. BROWN

(*Secretary of the Post Office of the Commonwealth of Australia*).

IN common with the experience in many other countries, the communication services administered by the Post Office in the Commonwealth of Australia suffered a serious setback during the years of the war. The transference of so large a proportion of the nation's manhood to the zones of military activity necessarily gave rise to an increase in the overseas business, and, on the other hand, caused a very great diminution in the usage of the internal services. At the termination of the war, when the nation was resuming its normal activities, it at once became manifest, not only that the existing services had to be thoroughly overhauled and rehabilitated, but that a rapid expansion in the provision of plant and facilities generally would be essential to cater for the current demands. The telephone service, being a branch in such personal and intimate contact with the community, stood out most prominently in this respect, and as a consequence the greatest endeavour was put forward towards the rectification of this portion of the communication system. I think it would be a fair statement to make that only now is the Department level with public needs, and this position has been reached after a few years of really strenuous endeavour, during which period a wonderful spirit of determination has animated the whole staff of the Post Office.

The Government had determined that the telephone service should be extended in full conformity with the national needs, and it allocated annually sufficient funds to permit this policy to be developed in the most economical fashion. The problem confronting the officers of the Australian Post Office was dissimilar in many respects from that which the British Post Office was faced at the conclusion of the war. The differences will be evident from a moment's thought. Australia is a continent of 3,000,000 square miles, populated by 6,000,000 of people. In the six State Capitals there are no less than 2,757,000 people. It will be clear, therefore, that the population density is extremely small, and the distances to be covered in the provision of both trunk and local lines are greatly in excess of those which obtain in densely populated territory. Another great difference as between the Commonwealth and Great Britain is the remoteness of the former from the main sources of supply of many classes of material extensively used for telephone and telegraph purposes. There is necessarily an absence of that close consultation which is possible when the large manufacturing concerns are situated immediately within the territory for which equipment is to be installed. The whole procedure, from the preparation of specifications until the time when supplies become available, is more laborious and protracted. Requirements for every conceivable class of material need to be forecasted for abnormally long periods ahead, and if there is any hiatus during the currency of a contract it is infinitely more difficult to rectify. Some conception of the magnitude of the problem confronting the Australian Post Office will be gathered from the fact that 16,000 applications were on hand for telephone service at June 30, 1920. Large numbers of these had been outstanding for twelve months or more, and it was evident that many more applications would have been held but for the common knowledge that the Post Office was not in a position to give service. At the time in question the output of work averaged 2,500 connexions per month. At the end of December, 1926, the number of applications awaiting attention was 6,000, and the average rate of execution was 5,200 orders per month. It is of interest that for the first time in the history of the Commonwealth canvassing for orders was instituted some six or eight months ago, and that policy has since been actively pursued. The number of telephones in operation was increased by 89.5% during the six and a half years in question. During the six years ended June 30, 1926, the mileage of wire in the local exchange system was increased by 102.8% and the mileage of wire provided for telephone trunk communications was increased by 136.5%. From the financial standpoint the comparative growth has been at a phenomenal rate. In the four years ended June 30, 1926, the expenditure on the creation of new assets exceeded that incurred during the previous twenty-one years. To-day it is believed that the rate of growth of the Commonwealth telephone service is almost the highest of all telephone administrations. It was 11.11% for the financial year ended June 30, 1926. The telephones per hundred of the population are now 6.9, which, from the latest available statistics, places the Commonwealth seventh on the list of countries arranged in their order of telephone density.

In laying its plans for affording relief in the various telephone networks one of the greatest obstacles to be overcome was presented by numerous large exchanges having reached the limit



MR. H. P. BROWN.

of their capacity. Not only was the plant incapable of extension, but buildings also had become fully occupied. To meet the revised order of things new premises had to be built and switching equipment sufficient in quantity to replace the existing working services and provide an adequate margin for current demand and future needs had to be installed. In the large networks the Department's policy has been to introduce automatic switching equipment, and it has restricted itself to the use of systems operating on the step by step principle. At the present time 25% of the total telephones of the Commonwealth are operated on an automatic basis, and in addition quite a large programme of new automatic exchanges is in course of execution.

In the country districts magneto apparatus has been used exclusively, but owing to the costs which are entailed in the provision of continuous service, the Department has been forced to make an exhaustive investigation into the feasibility of substituting automatic equipment. A number of experimental installations have now been brought into service, and it is hoped that the experience so gained will make it possible to pursue the policy on a large scale.

