

PICTURE TELEGRAPHY

by

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PICTURE TELEGRAPHY

The opinions and views expressed
in this Paper are those of the writer
and not necessarily those of the Post
Office Administration.

Telegraphy, as its name implies, is writing from afar, and the term may describe any system by which a written message is communicated to a distant place by prearranged signals. In all systems other than the facsimile process, from beacon fires, heliographs and semaphores to Baudots and the latest teleprinters, the human agent or machine receiving the rays of light, electrical impulses, or other signals, writes in its own way the message which they convey. Facsimile telegraphy is unique in that the signals of the sender are reproduced mechanically as signs or images resembling more or less exactly those of the original message.

Brief Historical Sketch

Facsimile telegraphy is not new. As far back as 1843 Bain invented a system of "chemical" telegraphy, by which handwriting and simple line drawings could be reproduced in facsimile through the chemical action of an electric current on an impregnated tape.

Many ingenious systems involving chemical processes followed, and although some were adopted by newspapers, with one exception none was used for a public telegraph service. This exception was the original Belin system, which was introduced between certain towns in France in the year 1924. This system, which must not be confused with the modern Belin system using the photo-cell, was typical of methods involving a chemical process, and for this reason a brief account of it may be interesting. The description may also suggest the reasons why the system was not more widely adopted for public services.

The message was written with a special adhesive ink, and powdered shellac, which stuck to the ink marks, was dusted over the form before the ink dried. The form was warmed by

an electrical heater which melted the shellac and, on cooling, the writing appeared as lines of hardened shellac, standing out in low relief. The form was put in a rotating drum. As the drum revolved, a moving lever was lifted slightly by the raised marks on the paper, closing a contact which sent a current to the telegraph line. At the receiving end the currents passed through a Blondel oscillograph, deflecting its mirror so that a reflected beam of light was directed on to a sheet of sensitive paper mounted on a rotating drum, synchronised with the drum at the sending end. The raised lines of the writing at the sending end were thus reproduced as dark lines at the receiving end.

These earlier systems naturally permitted the transmission of simple "black-and-white" subjects only. One system, it is true, enabled five different densities to be conveyed by a five-unit telegraph code, but the direct transmission of varying light values in terms of proportionate electrical impulses was not realised until the photo-cell was adapted to the purpose, enabling "half-tones" to be reproduced. The selenium cell will also cause electrical resis-

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tance to be changed by the stimulus of light, but there is a time lag in its effect and it was therefore superseded by the photo-cell.

In the Siemens-Karolus system, which is used by the British Post Office, the picture or message to be transmitted is fixed round a drum by means of spring clips. When the apparatus is started the drum rotates with uniform speed, and at the same time a spot of light is thrown on to the surface of the picture. This light spot scans the picture with a spiral movement, so that all portions of the picture from one end of the drum to the other are explored. The light from the sender lamp is interrupted by a rotating shutter in the form of a toothed disc. The light reflected from the surface of the picture actuates a photo-cell, and originates instantaneously a pulsating electric current proportional to the varying tones of the picture: the lighter the part of the picture the greater the current. The photo-cell current is extremely small and it is accordingly amplified in a valve amplifier, after which it is transmitted over a suitable telephone line. At the receiving end the current is amplified in a valve amplifier and is applied to the terminals of a Kerr cell or an oscillograph. This cell controls the intensity of a light spot which scans spirally as at the sending end by being projected on to a photographic film mounted on a drum rotated at exactly the same speed as that at the sending end. The film is taken from the drum in a dark room where it is developed, fixed and printed in the ordinary way. The films and prints are dried mechanically.

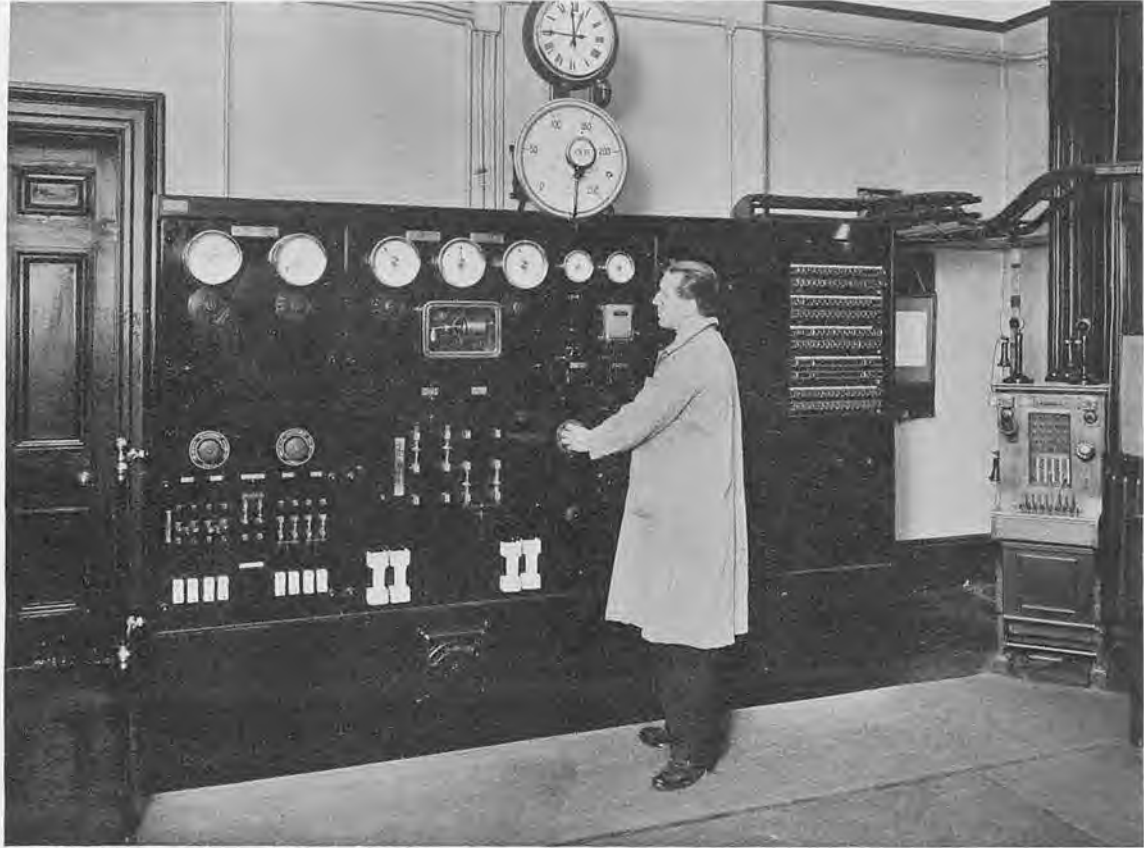
Before and after transmission the operators at the sending and receiving stations speak to each other over the wire by means of telephones connected to the picture apparatus. The preliminaries to transmission are arranged in this way and after transmission the receiving station reports whether the picture has been received satisfactorily. An independent speaker circuit is not used.

