The Story of Broadcasting

A. R. BURROWS

THE STORY OF BROADCASTING



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Senatore G. Marconi
G.C.V.O., LL.D.
Inventor of Wireless Telegraphy,

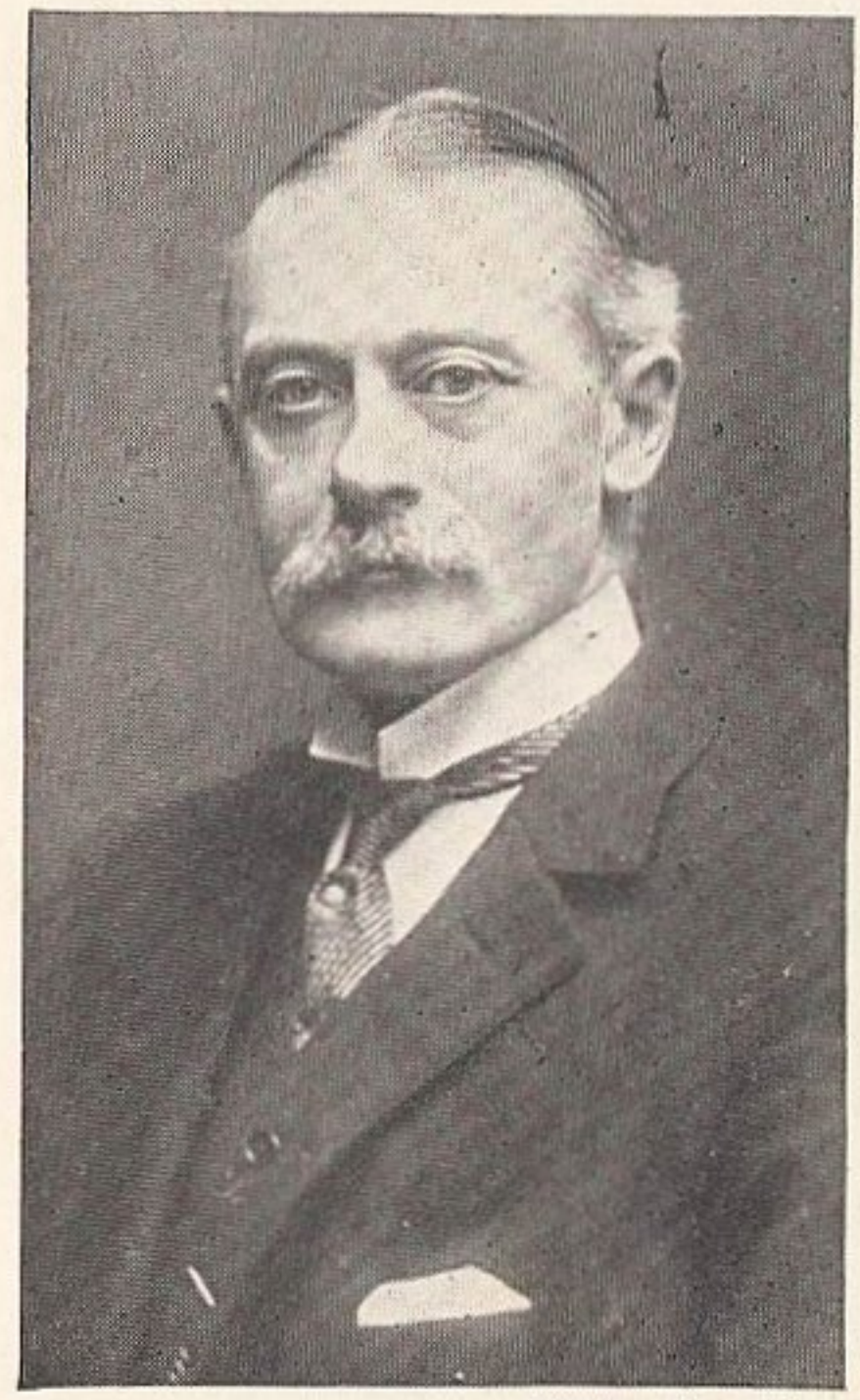


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J. C. W. Reith,
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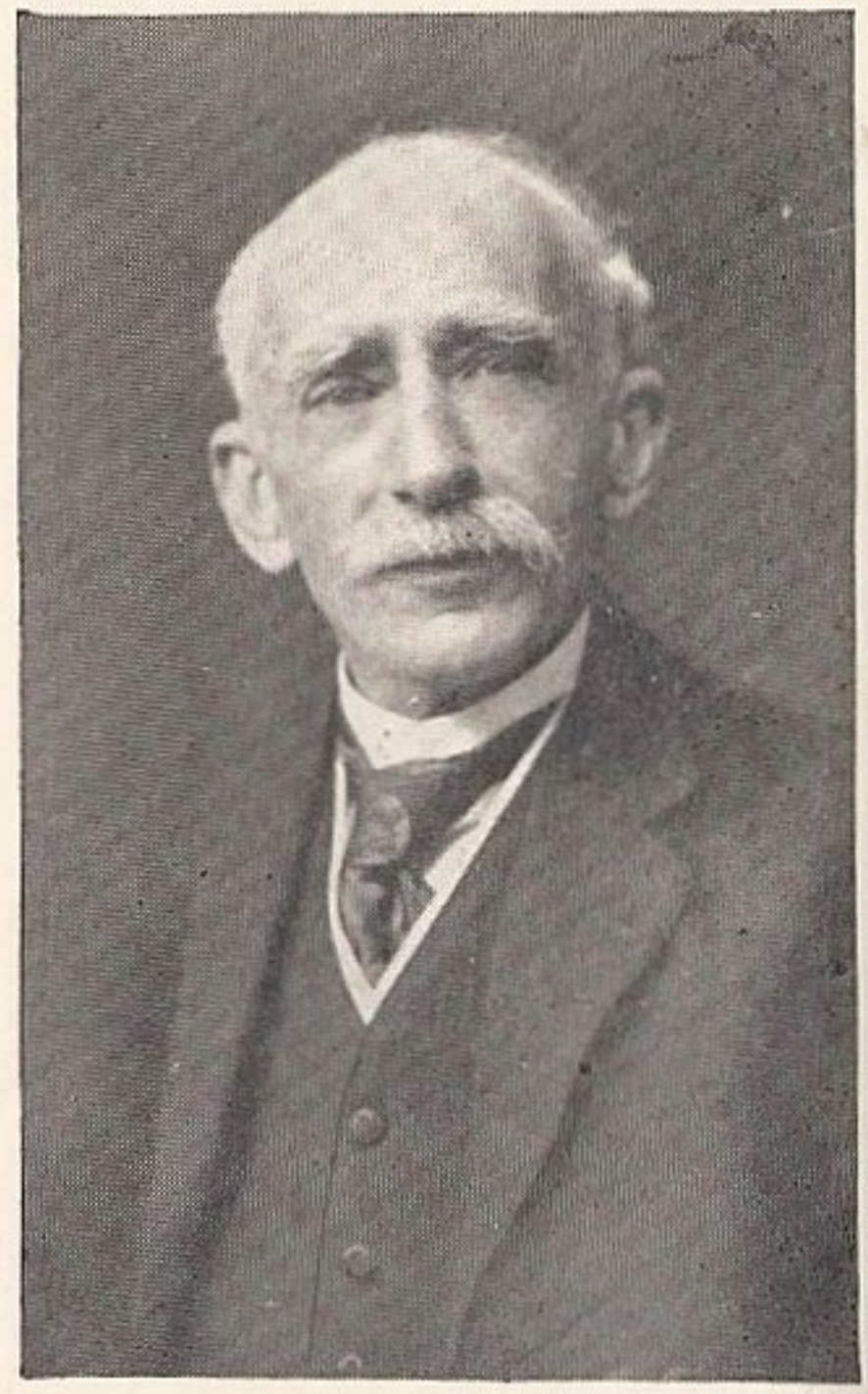


Photo : Russell.

Dr. J. A. Fleming, F.R.S.,
Inventor of the Thermonic Valve.

THE STORY OF BROADCASTING

By

A. R. BURROWS, F.J.I.

(Assistant Controller, and Director of Programmes, British Broadcasting Company).

With Eight Half-tone Plates

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This Work is Dedicated

by permission to

H.R.H. EDWARD PRINCE OF WALES

the first Royal Broadcaster,

and one whose interest has always been an incentive and an encouragement to this new instrument of communication between all parts of the British Empire.

FOREWORD

The appeal of broadcast telephony to the people of this and other countries is a matter in which I naturally take a very great interest. The remarkable progress made in Great Britain in the course of the last two years has my profound admiration.

I am pleased that Mr. Burrows, who made early and singularly correct predictions and who has been so intimately associated with this popular application of wireless science, has placed on record the story of broadcasting from its inception, dating back, as he states, to the first S O S at sea.