A brief reference has been made to the expansion in the trunk service. A further indication of what this represents will be

gleaned from figures showing the comparative extent of use: for the financial year ended June 30, 1920, the total number of trunk calls was 12,420,205, and for the year 1925-26 the paid calls totalled 26,085,231, an increase of 110%. Plans have been laid to provide for comprehensive trunk communication throughout the length and breadth of the continent. The transmission scheme adopted requires all circuits to have an efficiency not inferior to 12 T.U. between the terminal test-boxes. It will be evident that this plan has only been capable of accomplishment by the extensive utilisation of telephone repeaters. Australia is a land of great distances, and in consequence telephone repeater equipment must be used extensively. Because of the great distances separating the State Capitals and of the community of interest between these centres, a profitable field also presents itself for the utilisation of Carrier Wave Services. Between Melbourne and Sydney, a distance of roughly 600 miles, there are two physical trunks, and on one of these a three-channel carrier telephone is superposed. Repeaters are installed on the physicals, and a high-grade service is therefore available on all channels. The carriers were installed some eighteen months ago, and since that time the revenue has increased by 150%. Steps have been taken to provide three additional carrier channels, and it is hoped these will be available within the next twelve months.

A comprehensive scheme of telephone carrier services is also being installed north of Sydney to Newcastle, Maitland, the Northern River Towns of New South Wales, and to Brisbane. In a number of instances arrangements have been made to provide single channel carrier telephone services, where the traffic is in excess of the present line provision, but where the anticipated growth is not expected to absorb more than one additional circuit during the next five years or so.

The total mileage of telephone carrier channels in use and in course of provision represents the equivalent of 10,250 circuit miles.

A great deal of attention has been given to organisation and to the routing and handling of traffic, with the result that the paid time per circuit has been greatly increased and the waiting times have been diminished. Wherever practicable short-haul service is being rendered, and through dialling to automatic networks, in some cases over considerable distances, is in operation.

The following statistical data may be of interest:—

COMMONWEALTH OF AUSTRALIA—TELEPHONE STATISTICS: *Financial Years ending 30th June, 1922 to 1926.*

PARTICULARS.	YEAR ENDING				
	30/6/22.	30/6/23.	30/6/24.	30/6/25.	30/6/26.
Number of Telephones	258,881	282,087	317,520	363,242	403,616
% Increase over preceding year	7.58	8.96	12.56	14.40	11.11
*Mileage of Wire in Local Exchange Systems	876,490	1,008,165	1,141,075	1,357,441	1,511,389
% Increase over preceding year	11.64	15.02	13.18	18.96	11.34
*Mileage of Wire in Telephone Trunk System	118,030	132,312	160,867	211,287	248,890
% Increase over preceding year	7.29	12.10	21.58	31.34	17.80
Number of effective Local Calls	220,636,600	233,062,600	257,232,300	273,704,900	300,354,400
% Increase over preceding year	—	5.63	10.37	6.40	9.74
Number of Trunk Calls	13,968,200	15,914,600	18,122,200	21,675,400	26,085,200
% Increase over preceding year	8.19	13.93	13.87	19.61	20.34
†Number of effective Local Calls per telephone per annum	879	863	859	799	781
% Decrease compared with preceding year	—	D 1.81	D .46	D 6.98	D 2.25
†Number of Trunk Calls per telephone per annum	56	59	60	63	68
% Change from preceding year	(I) 1.82	(I) 5.36	(I) 1.69	(I) 5.00	(I) 7.94
§Total Value of Telephone Assets (including Buildings, Sites and Furniture)	£14,403,800	£16,550,600	£20,113,700	£24,390,000	£28,936,600
% Increase over preceding year	13.48	14.90	21.53	21.26	18.64
Gross amount expended annually on Telephone Assets (including Buildings, Sites and Furniture)	£1,918,000	£2,434,000	£3,922,000	£4,695,000	£5,075,000
% Increase over preceding year	41.03	26.90	61.13	19.71	8.09
Annual Telephone Revenue per 100 Population	£50.06	£53.84	£58.29	£62.39	£68.66
% Increase over preceding year	9.18	7.55	8.27	7.03	10.05

* Single wire mileage.
† Based on the number of telephones at 31st December in each case.
§ Value of assets at prime cost, less the value of plant dismantled. (No deduction made for Depreciation.)

On the telegraph side appreciable extensions have taken place, but as far as possible the erection of additional physical circuits has been curtailed by utilising the telephone plant to the utmost extent with a view to securing composite telegraph channels. Over the long-distance routes trunk circuits have been utilised to accommodate Carrier Wave Telegraph Channels. The mileage of wire in use for telegraph purposes on June 30, 1920, was 67,345, and at the corresponding date in 1926 it had increased to 72,223. The net addition represented only 7.24%. During the same years the length of wire used for joint telephone and telegraph purposes was increased from 79,930 to 137,755 miles, the percentage addition being 72.34. Carrier Telegraph Services have been provided over the Melbourne-Sydney and the Melbourne-Adelaide routes, in which cases five duplex channels have been made available at the outset, with provision for ready extension to ten channels in each case. These services are used not only for direct communication between the terminal points, but also for providing through services where the traffic warrants such a course. A regular Carrier Service is operating between Sydney and Adelaide, a distance of some 1,100 miles.