The foregoing does not pretend to be more than a mere outline of the apparatus and of the process involved. An excellent monograph on the technical aspects of the Siemens-Karolus and other systems has been published by Mr. E. S. Ritter, D.F.H., M.I.E.E., of the Post Office Engineering Department. Mr. Ritter and other writers have also contributed a number of technical articles to various service magazines.

The Post Office watched the development of facsimile telegraphy very closely, and was quick to appreciate its potentialities. It saw, however, that a system involving a rather cumbersome process with special ink, although possibly of considerable use in exceptional cases for the transmission of signatures and the like in facsimile, had very limited possibilities and at the best could not be more than an interesting novelty. It is true that in France the public were able, if they wished, to buy their own ink and shellac and themselves prepare the messages for transmission, but even so it was clear that such a service would be—to say the least—a perplexing addition to the work of the Post Office counter staff.

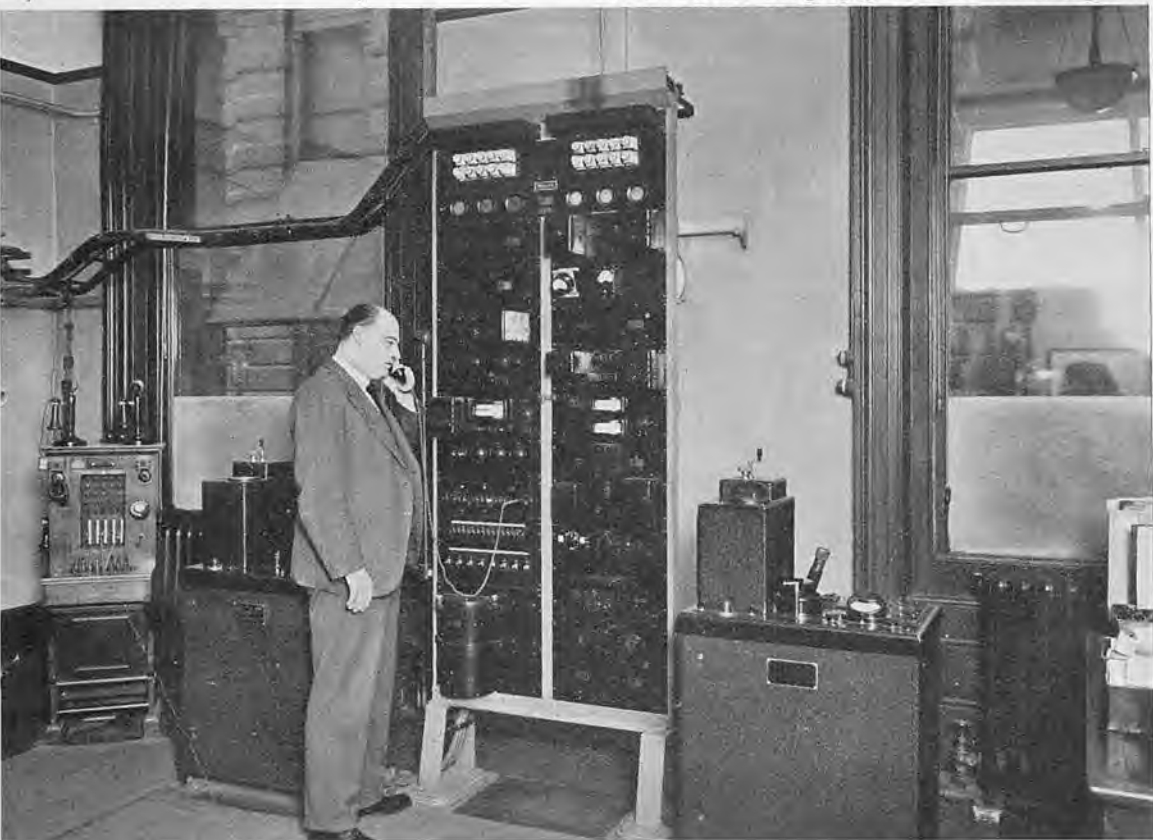
The application of the photo-cell and the thermionic valve to picture transmission altered the whole position. It not only extended the range of subjects to include half-tones, but it also enabled transmission to be effected direct from the original without any preliminary chemical process.