I concur with the author of this book in the belief that broadcasting, properly handled, will make a material contribution towards greater understanding and amity between Nations, the cementing of home life and the happiness of the individual.

G Marconi

London, 1924.

PREFACE

Some day a learned judge will ask the question: "What is Broadcasting?"

Counsel, in reply, will unfold a remarkable story.

Nature has been "broadcasting" since the earliest thunderstorm. With the first lightning flash, wireless waves were sent rippling across space, penetrating primæval forests, rocky caverns and the haunts of such animal life as then existed.

Man himself has been broadcasting for over a quarter of a century, using harnessed forces of nature and the wonderful discoveries of Senatore Marconi and other workers in the same field. These wireless waves, like those born of the earliest thunderstorm, have been passing quietly through our homes and our bodies. To us they have meant nothing.

The wireless station from which these waves originated has been viewed as a mystic place, having less bearing on the affairs of the man in the street than an astronomical observatory.

To-day the position is entirely changed. After two years' activity in these islands in the development of wireless telephony for the purpose of home entertainment, every other person is now discussing broadcasting or some item in the broadcast programmes.

This book is intended to give to all interested a fair idea of what has been happening behind the scenes for nearly thirty years; and also, what is happening every evening in the broadcasting studio

and transmitting station. Romance, pathos and stories of heroism are to be found in the chapters that follow, for broadcasting from its beginnings has been associated with dramatic happenings.

In order that the technical processes may be grasped by everyone, the writer has preferred to use simple language and homely parallels rather than affect a literary style or a scientific manner. He has here touched but the surface of a most fascinating subject, and would recommend for a closer study of the psychological aspects of broadcasting and also British policy and ambitions, a volume from the pen of Mr. J. C. W. Reith, Managing Director of the British Broadcasting Company; and, for a more intimate appreciation of the technical problems involved, interesting books by Captain P. P. Eckersley, Chief Engineer of the B.B.C.

Grateful acknowledgment is due to Captain Eckersley for checking the technical facts in the chapter dealing with "Behind the Scenes with the Engineers"; to the Editor of the *New York World* for confirmation of certain details regarding the German coded warning to travellers by the *Lusitania*; to the Management of the British Broadcasting Company for the use of various photographs, and to Marconi's Wireless Telegraph Company, Ltd., for historical details and certain other photographs.

In this book, which is in no sense an official history, there are omissions which might have added interest, but not essential information. The writer trusts that in the sorting-out process, no injustice has been done to any individual or event.

A. R. Burrows.

Putney, 1924.

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THE STORY OF BROADCASTING

CHAPTER I

TOWARDS THE INFINITE

THIS evening, when darkness has fallen and all is quiet, draw aside the window curtain, throw open the casement and gaze steadily above. If the night is moonless and the sky is free from clouds there will lie outstretched before you the most wonderful sight that exists for mortal eyes. It is a picture of the infinite.

You will be looking "through the windows of your soul," across boundless space, to other worlds, each one of which, suspended by an invisible agency and spinning like a golden top, pursues in silent motion an endless well-defined course. Those little scintillating stars, as we term them, are in most instances giants compared with this our earth, they weigh millions upon millions of tons, and are travelling, although apparently still, at speeds compared with which the flight of the rifle bullet becomes a snail's crawl.

A belt of mistiness may be noticed floating high in the heavens like a thin veil of tobacco smoke. This is probably the Milky Way, which lies from point of distance far behind the stars individually visible to the naked eye. Powerful telescopes show that this mistiness is itself made up of stars, so numerous and so distant as to be beyond all human

comprehension. According to Professor Gregory, one of these stars has recently been computed to be so remote from this small globe of ours, that the stellar light, travelling at the rate of a million million miles a year, *takes one million years* to reach us!

Here, in this picture of the night, we are faced with real things, worlds and distances so great as to be beyond proper appreciation. We may gaze on and think on, but gradually the brain gives up its struggle.

Early to-morrow morning, before the sun has dispelled the work of darkness, you will probably find minute crystal globules of dew on the foliage beneath the selfsame casement window. These little globes, less in size than seed pearls but surpassingly beautiful, are built up systematically of smaller parts, just as St. Paul's Cathedral is fashioned from small squares of stone.