On the equipment side there has been considerable development in multiplex working, the principal services being two quadruple duplex, Melbourne to Sydney (600 miles), two Sydney to Brisbane (650 miles), one Brisbane to Townsville (830 miles), and one triple duplex Brisbane to Rockhampton (408 miles). The total number of duplex channels in service is 23. In passing it may be of interest

to mention that quadruple duplex sets are being worked over the Carrier Wave Channels between Melbourne and Sydney.

Start-stop teletype has also been introduced to a considerable extent in the last year or two, and 36 sets of this class of apparatus have been provided. Creed apparatus is installed on certain of the long-distance routes, where benefit results from tape transmission from cables and other circuits. Seven services are being operated on this basis.

There is a marked difference between Australia and the United Kingdom in regard to reception over hand-worked circuits. In the larger offices the Australian telegraphist almost invariably uses a typewriter, and even in a considerable proportion of the country offices the same practice is in vogue. Where typewriters are not in use messages are written in ink. The operating rooms in a number of instances present anything but an attractive appearance, but fortunately it has been possible to remedy this state of affairs, and at an early date a change-over will be made in both Melbourne and Sydney to new operating rooms with an up-to-date, modern equipment and the necessary mechanical conveyors for the collection and dispatch of telegrams.

Phonogram services are also being extended, and an alteration in the regulations at present under contemplation will doubtless result in a considerable accretion to this class of business. A review has been made of the telegraph business to centres where the volume of traffic is small, and to offices situated within a short distance of the main telegraph centres. Economies have been effected by dispensing with Morse transmission and utilising the main telephone system for the dispatch of business to and from the phonogram rooms.

As in the case of the telephone branch, changes have been made in the telegraph organisation, and studies have been carried out with a view to securing the most effective routing of traffic and the improvement of circuit loading. There are 8,900 telegraph offices within the Commonwealth, and during the financial year ended June 30, 1926, 17,637,716 telegrams were handed over for transmission. The revenue received per hundred of the population was £21.53.

Wireless broadcasting claims such a degree of popularity that I may be permitted a brief reference to Australian experience. In 1923 a representative conference of wireless interests advocated the introduction of a scheme which required every licensee to utilise a receiving set manufactured so that it would be restricted to the receipt of a specified wavelength. The set was to be sealed and to be retained intact under a penalty, and the licence fee was to be paid to the particular broadcasting company operating on the relevant wavelength. It was arranged that each company could make its own charge, and the development of its business would necessarily be dependent on the nature and value of its programme, combined with the reasonableness of the fee which it imposed on its clients. Regulations on this basis were promulgated and a number of licences were issued for the establishment of broadcasting stations, but, as might be imagined, the system broke down almost before it became established. Unfortunately certain vested interests which it was impossible to ignore in the revised order of things had been created by this action. New regulations were promulgated in August, 1924, the basic principle being to circumscribe the broadcasting areas in conformity with the State boundaries. It was not easy to disregard the claims of certain companies which had secured rights under the original scheme, and as a consequence, in each of the States of New South Wales and Victoria two broadcasting stations were permitted. In the remaining four States only one station was allowed. These eight stations were to be known as A Class Stations, the significance of the classification being that the companies operating them would be permitted to receive fees collected in respect of listeners' licences.

It was provided that other stations, known as B Class Stations, might be licensed at the discretion of the Postmaster-General. The owners of the B Class Stations would derive their remuneration by indirect means, such, for instance, as advertising. The eight stations in the main group, known as A Class Stations, were to be situated in the capital cities of the States, and because of the great distance of the remote portions of the States from their respective capitals, it was decided to introduce a zoneing scheme on which the tariff would be based. Three zones were adopted, the first embracing a distance of approximately 250 miles, the second from 250 to 400 miles, and the third beyond 400 miles. The appropriate licence fees at the time of the inauguration of the service were 30*s*., 25*s*., and 20*s*. per annum respectively, but these have since been reduced to 27*s*. 6*d*., 22*s*. 6*d*., and 17*s*. 6*d*. All licences are issued by the Post Office, and the revenue collected in each State is allocated to the A Class broadcasting station or stations within that State. The growth of licences has been very unevenly distributed amongst the States, due to a variety of reasons, the figures up to the end of March, 1927, being as follows :—

	Licences in Force.	*Ratio to 100 of population.*
New South Wales	52,528	2.2
Victoria	106,081	6.2
Queensland	20,787	2.3
South Australia	15,807	2.8
West Australia	3,932	1.0
Tasmania	2,153	1.0
Commonwealth ...	201,288	3.3

Owing to the different density of population in the various States it seemed evident at the outset that even this scheme could only be of a tentative character, and that if equivalent treatment were to be accorded to licences, some system would need to be devised which would guarantee the utilisation of the financial resources through some centralised medium. A Royal Commission is at present considering this matter along with other phases of wireless telegraphy and telephony.