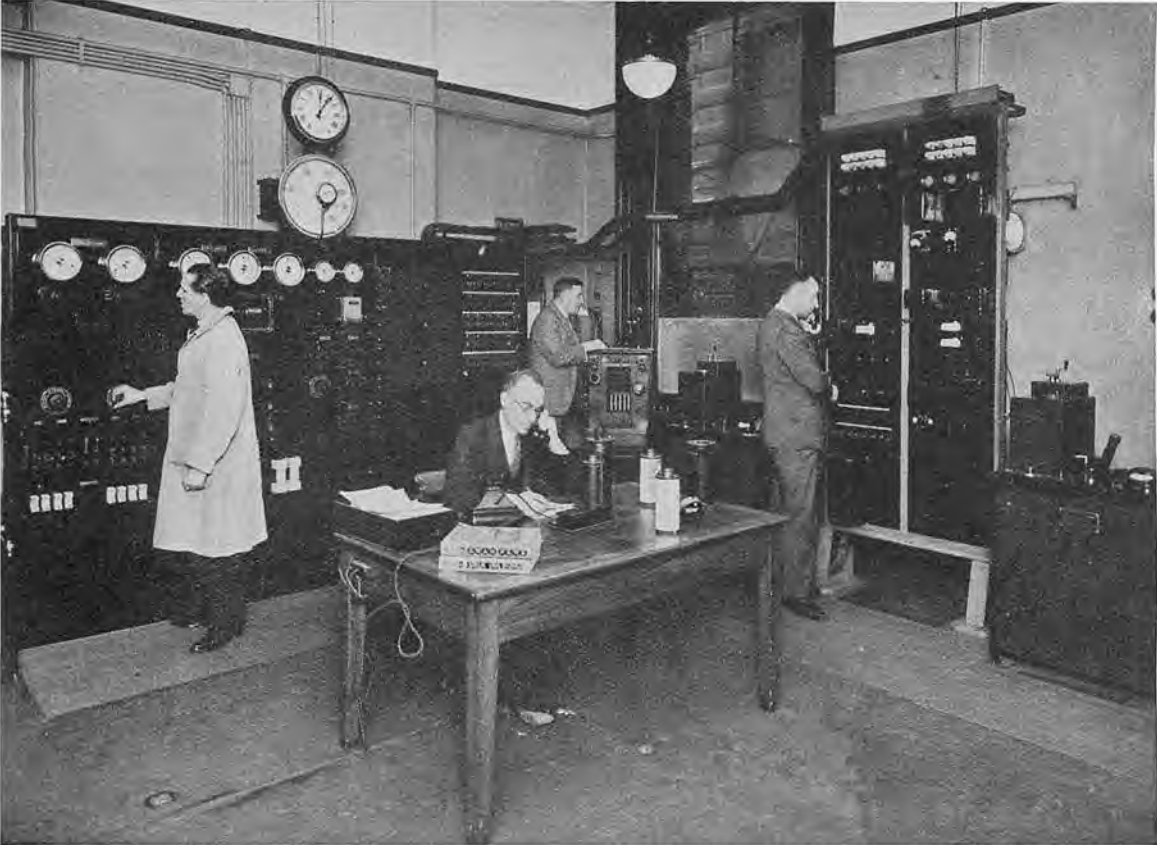
On the other hand the new systems embodying the photo-cell demanded more elaborate and costly apparatus and high grade telephone circuits. The speed of transmission remained such that, while a message of some hundreds of words could be sent, in favourable conditions, more quickly than by ordinary telegraphy, it was too slow to be advantageous to the sender of short messages. Further, the size and cost of the apparatus precluded its installation in all but the largest centres, and



C.T.O. Picture Telegraphy Section: Power switchboard

C.T.O. Picture Telegraphy Section: Control panel





C.T.O. Picture Telegraphy Section: General view

Picture Telegraphy: Clipping picture on to drum



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the Post Office saw that costs would have to be substantially reduced and transmission much accelerated before facsimile telegraphy could become in any way supplementary or alternative to the ordinary telegraph service. A few agencies interested in press photographs expressed a desire for a public service, but there was no evidence of a general demand.

The position at this stage was summed up in an answer given in the House of Commons on the 8th of December, 1927, by Sir William Mitchell-Thomson (now Lord Selsdon) to Viscount Sandon, who asked whether it was proposed to institute a service for sending photographs by wire in this country, and if not, what were the obstacles. Sir William stated there were no technical difficulties which could not be overcome; but that it was not proposed at present to institute such a service in this country as there was no evidence of any demand for it. He expressed the opinion that, in view of the comparatively short distances to be covered and the highly developed postal system, there would not be much scope for it on a remunerative basis. The Post Office, therefore, adopted a rather cautious policy, and subsequent events have proved that this was justified, since the limitations inherent in the system at its present stage of development would not justify any heavy expenditure. Subject to these limitations, however, the service is being energetically exploited. Inventions and suggestions designed to improve and facilitate the electrical and photographic processes are carefully considered, and the range of the services is continually being widened. The volume of traffic shows a tendency to increase.

The Introduction of the Public Service

From the spring of 1929 the interest in picture telegraphy grew and some of the larger

newspapers began to instal apparatus of their own. At the same time the Post Office conducted trials between London and Berlin, using an earlier form of the Siemens-Karolus apparatus. The results of these trials were satisfactory and showed that the earlier pioneering stage had been successfully passed. Although it was recognised that a public service would probably prove unremunerative, the time was considered ripe for embarking on a public service using Siemens-Karolus commercial apparatus (an improvement on the "experimental" apparatus with which trials had been conducted). This type of apparatus not only presented advantages over other types available at the time, but it was being most generally installed on the Continent and its adoption by the British Post Office thus opened up possibilities of the early introduction of services to and from a number of other countries.

When the decision to open a public service was reached, accommodation was obtained for the apparatus on a site on the ground floor at the north-west corner of the General Post Office C.T.O. Building, where the apparatus would be free from vibration and interference by other machinery. Three rooms were adapted for the purpose, the central room containing the receiver, transmitter and rack, and the other two the batteries and photographic apparatus respectively.