Were you able to magnify your dewdrop to something approaching the size of the earth, you would then discover the smallest part of the dewdrop capable of existing alone. This small part, known as a molecule, would in turn, as also the individual squares of stone in St. Paul's, be found to consist of smaller entities. The stone under the microscope would be seen to consist of grains of sand; the molecule of water to be composed of atoms of oxygen and hydrogen gas. Could you pursue still further this course towards the infinitely small, it would be found that these atoms of oxygen and hydrogen consist of small charges of positive and negative electricity all in a state of rapid motion. These small charges are known as electrons.

Man, with his limited number of senses, lives this

present life somewhere between the infinitely great and the infinitely small. His senses reveal to him only certain things essential for his earthly wants and safety. They are blind to many things now proven to exist and probably to countless other things of which we are still completely ignorant.

The science of wireless—and broadcasting—(which is but one department of wireless transmission) deal with media, agencies, and intervals of space and time which are outside our powers of appreciation, yet have been proved to exist, or have been measured to the satisfaction of many eminent scientists. This is not intended to be a scientific treatise; the parts played by these several factors, working as they are beyond the reach of our senses, will be described by means of homely parallels.

Passing reference has just been made to the belief that all matter, however dense and substantial, consists of charges of electricity in rapid motion. Motion, in one form or another, seems to be one of the governing factors of existence. The spinning of a world around its orbit, or its regular course around another larger body, gives to that world its seasons and the periods of light and darkness. The movement of the moon around the earth produces a periodic pull upon the water in our oceans, and creates what is known as high and low tide. With our seasons there are corresponding tides of life. In the spring some wonderful force causes the sap to rise from the earth to the extreme branches of the tree; in the autumn this sap falls away again, and the leaves, deprived of nourishment, drop to the ground. In the life of man there is a growth of mentality followed by decay.

All around us are similar examples of rise and fall —states of intense activity followed by states of relaxation. Some are gradual processes, others are intensely rapid.

When a sound is uttered by the human voice the vibrating vocal cords produce on the air a compressive movement something like that of the bellows of a concertina as they are stretched or pressed together. This movement travels across the air until it strikes some solid object. By surrounding a source of sound with some substantial material, such as a concrete wall, that sound can be held prisoner. Bring another person into the room where this vocal sound has been made, and what happens? The air waves strike the ear-drums of this second person and cause them to vibrate in sympathy with the vocal cords of the singer. In doing so the ear-drums convey to the nerves of the ear certain impressions which are taken to the brain and are recognised as sounds coming from the singer's throat.

This wave-motion which carries sound across the air particles from place to place, is a relatively sluggish one. The speed is only 1,056 feet per second. In other words, such noises as are received by our ears in the ordinary course of events travel only a mile in five seconds. The most popular illustrations of this fact are, perhaps, those provided by the lapse of time between a lightning flash and the thunder clap, and in an echo such as is created when a sound is thrown back to its original source by a reflecting surface—a wall or hill. This distance of the seat of a thunderstorm can always be determined by counting seconds from the time a lightning flash is seen; for every group of five seconds between

the flash and the thunder report (which actually happens at the same time as the flash), one mile may be allowed.

It is an interesting fact that the compression-waves set up when a sound is created travel more rapidly through matter that is denser than air. Tests were made nearly a century ago in the Lake of Geneva which showed that the note of a bell struck under water travelled at 4,708 feet a second, or four times as fast as the same sound transmitted through the air. Similar tests, made at a later date, showed that the speed of sound through a steel wire was as great as 16,336 feet a second, or over fourteen times that of the speed through air.

It is not difficult to imagine other forms of wave-motion. One wave-form with which we are all familiar is that created by a blow on the surface of water, such as is given when a stone is thrown from above. These waves take the form of undulations, resembling a series of hills and valleys. At first sight it would appear as though the water moved from the centre of disturbance to distant point. Actually this is not so. The surface of the water is merely made to rise and fall. It is this particular form of wave-motion with which we are concerned in wireless, the great difference being that whereas the crest of a wave in water moves quite leisurely across the surface of the water, the crest of a wireless wave moves at the rate of 186,000 miles per second—a distance more than seven times round the world, between two ticks of a clock.

Scientists have long since shown that light and electricity have one thing in common—they pass across space at the same terrific speed—that just

mentioned. The light wave has the concertina-like form, the electric wave the undulating form.

Return for one moment to the transmission of sound, as in the case of a conversation between two persons. That such a conversation takes place by compression-waves carried in air is demonstrated by the fact that when the air used for the purpose is put into a state of motion—as in a gale—the voice of the speaker can only be heard when the air blows from the speaker towards the person addressed. If the air is moving at gale speed in the reverse direction, then the speaker may shout his loudest and not be heard at any appreciable distance.