In concluding this summary of some of the activities of the Commonwealth Post Office, I should like to express indebtedness to the generosity which has been shown by many of our friends in Great Britain and in the United States in placing at our disposal the results of technical research and other studies which they have found it desirable to undertake in the interests of their respective administrations. In a country of small population, large mass-production factories, with their associated research staffs and laboratories, are impracticable. It is natural, therefore, that we in Australia should look to those more fortunately situated for enlightenment on the problems which they have been called upon to face because of the very magnitude of their undertakings. Fortunately, the personnel in the Commonwealth service stands on a very high plane of technical efficiency, and is making its own contribution to the advancement of the arts of telegraphy and telephony. A Post Office research section has been established, and twelve highly skilled engineers are applying themselves to the incorporation of modern invention into the Commonwealth services. A programme of original research has also been mapped out, and is being pursued systematically.

I have not touched on the postal side of the Department's activities, as I understood it to be outside the province of this article. It may not be out of place to mention, however, that intensive studies are being made in this sphere of Departmental activity with particular relationship to the elimination of all manual processes which can be performed by mechanical aids. In Sydney a new sorting office has been erected and a most comprehensive scheme of mechanical appliances is now in process of being installed. I feel sure that the appliances which are being incorporated in the system are of a character which would interest many of my old friends in the British service, and at a later date, when some little experience has been gained of their utility, I shall be pleased to make detailed information available.

REVIEWS.

"*Das Telephon und sein Wesen.*" *By August Rotth.* (*Berlin: Julius Springer.* 148 *pp. Price* 4.50 *marks.*)

This is a very readable work on the invention of the telephone and its early developments. It goes into the history of the beginnings of electrical transmission of speed and deals at some length with the claims of Bourseul, Reis, Gray and Bell. Graham Bell's specification of 1876 is given in full in English. In the author's opinion "it is not to be doubted that, knowingly or unknowingly, Bell stood on the shoulders of Reis." Gray and Bell, he considers, were both indebted to Reis for the use of the membrane in the receiver. The claims of Hughes and Lüdtge to the invention of the microphone are also touched on, and the work of Sylvanus Thompson and Werner Siemens in the further development of the telephone are recorded. The final chapters deal with the patent disputes in which the Bell Company was involved in its early days. Interesting sketches of the early telephones of A. G. Holcomb and Phil. van der Weyde are given—indeed, the little book is well illustrated throughout by clear diagrams.

"*An Outline of Indian Currency.*" *By H. B. Turle.* (*Thacker, Spink & Co., Calcutta.* 94 *pp. Paper, Rs.* 2. *Cloth, Rs.* 3.).

This work is somewhat outside the scope of the *Journal*, and we shall touch on it but briefly. It contains some preliminary remarks on the origin and nature of currency, on the efforts of modern governments to regulate exchange, and on the difficulties created by the adoption of a gold standard. A review of Indian currency up to 1913 follows, and the work of the Herschell, Fowler and Chamberlain Commissions is described. The dislocations caused by the war created considerable difficulty in maintaining the exchange value of the rupee, which the influence of internal conditions in Mexico on the production of silver tended to aggravate. For stabilising the exchange, Commissions on Currency were held in 1919 under Sir H. Babington Smith, and in 1925 under the Right Hon. E. Hilton Young. The latter Commission recommended stabilisation of the rupee at a rate corresponding to an exchange rate of 1*s.* 6*d.* On the subject of the rate of 1*s.* 4*d.* or 1*s.* 6*d.* the author says it is impossible to say that one is right and the other wrong without coming to a definite decision on the question of the adjustment of prices. Provided the Government has sufficient resources to maintain the rupee at the selected level, the prosperity of India will, as before, depend on her natural resources and human efficiency and will only be temporarily affected if the rate chosen is either above or below the existing price level.

"*Automatic Telephony.*" *By Charles W. Wilman, A.M.I.E.E.* (*Lecturer in Telephony at the Coventry Municipal Technical Institute*). (*Crosby, Lockwood & Son,* 7*s.* 6*d. net.*)

This book is an elementary treatise on the principles underlying the art of automatic telephony of the standard step-by-step system, and no attempt has been made to describe in detail the system of any one particular manufacturer. There is a good chapter on Relays and their Time-Elements, and the chapters on Pre-Selectors, Group Selectors, and Final Selectors each commence with a useful enumeration of the functions of the unit.

The Director system of London and the Controller system for large areas are faithfully dealt with. We can recommend this book to readers who are commencing the study of this fascinating branch of our work.