The first announcement of the decision to open a public service was made by Mr. Lees-Smith, Postmaster General at the time, in reply to a question by Mr. Bowen in the House of Commons on the 16th of July, 1929. The installation in the Central Telegraph Office was formally inaugurated on the 7th of January, 1930, by the opening of a public service with Berlin. The ceremony, which was attended by a number of Post Office officials and press representatives, took the form of an exchange of photographs and greetings

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between Mr. Lees-Smith and Dr. Schätzel, who was then Minister of Posts in Germany.

The service with Berlin was quickly followed by extensions to Frankfort, Munich, Copenhagen, Vienna, Oslo, Stockholm and Rome, some of which were also inaugurated by a ceremonial exchange of greetings. Extension to France, where a modernised Belin system was being adopted, was not feasible at the outset owing to the difficulty of working with the Siemens-Karolus apparatus. This difficulty was, however, removed by the partial adoption of standardisation principles, recommended by the International Telegraph Consultative Committee at its meeting at Berne in 1931, which are dealt with more fully later. A public service with Paris was opened on the 15th of June, 1933, and early in the following year the Anglo-French service was extended to Bordeaux, Lyons, Marseilles, Nice, Strasbourg and Toulouse. At the close of 1934 the Anglo-German service was extended to Cologne, while in April of 1935 a public service with Belgium was opened. There is also a service between London and Amsterdam. In this latter case, however, direct transmission to and from London is not practicable as the Amsterdam station, which was installed primarily for working over the wireless channel with Bandoeng, is of the earlier Siemens-Karolus type and does not conform to international standards. The pictures are relayed at Berlin where, in addition to up-to-date models, there is apparatus similar to that in Amsterdam. These Anglo-Continental services also provide facilities for the transmission of pictures by telegraph throughout to and from New York and San Francisco. The pictures are exchanged in London between the Post Office and Cable and Wireless Ltd., who operate a trans-atlantic service over their wireless telegraph channel with New York. In October of 1934 this Company opened a service with Australia with some highly satisfactory pic-

tures in connection with the visit of the Duke of Gloucester.

Picture telegrams can be addressed to places other than the actual towns in which there are stations. They are sent by air mail or the most rapid alternative means available from the nearest picture station. Thus, for example, a picture sent from Penzance to Naples would be posted to London and telegraphed thence to Rome, whence it would be posted to its destination. By this means pictures can be exchanged with all parts of Europe, but the utility of the service is naturally limited very largely to people living in the centres where picture stations are actually situated. The longer the distance to be served by post, the less valuable the service becomes.

Most pictures from this country are accepted at the Central Telegraph Office, London, but acceptance facilities are also provided at six other London Offices and at the Head Offices at Birmingham, Edinburgh, Glasgow, Liverpool, Manchester and Newcastle-on-Tyne. Any member of the public may, however, post a picture direct to the Central Telegraph Office with a remittance in payment of the charges.

In addition to the public services, the Post Office installation works with a number of private stations abroad, principally in towns in France and Germany where public stations also exist. There are, however, private stations in towns not reached telegraphically by the public services, as for example, the "Fremdenblatt" in Hamburg and "La Stampa" and the "Gazzetta del Popolo" in Turin.

The new Belin portable sending apparatus, which is now on the market, can be installed temporarily on occasions of special interest in places where no other stations, public or private, exist. Such a set was installed in Brussels (before the opening of the public station) on the occasion of the funeral of King Albert, and there was also a transmission from



Picture Telegraphy: Sender machine



Telegraphed from Berlin

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Perpignan on the occasion of the assassination of King Alexander of Yugoslavia. The Swiss Administration has authorised a news agency to send pictures from any telephone exchange in Switzerland, and it is to be expected that by the increasing use of portable apparatus the sphere of activity of the Central Telegraph Office installation will be considerably widened. Developments in Czechoslovakia, Poland and Russia are being watched with a view to the ultimate introduction of a public service with these countries.

The Advantages of Picture Telegraphy

The chief advantage of facsimile telegraphy over ordinary systems of telegraphy lies in the almost unrestricted range of matter which can be transmitted. A few tints, which are not good photographic media, are unsuitable for transmission, but otherwise any writing, design or photograph can be sent. A message transmitted by ordinary telegraphy is delivered, as a rule, solely in Roman characters and Arabic figures, but the facsimile system knows no such limitation. Chinese, Russian and shorthand characters and even thumbprints can be transmitted with equal facility, so that the addressee can have a facsimile of the original telegram handed in by the sender.

Telegrams received by the ordinary system from places where the operators are unfamiliar with the English language often appear a little crude as a result of misreading by foreign operators of English words written in the English style of handwriting, frequently in some haste at channel ports or frontier stations. For example "comfortable" may be rendered as "confortable," or "terrace" as "tennace"; and no less than nine such errors were recently observed in a dozen inward telegrams selected at random. The foreign operators cannot be blamed for such mistakes,

and receiving telegraphists in this country are properly reluctant to correct, on their own responsibility, any but the most obvious errors. While such slight distortions of the sender's wording are not likely to mislead the addressee, they are nevertheless liable to weaken, to some extent, his confidence in the service. The difficulty is, of course, inherent in the ordinary system, and is practically irremediable. The receiver of a telegram transmitted by the facsimile process has the satisfaction of seeing an exact replica of his correspondent's own handwriting.

In ordinary telegraphy the task of transmission varies with the nature of the text to be signalled. Simple texts with connected meaning in a language familiar to the sending telegraphist are fairly easy to transmit. Special care has, however, to be exercised in signalling code and groups of figures or other messages which, on the face of them, are unintelligible; and this slows down transmission. Consequently the charges and word counting rules for ordinary telegrams have had to be adjusted to the nature of the text, thus complicating the work of the counter staff and sometimes bewildering the public. The code problem in particular was always a source of great trouble to the International Telegraph Union, and there are indications that its successor, the International Telecommunication Union, has inherited some of the burden.