The transmission of sound through air is a form of wireless, but the range of action is limited, and, owing to the relatively low speed of travel, any application of this form of transmission would have little commercial value, even though it were possible to speak unaided through air over great distances. Were one able to shout across the Atlantic, a simple "Hallo" would take four hours to reach New York from London, and the answering "Hallo" from New York would require another four hours. One could conveniently go to sleep between a greeting and the reply. Even were it possible to talk the lesser distance between London and Glasgow with the unaided voice, one hour would elapse between the first word from London and the receipt of the reply.

It would appear evident that the medium which permits the passage of light from one distant point to another, or a similar long-distance movement of electrical energy, must be much less sluggish in behaviour than the air. If the fact that sound waves travel more rapidly as the medium becomes more dense has any bearing on the transmission of light

and electricity, one would also expect to find an extremely dense medium at work where light and electricity are concerned. Here, apparently, our senses fail us, for the space which lies between our casements on this earth, the sun, and the more distant worlds as seen by night, does not appear to us as something more substantial than the finest steel, but exactly the reverse. We common folk and the scientists have come to a parting of the ways. The great, seemingly empty space known as the heavens is filled, according to physicists, with something which, though invisible, unweighable, non-existent so far as human senses are concerned, is actually, in many of its characteristics, far more closely knit than the finest steel. This mysterious elusive something is termed æther. It fills what we prefer to call space, even space from which the air has been exhausted. It is equally common in liquids and in the most solid substances with which we are acquainted. Æther pervades all things.

Sir Oliver Lodge, in his fascinating treatise "The Æther of Space," points out that the gravitational pull between this earth and the moon, by means of which the moon is held to its course around the earth, is such as could only be sustained by a pillar of steel 400 square miles in cross section, and that the pull between the sun and the earth would require, if "material" things were employed, at least a million million steel rods, each 17 feet in diameter.

The æther of space finds no difficulty in supporting these strains, besides performing many other functions.

This is all very perplexing, but we have to keep well in mind the fact that judgment by the senses is necessarily limited judgment. To us, for instance, a

block of wood is something very substantial and opaque, but we know by experience that to the X-ray that block of wood hardly exists, for the X-ray passes through it as though it were a sheet of glass, and reveals what is beyond.

The scientific theory, therefore, that this æther is really an intense and highly elastic thing, is borne out by the fact that light and electricity, which pass through it by wave-motion, travel at extremely high speeds compared with sound in air.

The phenomenon we term light is really a form of wireless transmission. The object seen is really a complex message received on the retina of the eye after its passage across space.

But the moment has now arrived when we should rest from the contemplation of this mystic medium, which, after all, can only be judged by what happens through its assistance. Our real subject is the romantic story of wireless.

CHAPTER II

THE BIRTH OF WIRELESS

For a long time scientists were divided into two camps upon the manner in which light passed from one object to another. On the one side were men who argued that an object giving light was discharging minute particles across space in the same way as bullets are discharged from a machine-gun. On the other side was an equally active group which insisted that light passed from place to place by wave motion. Huyghens was the ringleader of the latter group, and his disciple, a brilliant young Scotsman named Clerk Maxwell, went further and insisted that light was essentially of electro-magnetic origin. That was in 1867.

A German scientist, Heinrich Rudolph Hertz, working in support of Maxwell's theory, set out to produce electrically very rapid vibrations in the æther which he felt would behave in the same way as light. He found (in 1887) that by creating intense charges of positive and negative electricity and causing them to discharge across an air gap in the form of an electric spark, he gave to the æther of space a blow similar, in a sense, to the blow given by a stone to the surface of a pond, and that the wave sent across space behaved in many respects similar to waves of light. Hertz, however, was so interested in this one problem that he failed to grasp the fact that in discovering a new method of setting up waves

across space he had laid the foundation of a new means of communication.

For the next stage in this most fascinating story we must shift the scene from Germany to France, where, five years later (in 1892), a French professor, Dr. Edouard Branly, found that an improved form of Varley's lightning bridge consisting of small piles of metallic filings, which remained loosely apart under normal conditions, and therefore did not allow electric currents to pass freely through them, "cohered," or bound themselves closely together under the influence of the Hertzian wave.