"*Atomic Theory. An Elementary Exposition.*" *By Arthur Haas, Ph.D. Translated by T. Verschoyle, M.C., Ph.D., A.R.C.S.* (*Published by Constable & Co., Ltd.,* 10-12, *Orange Street, W.C.*2. *xiv* + 222 *pp. Price* 10*s.* 6*d. net.*)

Among the remarkable scientific achievements of recent years, the discoveries which have been made in connexion with atomic structure are probably the most fundamental. These advances have revolutionised the views of the chemist, the physicist, the engineer and even the astronomer as to the underlying causes of the phenomena with which they deal, and have shown a uniformity in the ultimate structure of matter which, although previously suspected, had not before been demonstrated. A knowledge of these discoveries is nowadays essential to all who have to deal with physical science, using the term in its widest sense.

Unfortunately, the advance in this field has been so rapid that information on it is not yet fully available in text books and, for the greater part, has to be sought for in original papers written in various languages. This is a disadvantage for anyone who wishes to obtain a general view of the matter without going into minute details. For such, the present book will be welcome.

The author has recently published a large standard work on Theoretical Physics, noteworthy for its clearness of exposition. The subject matter of the book under review forms one of the sections of this large work. Many, especially those for whom student days are past, will not wish to purchase the complete work, and it is for the benefit of such readers that the section on Atomic Theory has been published as a separate volume.

The book is divided into five chapters. The first deals with the elementary quanta of electricity and energy. In the second chapter the theory of the construction of the hydrogen atom is discussed. The third chapter deals with Röntgen rays, and their use in sub-atomic researches. The fourth chapter is devoted to the theory of the elements, the natural sequence into which the elements can be arranged, the phenomena of radio activity, and similar matters. The final chapter deals with the general theory of spectra and atomic structure.

The book is very clearly written, the use of higher mathematics is avoided, and only an elementary knowledge of physics on the part of the reader is assumed. We can recommend it to anyone who wishes to obtain a good general and up-to-date knowledge of the matters of which it treats.

PRESENTATION TO MR. J. A. W. GREGORY.

AT the North-Western District Office, Preston, on the 30th ult., Mr. J. A. W. GREGORY, Assistant Traffic Superintendent, who has been transferred to Southampton, was presented by the Traffic and Clerical Staff with a handsome Canteen of Cutlery. Mr. A. L. Barclay, Traffic Superintendent, occupied the chair, and Mr. S. O. Allen, the District Manager, made the presentation.

Eulogistic references were made to the esteem in which Mr. Gregory was held, and the happy relations which existed between him and the staff. Regret was expressed at losing Mr. Gregory, but hopes are held that his transfer to the South will speedily and completely restore him to good health.

Mr. Gregory suitably replied, acknowledging the gift and expressing his sincere thanks for the kindly expressions of good wishes towards him.

CIVIL SERVICE APPROVED SOCIETY.

As delegate of the Central Telephone group of the membership, I attended the Annual General Meeting, which was held at the Home Office on Tuesday, July 5th, 1927.

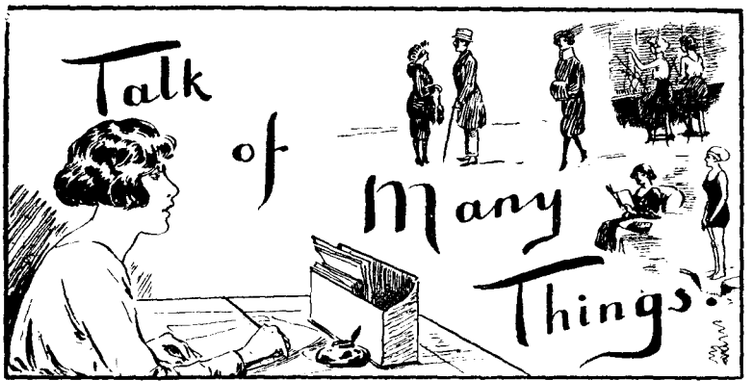
Sir John Anderson and Sir Malcolm Ramsay were elected President and Vice-President, respectively, and these two gentlemen, with Sir John Kempe, were appointed Trustees of the Society.

Mr. T. Jordan, who retires from the Registrar of Friendly Societies Office in September, was appointed full-time Secretary as from the date of his official retirement.

That the affairs of the Society are being closely watched was proved by the keenness of the discussions and by the large number of delegates from all parts of the country who attended the meeting. One delegate actually travelled specially from Northern Ireland.

H. A. BAKER, L.T.S. (K.D.3.C).

WE TELEPHONISTS



OUR valued contributor, Mr. Flage, has, we know, a wide circle of readers, and we have much pleasure in printing a letter to the Editress of this column, inspired by him, from a correspondent in Palestine. (The verses which follow were found in the waste-paper basket) :—

"General Post Office,
"Jerusalem.

"Dear Madam,

"In the first paragraph of his chat on 'Bank Holiday Duty' in your June number, 'Percy Flage' bewails the paucity of Bank Holidays in England. He should come to Palestine, where, in addition to 3 official languages, a thoughtful Government provides public holidays for each section of the community. In the course of the year there are (apart from King's birthday) no less than 32 official holidays—8 for Christians, New Calendar; 8 for Christians, Old Calendar; 8 for Jews; and 8 for Moslems—all on different dates.