The acceptance of a picture telegram at a Post Office counter is a much simpler and more interesting transaction than the acceptance of an ordinary telegram for a place abroad. There is no need to count the words or to scrutinise them to see whether they are plain language or code, or whether there are too many figure groups in the text. It is merely necessary to work out the area and multiply the rate per square centimetre to the particular destination by the number of square centimetres. This process could be further

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simplified by placing over the picture a transparent chart ruled into square centimetres from which the charge could be read at sight. A few such charts were used experimentally when the service with Germany was first started, and the only disadvantage, which could doubtless be overcome, was the tendency of the transparent material to slight expansion and contraction with variations in temperature.

All the official particulars of a picture telegram, such as the area and the amount of the charge, are entered on an ordinary telegram form, to which are affixed the postage stamps in payment of the charge if the sender does not hold an account. This form, which is adequate for record purposes, is retained by the Post Office, so that the original picture, which may be of some value to the sender, can be returned to him after transmission if he so desires.

The information regarding the picture services contained in the Post Office Guide, and published separately in a leaflet, appears a little indigestible, but it was written so that the reader might run rather than that the runner might read.

Not the least important advantage of picture telegraphy is the interest and pride of craft it stimulates in the operators. They speak over the telephone to colleagues in a dozen countries, they study the intricacies of thermionic valves and photo-cells, they make nice adjustments of the apparatus in order to get the best results and they practise all the refinements of the best photographic technique. The operators of the Post Office station are a highly enthusiastic band, as anyone who has watched them at work can testify. They carry their enthusiasm into their leisure hours, not a few of which have been devoted to lecturing and writing articles on their duties.

In conclusion, it might be mentioned that picture telegraphy apparatus applies a severe test to the quality of the maintenance of telephone circuits, and shows up imperfections

which are less easily brought to light by other means. The installation in the Central Telegraph Office has been used as a means of continuously testing lines on one or two occasions when transient interruptions were suspected.

Rates of Charge

The fixing of the tariff for the public picture telegraph service raises a difficult problem, chiefly because of its dependence upon the telephone service. There are several very different components in the cost, for example the preliminary operations, the cost of the sending and receiving units, the use of telephone circuits, photographic materials and, of course, staffing. For various reasons the period of user of the telephone circuit cannot be estimated very accurately in advance. In the case of pictures handed in by newspapers and press agencies established in London it would, it is true, be feasible to fix the charges after transmission and debit them to an account; but this might not unnaturally give rise to disputes. In the case of pictures handed in by occasional or casual senders who are not account holders, it is obviously necessary that the charges for picture telegrams should be assessed at the time of acceptance, and this can only be done on the basis of the area to be transmitted. The charges for telephone calls are, however, based on the period of user, and the telephone element is accordingly calculated by reference to the average time of transmission of a picture of the maximum dimensions. To this figure is added the cost of staffing, preliminary and photographic processes and the maintenance of the apparatus; and the sum of the elements, divided by the number of square centimetres in the area of the maximum picture, gives the rate per square centimetre. It so happens that the rate per square centimetre works out at about the same as the rate

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per word for an ordinary telegram to the same destination. Certain costs, such as those of synchronisation and photographic processes, are much the same whatever the size of the picture, and it is necessary to impose a fairly high minimum charge. When picture telegraphy has developed more widely and a regular flow of traffic permits of the accommodation of a number of small telegrams on a single drum, a much lower minimum might prove economic. For the present rates to prove remunerative it would be necessary for a somewhat larger volume of traffic to be handled.

This basis of charging is theoretically sound in the case of pictures of the maximum dimensions. In the case of smaller pictures, however, the drum is rotated until the whole of the original has been explored by the light spot and is then stopped. In such cases the time of transmission varies directly with the length of the side of the picture which is parallel to the axis of the drum and not necessarily with the area of the picture; but the point is not one of much financial importance and is mentioned rather to illustrate the problem.

In the case of a transmission between a public station and a private installation, the charge for the actual time the telephone line is used, based on the telephone call rates between the two places connected, is debited to the subscriber's telephone account. The Post Office and most other telegraph Administrations also make a special supplementary charge for the service of the public station and this charge is collected by the telegraph Administration concerned at its own end from the sender or addressee as the case may be.

Transmissions between two private stations are, so far as the Post Office is concerned, primarily telephone transactions, and as such do not come within the scope of the present paper. In effect the sender books a telephone call and he and his correspondent use their

private picture apparatus instead of their telephone instruments. The responsibility of the Post Office is limited to supplying a satisfactory telephone circuit free from "monitoring" or any interruptions.

The standard scanning of $5\frac{1}{2}$ lines per millimetre in the case of the 66 millimetre drum and 4 lines per millimetre in the case of the 88 millimetre drum is necessary for the satisfactory transmission of half-tones, but simple line drawings without too much detail, and writing or print of reasonable size might be satisfactorily transmitted with more widely-spaced scanning, with consequent acceleration of transmission. It might be feasible to have two standards of work, a higher one for photographs and a lower one for black and white subjects, at suitably differentiated rates. An arrangement somewhat on these lines has actually been adopted in the internal facsimile service of the Commonwealth of Australia. The rate for grade "B" transmissions is about two-thirds that for grade "A", and the sender indicates which quality he wants. The accepting officer may decline to accept a picture or document at the "B" rate, if in his opinion that grade of transmission is unlikely to give satisfactory reproduction.