A Russian named Popoff also discovered that substances could be made to "cohere" at more than three miles from a violent lightning flash. But Branly and Popoff, as Hertz, failed to appreciate the significance of their discovery, and it was left to a brilliant young Italian, Guglielmo Marconi (in 1895), then only 21 years of age, to conceive the idea of combining these two important discoveries in a process which would secure nothing less than the transmission of intelligible signals across space. Marconi arranged at one point a Hertzian wave apparatus which could be interrupted so as to send out trains of waves representing the dots and dashes of the Morse code. At another point a few feet distant he placed an improved form of filings coherer, in which a small pile of filings was made to pass, or refuse to pass, a local electric current. Marconi found that when he "shunted" the sparking contacts of his receiver the Morse signals sent out by his transmitter were correctly reproduced by the electric currents passed locally through the coherer. This was the starting-point of wireless as we know it to-day.

The idea of communicating electrically across

space without the use of wires was not a new one. Many great brains had given attention to this attractive problem for years past, but the methods employed by Morse, Bowman-Lindsay Wilkins, Preece, Willoughby-Smith and others, although successful over limited distances, all failed when viewed from the commercial aspect.

It was instantly apparent that Marconi had placed at the disposal of the scientific world ideas boundless in their possibilities. Physicists of many nations instantly applied themselves to the development of this new wave system of signalling.

The distances covered were small in relation to the amount of power required. His first apparatus secured its results by "shock tactics." This did not last long, as the young inventor found he could secure a degree of sympathetic action between the transmitter and receiver by adjusting the proportions of the resonating devices at the two ends. Later, Marconi discovered that by raising one arm (capacity area) high in the air and leading the other to earth, he was able to give more violent blows to the æther and set up more powerful wave impulses. By this method the distance between the transmitter and receiver was markedly increased.

For some time prior to Marconi's discoveries Sir Oliver Lodge had been experimenting with "syntonic jars," showing how a discharge from one "tuned" Leyden jar could influence another Leyden jar circuit tuned in sympathy. Like Marconi, he undoubtedly had in mind the wonderful effects which had been secured in the science of sound by the employment of what it known as sympathetic vibration. Lodge set out to see how far he could reproduce these effects in ætheric wave motion.

There is hardly one of us who has not noticed at some time or another that when a piano is being played, one particular note will cause some ornament in the room to jingle. This is accounted for by the fact that the sound waves thrown out by that string hit the ornament in question and caused it to vibrate. These sound waves actually hit every surface in the room and cause them all to vibrate to some degree on the first blow, but the jingling vase is so constructed that as its sides recoil from this blow they meet the second blow caused by the swinging string in the piano. The vase happens to be tuned accidentally in sympathy with the piano string, and its sides vibrate so regularly that even the small amount of energy passing across the room from the piano can keep these sides in motion.

Another, and perhaps a simpler illustration of the possibilities of sympathetic vibration, is to be found in the case of a child's swing. We all know how much energy is required to start a swing and to raise the swinging child to the highest point; we also know how small is the impulse required to keep that swing in full motion, provided the blow is given exactly at the end of each oscillation.

Lodge was aware that a wireless transmitting circuit, of the character employed by Marconi, behaved in a sense like the "escapement" of a watch, the two principal factors of which are a fly-wheel and a spring. The frequency of the swing of the fly-wheel is governed by two things—the weight of the fly-wheel and the length of the hair-spring. In practice we keep the weight of the fly-wheel constant, but if we wish to regulate our watch we make this fly-wheel move faster or slower by altering the length of the hair-spring to which it is coupled.

In an electric circuit of the character arranged by Marconi there are two factors, known as inductance and capacity, which roughly, for the sake of argument, may be compared with the fly-wheel and the spring. Lodge showed that, by introducing into the elementary wireless circuit a cylindrical coil of wire, the inductance (corresponding to the inertia of the fly-wheel) could be increased and the electric impulses made to take place at greater intervals; also, that the trains of electrical oscillations were lengthened. By the use of similar refinements in the receiving circuit the transmitter and receiver were made to work in sympathy, and it was instantly found that with the original amount of power employed very much greater distances could be covered.

In 1900 Marconi made a further important contribution to the development of the new science by employing *two* distinct circuits, both at the transmitting and receiving ends. One, the aerial circuit, served as a radiator or collector; the other, the condenser or "reservoir" circuit (tuned in sympathy with the aerial circuit) served as a "feeder"—in the case of the transmitting apparatus—and as an "accumulator" in the case of the receiving apparatus. This invention was made the subject of a master patent, and the practice still prevails, not only in telegraphy, but in telephony as well.