"Unfortunately for 'Percy,' no Government official is allowed to profess more than one religion during a single year!

Yours faithfully,
"GOLDEN CITY."

He soliloquises (mournfully) :—

When I was sent to Palestine
I kept an open mind.
No bigot I; I yearned to try
The creeds of all mankind.
In March I'd be a Moslem,
In June, I'd be a Jew;
In August and December,
A Christian, Old and New.

When I arrived in Palestine,
Life looked extremely gay;
Adjustment slight to views thought right,
Gave endless holiday.
From Jan. to March a Moslem,
April to June a Jew;
Then Christian Grace should hold first place—
Ergo—days thirty-two.

And now I'm fixed in Palestine,
Alas! Ochone!! Eheu!!!
No more am I a Moslem,
Much less am I a Jew.
All Christian Creeds have left me,
All faith long since has fled,
Changing too late I lost each eight!
(It serves you right.—The ED.)

Gardens.

July is with us, and once more the gardens and the gardeners have come into their own. Some there may be who do not love a garden, but they are not missed, for gardens have their myriads of admirers, from Kings to peasants.

This is a joy in which we may all share, and there is probably no affection so well-placed; the more care and love we lavish on our garden, the more it responds, and the sweeter it becomes. Never mind how small it may be—look after your garden, and you will be amply repaid. If you want a special little thrill, take pride in some particular kind of flower—the sweet pea, for example. It is not every soil that is suitable for growing roses—the acknowledged queen of the garden—but the sweet pea will grow in a very ordinary soil, and, given sufficient space and sunshine, will blossom profusely. As I watch mine flowering day after day, delighting in their exquisite scent and marvellous colouring, I am reminded, as are scores of garden lovers, I suppose, of T. E. Brown :—

"A garden is a lovesome thing, God wot!
Rose plot,
Fringed pool,
Ferned grot—
The veriest school
Of peace; and yet the fool
Contends that God is not—
Not God! in gardens! when the eve is cool?
Nay, but I have a sign;
'Tis very sure God walks in mine."

L. R.

Hop Exchange.

On a recent Sunday members of the Hop Exchange and their friends spent a very enjoyable day on the river from Windsor to Hurley. Judging from the merriment of the party the heavy showers during the day appeared to have very little effect.

Lunch and tea were provided on the launch, and several impromptu musical items were rendered with great success by Miss N. Smith, Mrs. Knight (formerly Miss I. Dean), Mr. Kent and others, while Miss J. Buckley kindly lent a gramophone for the occasion. Our thanks are due to the organiser, Mr. Baxter, whose capable arrangements made the day such a brilliant success.

F. D. B.

Kirkdale Tennis Club.

The Tennis Club members wish to thank very heartily Miss Verbrugge and Mr. Solomon, on the occasion of their marriage, for the work they have done to make the Club a success. Miss Verbrugge has served the members well for many years, and to Mr. Solomon the Club owes much. May they enjoy happiness and prosperity in the future,

In filling the vacant place of Secretary, I trust that I may serve as faithfully and as well as Miss Verbrugge. I hear that a tournament is desired; no doubt one could be arranged. It would be interesting to divide the members into several teams, one for experienced players, one for learners, and a team for old members who are new wives; while the losers of all teams could compete for a prize between themselves.

We cannot all be victorious, but we can be good losers.

G. M. T.,
Sydenham Exchange.

New Versions of Old Songs.

No. 2.—MY DEAR SOUL.

Hast thou heard the Busy Back
In the Busy Hour
Singing down the junction track,
Forty bagpipe power?
So it seems to waiting Subs.,
More than they can thole,
Makes them yell, words like—"Well,
'Pon my soul!"

Hast thou heard the ringing tone,
On a junction call,
With a syncopated drone
Not well-known to all?
So when Subs. would clear the line,
Then we take control,
Say it's new—see them through,
To their goal.

Has thou heard the dreary hum
Through the telephone,
When the dialled number's dumb,
Or the bird has flown?
Or perchance the line is "dis"
Through a broken pole,
Don't complain, try again,
My dear Soul!

C. A. S.

Guaranteed.

"See this bracelet? I got it from a millionaire."
"Yeh! Who?"
"Woolworth."

From *Northern Manhattan Echo.*

The Transatlantic Telephone Service, Jan. 15, 1927.

American Service is now in full swing,
And fair cousins from o'er the Atlantic.
Oft when passing a call, for our Night Staff will fall,
They find them so quaint and romantic!

But the smart Wall Street Gent., on business intent,
By this holdup is rendered quite frantic—
His remarks anent queues, cause the cables to fuse,
For his language is *most* "Transatlantic."