International Regulations

As might be expected the first international telegraph conference after the introduction of public picture telegraphy services drew up rules for their conduct. The Madrid Conference of 1932 included in the Telegraph Regulations a brief article recognising picture telegraphy, and drafted a series of provisional regulations to serve as a basis for future discussion.

Such discussion took place at the meeting of the International Telegraph Consultative Committee (known officially as the C.C.I.T.) held at Prague in the spring of 1934, and the

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Committee framed a series of regulations providing for the operation and accounting for the picture telegraphy services. These regulations embody the best features of modern telegraph and telephone practice.

As already indicated, the present system of charges for the public services is not entirely satisfactory. Various proposals for a revised basis have been made to the C.C.I.T., but consideration of them has been deferred until more experience has been gained and there is a better prospect of reaching a permanent solution.

The most important problem which has occupied the attention of the C.C.I.T. is that of working between various types of apparatus. As in the early days of railways differing gauges prevented through running, so at the outset the differing types of picture telegraphy apparatus could not work with one another. As already explained, the adoption of the Siemens-Karolus system enabled the Post Office to open services with some half-dozen countries within a few months of the installation of the apparatus, but it was not practicable at the outset to institute a service with France, where the Belin system was being developed.

The Siemens-Karolus machines were originally equipped with drums of 88 millimetres diameter, permitting the transmission of pictures of 18 by 26 centimetres. For commercial purposes the maximum size was limited to 18 by 25 centimetres, the odd centimetre strip being used for the preamble. The Belin system transmitted a picture the maximum dimensions of which were 10 by 14 centimetres. Experience showed that the usual size of pictures sent by the press was 13 by 18 centimetres, and the C.C.I.T. decided at the meeting at Berne in May, 1931, that a drum of 66 millimetres diameter, giving a picture 13 by 18 centimetres, should be the standard for all future apparatus. This size was actually adopted for the Belin stations then being

installed in France, and the German Administration similarly equipped one of its three Siemens-Karolus stations in Berlin.

Intercommunication was not, however, dependent upon the use of the 66 millimetre drum. The essentials for intercommunication were the adoption of a standard speed of 60 revolutions a minute for either drum, with scanning at the rate of $5\frac{1}{2}$ lines per millimetre for the 66 millimetre drum, and at the rate of 4 lines per millimetre for the 88 millimetre drum. Administrations were left free, if they so desired, to retain their 88 millimetre drums and merely to replace the motor pinions and change the gear wheels for others containing a different number of teeth, and to make certain other comparatively minor adjustments. The new standards were introduced on the 1st of August, 1932, and most of the public and private stations which already had the larger drums, retained them. The result was that, in services like the Anglo-French, pictures sent from the larger to the smaller drum were received with dimensions about three-quarters those of the original, and in the opposite direction the dimensions of delivered prints were about one-third larger than those of the original. Apart from the complication of charges this was not a serious matter, although at the outset a few users complained that they had to enlarge or reduce their pictures photographically before they were suitable for reproduction in the press. Unfortunately, however, the very high quality of the work performed before standardisation inevitably suffered a slight deterioration owing to the coarsening of the "grain" of the picture by the change of scanning. On the other hand the change had the advantage of reducing the time of transmission of a maximum-sized picture from 18 to $13\frac{1}{2}$ minutes. The possibility of equipping the apparatus in the Central Telegraph Office with a 66 millimetre drum is being considered.



Telegraphed from Vienna

A MERRY EASTER



BILDSTELLE WIEN



St. Stefansdom in Wien.

Telegraphed from Vienna

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As previously explained the Siemens-Karolus "experimental" apparatus was not susceptible of standardisation and the installation of that type in Amsterdam is connected to the main European system solely by means of a similar installation in Berlin.

It is thought that a future Conference might, with advantage, make an attempt to devise a concise term to describe the type of electrical communication which forms the subject of this paper. The International Regulations, which are in French, employ the term "phototélégramme", but the English equivalent "phototelegram" is not too happy etymologically. Moreover, not all systems use photographic methods. The Post Office originally adopted the term "picture telegram", but, as one of the operators pointed out, the term would not convey to the casual reader that the system can be used not only for pictures but also for writing, plans and practically anything which can be reproduced in black and white in two dimensions. In official publications, therefore, the title was widened to "picture and facsimile telegraphy" which is rather lengthy for an age of slogans. In France the term "Belinogramme", sometimes shortened to "Belino", is gaining currency, but this is obviously unsuitable for general use, as, apart from sounding like the name of a patent medicine, it is really applicable only to pictures etc. sent by a particular type of apparatus. In German-speaking countries the word "bild-telegramm", which is, of course, comparable to the English "picture telegram", is used. In Italy the word is "fototelegramma", an equivalent of the "phototélégramme" of the International Regulations. The writer would suggest the expression "telicon", as descriptive of a two-dimensioned image sent from a distance. This would be in harmony with the long-established "telegram" (writing from afar) and "telephone" (sound from afar).

Traffic Problems

The solution of the perpetual traffic problem—the provision of speedy and satisfactory service on an economical basis—presents special difficulty in the present early stage of development of the picture telegraphy service. In ordinary telegraphy it is not difficult to ensure that the messages are transmitted strictly in the order in which they are handed in, subject to the prescribed degrees of priority or deferment, which the sender can himself determine by payment of the rate appropriate to the service which he judges will best meet his needs. The volume of traffic is fairly regular and the channels and instruments can be provided in sufficient number to meet the known demand. The circulation of picture traffic is complicated by three things: firstly it has to be sent over telephone circuits; secondly it comes in rushes on occasions of special interest; and thirdly the means for its disposal are at present very limited. The position is not made easier by the very exacting requirements of the press, who form the bulk of the users and to whom a very rapid service is essential. Newspapers and press agencies spend large sums of money on obtaining important pictures, and it is not uncommon for a photographer to charter an aeroplane from the source of his "copy" to the nearest town where there is a picture station. The picture which gets through first will be a valuable scoop; the others, which may arrive only a few minutes later, will have lost the market. There was a time, as on the occasion of the assassination of President Lincoln in 1865, when, by chasing the trans-atlantic mail from New York in a fast tug, a news agency gained an advantage of seven days over its competitors. Nowadays the margin between a valuable scoop and a financial loss is often a matter of seconds. Owing to the costly nature of the apparatus, the heavy demand it makes on accommodation, and the spasmodic incidence