In this connection the record of early progress is interesting. The first experiments by Marconi in England were made at Westbourne Park, but the first demonstrations by Marconi were given between a building belonging to the Post Office in Queen Victoria Street and St. Martin's-le-Grand, a distance of a few hundred yards. Some weeks later (in 1896) communication was satisfactorily established on

Salisbury Plain over a distance of $1\frac{3}{4}$ miles. Next year, in May, 1897, signals were transmitted 8 miles, between Lavernock and Brean Down, both places in the Bristol Channel. In September or October signals transmitted from Salisbury Plain were received at Bath, 34 miles away; and in November the first Marconi station was erected at The Needles, Isle of Wight, for communication with Bournemouth, a distance of $14\frac{1}{2}$ miles. Another four years later, on December 12 and 13, 1901, wirelessly telegraphed signals transmitted from Poldhu, in Cornwall, were received near St. John's, Newfoundland, on an aerial held aloft by a kite, in a gale of wind. These signals had traversed 1,800 miles of ocean.

It was only natural that so fascinating a subject should claim the attention of an ever-increasing number of scientists the world over. From many countries came new ideas helpful in increasing the efficiency of wireless instruments. The story of development is outside the scope of the present book; those likely to be interested in the technical details are referred to numerous excellent works written by persons better equipped for the task.

There is one more point to which attention must be called. The wave-trains set up by the original spark transmitters were *not* actually *continuous*. They consisted of little groups of waves following one another in rapid succession, so rapidly that, whereas scientific measurement showed them to be distinctly separated, the effect produced on the receiving apparatus, or the human ear, was to all intents and purposes a continuous one. In sending a wireless message this wave-train was merely broken up into sections of varying length corresponding with the signs in the Morse code.

It must not be assumed that this rough outline carries us right up to present-day practice in wireless telegraphy. It is but a bare and simple description of the early, shall we say, "toddling" stages. Senatore Marconi's master-mind and the brains of many others have worked unceasingly for well over a quarter of a century to give this wonderful discovery a real utility, and to devise instruments which, although embodying the latest refinements, can be operated by persons of average intelligence and under the exacting conditions prevailing at sea or in the tropics.

The ever-present desire to increase working distances, and the consequent employment of more electrical power, required in time an entire departure from the earlier methods of creating and discharging high-tension currents. Marconi was always equal to the occasion, and in a few years high-power spark stations of the Transatlantic order, such as the original stations at Clifden and Carnarvon, bore about the same resemblance to the original apparatus demonstrated to Sir William Preece as the modern railway locomotive does to a child's scooter.

The British Post Office is erecting to-day, near Rugby, a wireless station in which the aerial system is 1½ miles long. This will be held aloft on sixteen lattice steel towers, each 850 feet high, or more than twice the height of St. Paul's Cathedral. The power-house will resemble an electric light works, and it is hoped that the blows given to the æther on this site will travel instantaneously round the world with such force as to be recorded day and night with ease in Australasia.

Compare the Rugby station with the mysterious little boxes of instruments, since unfortunately

destroyed, which the young "magician" Marconi showed with such pride to the chief engineer of the British Post Office twenty-eight years ago! Their range was about five times the length of a cricket pitch, but they were the seeds of the most remarkable scientific growth of modern times.

CHAPTER III

"S O S"

AMIDST the great excitement which has surrounded the recent popular application of wireless, the fact has been generally overlooked that broadcasting has been the main function of applied wireless from its earliest days. The life-saving possibilities of Marconi's great invention were brought home to the public more than a quarter of a century ago, when a wireless message from the East Goodwin Lightship, which had recently been equipped with transmitting gear, called for lifeboat assistance as it had been struck during a fog by the steamship *R. F. Matthews*. From that moment steamship owners and others concerned with the safety of life at sea, saw a future for wireless in the equipment of passenger vessels with wireless apparatus.

Exactly twenty-one years ago the nightly broadcasting of news to ships out of sight of land was commenced from Poldhu, in Cornwall, a practice which was continued without break until Poldhu was recently reconstructed for long-range experiments in the new beam system of telegraphy. These bulletins, together with others of a similar character, are now broadcast by the Post Office high-power station at Leafield, Oxfordshire, and the practice of broadcasting news telegraphically is now observed almost the world over. To-day it is a commonplace event for wireless operators on ships, on even so short

a voyage as an Atlantic crossing, to receive thousands of words of current news from stations in various countries.