M. C.

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.

PROGRESS OF THE TELEPHONE SYSTEM.

THE total number of telephone stations working at May 31, 1927, was 1,531,868. New stations during May numbered 24,473 and ceased stations 10,447, resulting in a net increase of 14,026 on the total at the end of the previous month.

The growth for the month is summarised below:—

	London.	Provinces.
Telephone Stations—		
Total at May 31	540,947	990,921
Net increase for month	5,293	8,733
Residence Rate Installations—		
Total	118,355	191,865
Net increase	1,701	2,317
Call Office Stations—		
Total	4,791	17,539
Net increase	33	204
Kiosks—		
Total	512	2,824
Net increase	34	154
Rural Party Line Stations—		
Total	—	10,036
Net increase	—	49
Rural Railway Stations connected with Exchange System—		
Total	—	774
Net increase	—	16

The number of inland trunk calls dealt with during April (the latest statistics available) was 8,012,729, an increase of 684,715, or 9.3% on the April, 1926, figure.

Calls made to the Continent during April last numbered 25,052 and from the Continent 27,245.

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

PROVINCES—Halifax (automatic).

And among the more important exchanges extended were:—

LONDON—Ambassador, Paddington, Popesgrove, Streatham, Tilbury, Wanstead.

PROVINCES—Ayr, Belfast, Birmingham (South), Cleethorpes, Cradley Heath, Fort William, Gateshead, Glossop, Goole, Hamilton, Henley-on-Thames, Horsham, Penzance, Plymouth, Wakefield, Wallsend.

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

Tavistock—Truro—Penzance,
Bristol—Temple Cloud,
Bridgend—Aberkenfig,
Hull—Grimsby,
Hitchin—Letchworth,

while 80 new overhead trunk circuits were completed, and 88 additional circuits were provided by means of spare wires in underground cables.

PRESENTATION TO MR. R. P. LOWE.

A PRESENTATION of a Gold Watch was made to Mr. R. P. Lowe, Contract Manager, Norwich, and a Work Basket to Mrs. R. P. Lowe, from the members of the staff, to mark the occasion of his promotion to Newcastle. The presentation was made by Mr. C. F. Ashby, District Manager, who spoke with appreciation of Mr. Lowe's long service in Norwich and his excellent work in the Contract Section, and also in connection with Civil Service social activities. Mr. R. Inglis (District Office) and Mr. C. A. Gate (Traffic Section) contributed remarks to the excellent relations that have existed between their Sections and the Contract Department.

Mr. R. P. Lowe suitably replied, thanking the members of the staff for their splendid gifts and for the pleasant remarks regarding his work.

LONDON TELEPHONE SERVICE NOTES.

Accounts Branch.

THERE is nothing of special importance to record this month. The quarterly balances are done and the dispatch of the Accounts for the current quarter is already in full swing and the regular routine of the quarter commenced once again.

The closing date for the September Directory has passed and the new issue is now in the press.

Those officers who in recent weeks have been working at top speed in order to get every alteration and addition up to the very last minute included can now think of such relaxations as annual leave before the next issue is put in hand.

Cricket.

The rainy summer has not in any way damped the enthusiasm of the Accounts Branch Cricket Club, and on the whole the fixtures have been fortunate in their weather.

A number of interesting matches have taken place since the last notes were written.

On June 15 a league match was played with the Traffic Branch, which ended in a draw. The return match was played on July 5, when the Accounts won handsomely with 110 for 3 wickets, while their opponents were all out for 60, 16 of which were scored by Grove. Good scorers on the Accounts side were: Taylor 29 not out, Mayle 28 and Moon 24. The Second League match with the Contract Branch took place on June 28, when the Accounts Branch again did well with 90 for one wicket, Young scoring 49 and Moon, not out, 24. Moon also distinguished himself by taking 6 wickets for 33 runs. The Contract Branch were all out for 89.

The return match with the London Engineering District was held on June 23, when the latter had their revenge by winning with 110 runs against 83.

A match against a team from A.N. Section was also held on July 8, and resulted in a win for the Accounts.

The Accounts Club having defeated both Traffic and Contract Branches now has to play their combined teams. A full account of this match, which is to be held on July 26, after these notes have gone to press, will appear in the next issue of the *Telegraph and Telephone Journal.*

Contract Branch.

The volume of business obtained by the Contract Branch during the first quarter of the current financial year was as follows:—

	Stations.
New business obtained	21,321
Ceasements	10,712
Net gain ...	10,609

The net gain represents an annual rental exclusive of call fees of over £57,000.

The new business obtained in June—and consequently the net gain—was a great disappointment. It would appear, however, from enquiries made that the absence of orders is pretty general throughout trading circles. Everything appeared to be going well until the Whitsun holidays, but it is curious that on the return to business of those who should have been our customers, they seemed to be immersed in a sort of miasma which numbed their senses, temporarily at any rate, and prevented them from using their facilities to order telephones and a hundred and one other things—hence the slackness in business generally.