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of the traffic, London, and most other centres, have a single set only for the public service. The result is that, if a news agency hands a picture to the Central Telegraph Office at, say, two o'clock, it may reach its destination by half-past two. A competitor who arrives at the Central Telegraph Office at one minute past two may not get his picture to its destination until three o'clock, while a third competitor arriving breathless at three minutes past two will be fortunate to secure delivery by half-past three. If the picture is of great news value, competitor number three will probably have lost the market, and it is not perhaps surprising if, on recovering his breath, he vents his disappointment on the innocent Post Office.

Then again picture telegrams must take their turn with the telephone calls. It usually happens that, when picture traffic is heavy, there is also a brisk demand for telephone calls, and the pictures have to take their turn with the calls booked as well as among themselves. Where there are plenty of telephone circuits suitable for picture transmission this is not a serious problem, but on the more lightly-loaded routes, for which a single circuit is normally adequate, there is a danger that picture transmissions, which require a circuit for twenty minutes at least, may delay ordinary telephone traffic. It is for this reason that on such routes the public picture service is confined to the less busy hours. Further difficulty results from the possibility that the distant station may not be available just when it is wanted. It is also necessary to share the advantages of the service as equally as possible among those who wish to use it, and provision is made for limiting the number of pictures to be sent consecutively on behalf of a particular user in the same way that duration of telephone calls is sometimes restricted on occasions of heavy demand. The newspapers which possess their own private installations have some advantage over the users of

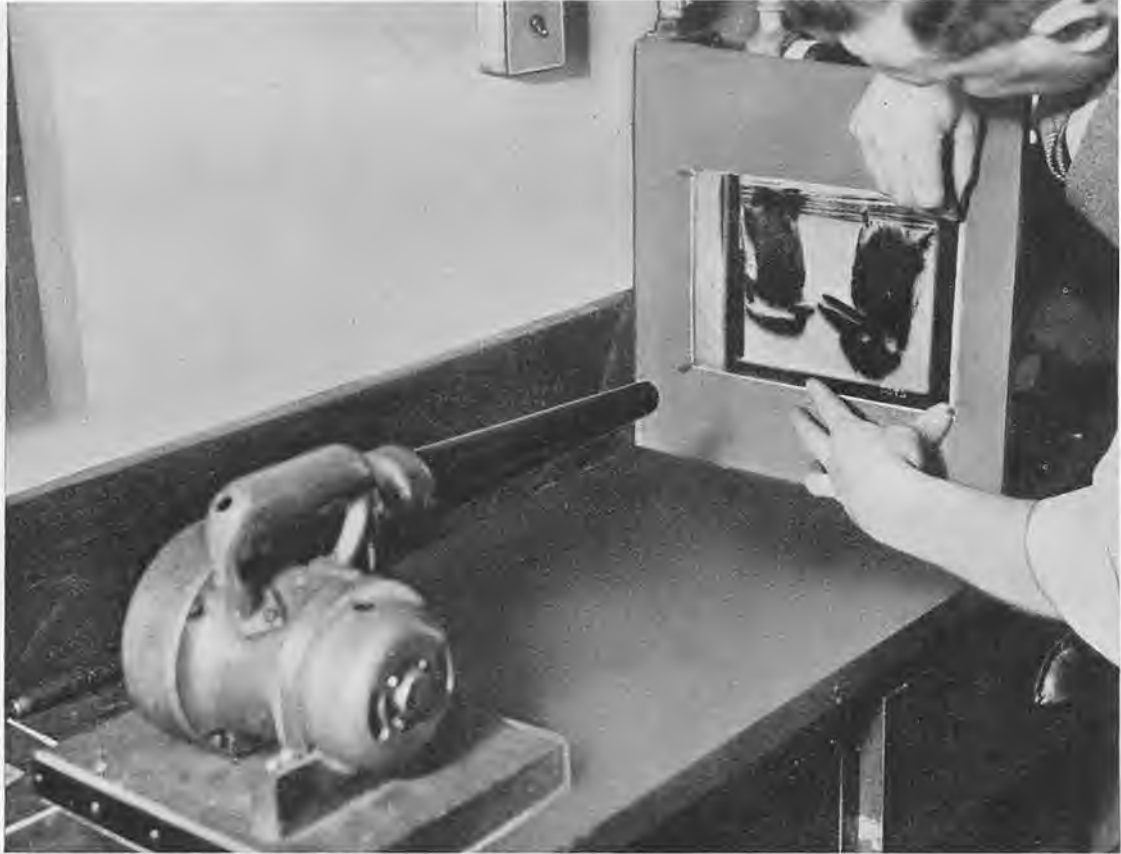
the public services; but care is taken to see that their use of telephone circuits does not operate to the prejudice of the public service. This, of course, adds yet a further complication to the traffic problem.

It is clearly impossible to lay down rules to fit every situation which may arise. The possible combinations of circumstances are infinite and the chance of providing for an actual situation remote. In the ultimate resort the disposal of the traffic depends upon the discretion of the operators. In view of the large sums which are often at stake, the number of complaints is small and reflects great credit upon the staff. Some of the problems instanced above were encountered on the occasion of the wedding of the Duke and Duchess of Kent, when a particularly heavy volume of traffic was disposed of in a very satisfactory manner. On this occasion some identical pictures from the same senders were sent simultaneously to a number of stations abroad.

Line and apparatus time could be halved by duplex working (transmission over a circuit in both directions at once). This has been successfully done in experiments but the incidence of commercial picture traffic has not so far given occasion for this method of working.

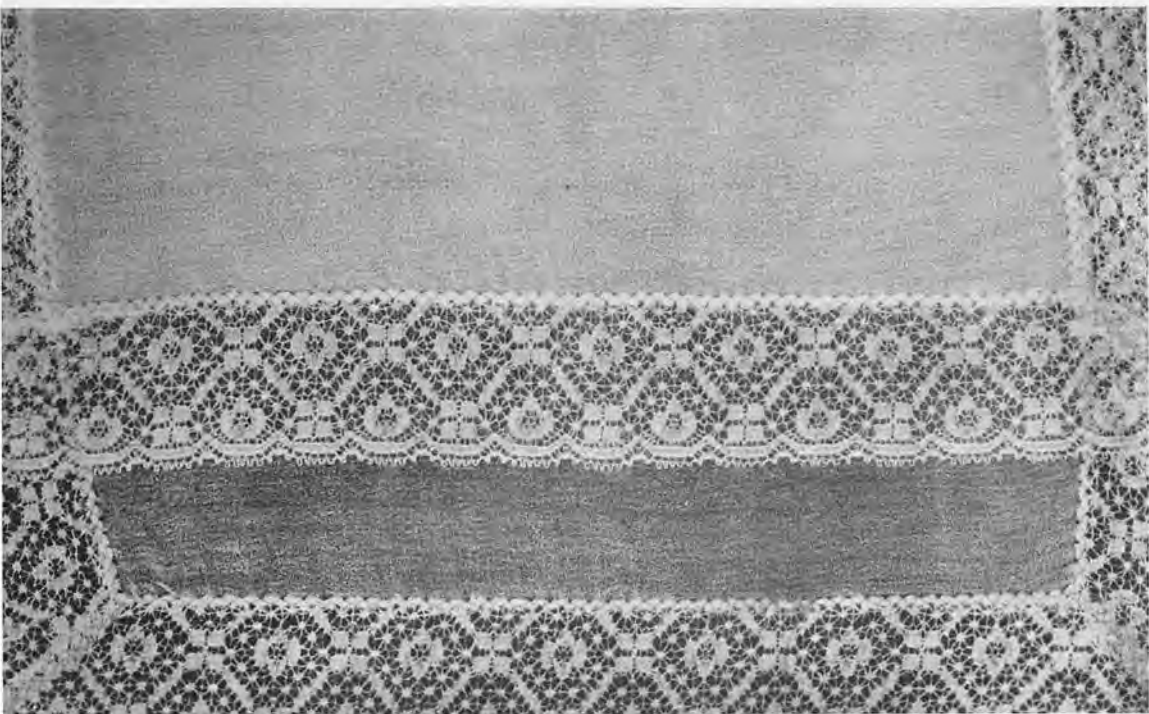
Utilisation of Service

It is the policy of the Post Office to make known, by means of judicious publicity, the ever widening range of facilities which it has to offer. No opportunity has been lost of securing useful publicity for the picture service. A considerable amount of propaganda has been undertaken by personal canvass of prospective users of the service. Experience clearly shows, however, that in existing conditions the picture telegraphy service appeals almost exclusively to the press for the transmission of photographs. Little use has been made of the service for the facsimile transmission of letter-



Picture Telegraphy: Drying the negative

Lace telegraphed from the actual material





Telegraphed from Oslo

Telegraphed from Rome



Picture Telegraphy

press. Newspapers and press agencies are perfectly well acquainted with the facilities offered and they are not slow to use them when they can do so to advantage. Although the day-to-day level of traffic is rather low, when something of special news-interest occurs the traffic is as much as can comfortably be handled, and indeed some events of national importance have taxed the capacity of the Post Office service to its utmost. The experience of foreign Administrations in regard to the incidence of traffic in picture telegraphy services is believed to be the same as that of the British Post Office.

Enquiries regarding the service have been made from time to time by interests such as banks, who might be expected to provide a more regular flow of traffic than the press. Unfortunately, however, the service cannot often meet their needs, partly because they want, as a rule, to despatch short messages which can be transmitted more rapidly by ordinary telegraphy, and partly because of the limited number of centres served and the restrictions on hours of working imposed by the exigencies of the telephone service.

The picture service provides a very happy medium for the exchange of greetings at Christmas and on other occasions, and public attention has been invited to the possibilities in this direction.

It is reasonable to anticipate that in course of time the speed of transmission will be increased, that picture stations will spring up

all over Europe, and that the service will then appeal to the business community as a whole and to large numbers of social users. In that event it would be possible to accommodate two or more small pictures on the same drum, and this would point a way towards minimum charges more comparable with those for ordinary telegrams. If the traffic were such as to make simultaneous or duplex transmission a regular feature, some reduction of basic rates might also be feasible.

If and when it becomes practicable to offer a rapid and inexpensive service with telegraph transmission throughout between all the chief towns, no doubt a widely disseminated publicity would bear fruit which in present circumstances is not to be expected. Meanwhile, by lectures and by articles in magazines, both technical and popular, engineers, operators and others have done much to bring the fascination and potentialities of the service before the public. Interest has also been stimulated by demonstrations in the Central Telegraph Office to persons and societies interested. Some remarkable specimens of pictures which have been exhibited from time to time afford the best possible evidence of the high quality of reproduction attained. The visitors' book in the picture room contains the names of over three thousand people from all parts of the world, a testimony to the widespread interest which has been aroused by this fascinating invention of electrical science.

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