Let us hope they will speedily recover.

Cricket.

The destination of the L.T.S. Championship has now been decided and the honour has fallen to the Accounts Branch, who managed to beat the Traffic and Contracts in successive matches.

The Accounts proved to be much the better eleven in the last match with the Contracts. The Contracts batted first and scored 93, Dickinson and Cowdray contributing more than half the total. The Contracts were unfortunate in having several of their best players away on annual leave, and this handicap was severely felt in bowling, and Moon and Taylor managed to hit off practically the whole of the runs required before they were separated.

The final match in the competition between the Contracts and Traffic will determine who shall hold the "wooden spoon," and ought to provide an interesting encounter.

Five of the Contracts team were selected to play in the inter-departmental match against the A.G.D., and Oliver, who has been in splendid batting form for the Contracts, had the honour of contributing the highest score.

Several matches remain to be played before the season closes, and with a view of building up a strong combination for future competitions any player in the District Offices who is prepared to play, should get in touch with the Cricket Secretary, Mr. T. Culley, of the City Contract District.

Retirement of Mr. C. F. Joyce.

Mr. Bold, the Superintendent of Accounts, on July 8 last, at Cornwall House, gracefully expressed the feelings of his colleagues to Mr. C. F. Joyce, who has retired from the London Telephone Service after nearly 40 years' service.

Mr. Joyce entered the service of the National Telephone Company in December, 1887, and in 1912 came over with that Company to the Post Office. For many years he was employed in a clerical capacity, but owing to defective eyesight was transferred to the Collecting Staff. His kindly and generous nature engendered a special affection amongst his colleagues, and Mr. Bold paid the highest tribute to the zeal which had always characterised the performance of his duties. In asking his acceptance of a silver chronometer and a cheque subscribed by his colleagues, Mr. Bold wished him better health, good luck, and many years of life yet to enjoy his well-earned retirement.

Mr. Joyce feelingly expressed his thanks and hoped that he would have many opportunities to reciprocate the friendship which had been further cemented by their action that day.

DO IT NOW!

A PERSONAL VIEW.

THIS business slogan of to-day might indeed be regarded as the inspiration of the rapid development in our electrical services and of those kindred transport services whose object is to bring peoples and places into closer communication. The many developments during the past few years have certainly done much to shorten distance even if, as some urge, they have also had a tendency to shorten life itself as a result of the nervous strain of living in a state of perpetual hustle.

History tells us that the introduction of steam as a motive power and of the electric telegraph caused a complete revolution in commerce, and that a craving has subsequently developed for speed and more speed. The telephone brought the personal touch and speedier communication, the aeroplane brought its spice of adventure and speedier transit; and wireless—that still mysterious and unplumbed science—has already brought many things with the still greater speed of light. These handmaidens of science have their legitimate uses to the community, and they bestow many advantages on business and social circles; but we venture to suggest that, in so far as they may insistently pursue the business man into the realms of rest and recreation, study and quiet thought, they also have their abuses. We would therefore regard commercial telegraph and telephone services with passengers in trains and short-distance aircraft as partaking to some extent of the nature of vindictive pursuit.

At the present time the telegraph cables and the beam and other wireless stations wreathe a cobweb of communications over the whole globe. The inhabitants of the North and South Poles—if there be any—can now get instant news of heat-waves in London or New York and can enjoy whatever measure of comfort or vicarious warmth they can derive from the fact. For many years communication with ships at sea has been an everyday occurrence. The Rugby wireless station has given world-wide, one-way communication with shipping and the short-wave station at Devizes seems to promise a universal two-way service to ships in the near future. A commercial service to long-distance aircraft when in flight is, literally and metaphorically, in the air, and there seem signs that the railway passenger cannot long hope to dodge wireless programmes, the telegram and the telephone call.

When will this spirit of hustle call a halt? Shall we ultimately have each a telephone installation attached to our person or after a long period of evolution be born with one? In the early stages, presumably, this installation would form part of our hat or maybe our collar-stud. (The ladies, perchance, would be obliged to revert to earrings or lockets—incongruous accessories to an Eton crop.) Shall we be liable to telephone calls at all times, even when golfing, boating, bathing or dancing, in prayer or in meditation? Perish the thought, lest the plain man be forced to abandon business altogether. But where will it all end?

After all, perhaps there is no need to conjure up such tragic possibilities. Human laziness is a potent antidote. There is that growing habit of long week-ends and other indications that the spirit of hustle and the spirit of health are already in deadly combat; and sanity may yet prevail. As a last resource we can don a knapsack and stealthily creep away to join the army of "hoboes," those noble gentlemen "who toil not neither do they spin," and shun "glad rags."

This being holiday time, shall we add "Do it now"? J.W.W.