In April, 1920, when the British delegates to the Imperial Press Conference were en route from Liverpool to Canada, I had the unique experience of editing on the vessel at sea, for the benefit of the distinguished journalists, both morning and evening newspapers, in which "red hot" news was provided by wireless. Some of this news, conveying the results of sporting events, such as the contests for the America Cup and the racing at Liverpool and Hurst Park, was received on the ship in mid-Atlantic within five minutes of the event being decided, and justified the design on the front page of the ocean paper, which portrayed Fleet Street hovering in shadowy form in the smoke from the vessel's funnel. Other news was actually received by wireless telephony.

Lord Burnham, President of the Conference, was able to talk to the captain of the *Olympic* over 500 miles away, and many other editors experienced their first conversation by wireless on this occasion.

The first really outstanding example of the life-saving possibility of a broadcast appeal for help came in January, 1909—fifteen years ago—when the steamship *Republic* was rammed and sunk by the *Florida* off the Nantucket Lightship. The wireless operator on board the *Republic*, Jack Binns, *now an "Uncle" at one of the American broadcasting stations*, used the new medium at his command to such advantage that 761 persons were saved. Within five months several hundreds more were rescued from death as the result of signals broadcast from disabled ships.

Who, too, can forget the terrible night of April 14, 1912, when the *Titanic*, the largest and proudest vessel of her day, which had set out from Southampton five days previously in perfect weather on her maiden voyage, struck an iceberg at midnight, and within a few hours was lying for all time on the ocean bed.

It was 12.15 a.m. when the wireless officer of the *Titanic* startled the ships of the Northern Ocean by sending the Marconi Distress call C Q D, followed by "Come at once. Struck berg. Lat. 41° 46′ N. Long. 50° 14′ W. Advise Captain."

When Phillips sent that C Q D, under his captain's orders, it was with a confident smile. Had not the *Titanic* positively the latest devices for keeping a vessel afloat indefinitely?

At 12.42 Phillips's viewpoint had changed. He supplemented his C Q D with S O S (the International distress signal yet little known). At 1 a.m. a still growing anxiety was indicated by the transmission of both signals in rapid succession. Phillips called, through the darkness, amongst other vessels the *Carpathia*, *Frankfurt* (German), *Caronia*, *Virginian*, *Olympic*, *Baltic*, and *Birma* (Russian). These calls could be heard amongst a number of other messages until 2.17 a.m.—when the signals failed. The *Titanic* sank with 1,503 souls on board, leaving 703 others, scantily-clothed men, women and children, to fend for themselves in the crowded ship's boats.

Meanwhile Phillips's night's work—those broadcast appeals for instant aid—had turned many ships from their course. The *Carpathia*, seventy miles away, made straight for the spot indicated, and found, four hours later, at dawn, some fragments of floating wreckage. A few minutes afterwards some

of the ship's boats were sighted, and the occupants, some injured and dying, were taken on board.

Phillips, the senior operator, died at his post—as many a wireless man has done since that date. An eye-witness has told how, with the fore well-deck awash—when the women and children had been placed in the boats and cleared—the captain told the wireless operators to "shift for themselves" as the ship was sinking. Instead, "Mr. Phillips took the telephones up again, when the captain had gone away, and restarted work. Mr. Phillips tried to call once or twice more, but the power was failing, and there were no replies."

Phillips was last seen standing on the deck-house.

At Godalming, Phillips's home, may be seen a memorial to the first broadcaster hero. A movement was started in France this summer to perpetuate the memory of this gallant fellow by five minutes' wireless silence annually at the moment when the *Titanic's* signals abruptly ceased. Phillips migrated to the wireless service from the Learners' Department at the General Post Office.

Who does not remember also another thrilling event within six months of that date, when, on October 10, the *Volturno*, 1,000 miles west of Ireland, burst suddenly into flames, and those on board were faced—as it appeared to them—with the alternative of death by fire or drowning. From the wireless cabin of the burning vessel there was flashed once again the all significant S O S, and full indications of position. Many vessels heard the call, many captains gave orders for more steam and full speed ahead; eleven arrived to take part in the saving of life. Five hundred and forty-one persons lived to tell the story.



Photo: Vandyk.

1



Photo: Foulsham & Banfield.

2



Photo: Archie Handford.

3



Photo: Foulsham & Banfield.

4



Photo: Drummond Young.

5

1. **Capt. P. P. Eckersley,** Assistant Controller and Chief Engineer.
2. **A. R. Burrows, F.J.I.,** Assistant Controller and Director of
3. **Admiral C. D. Carpendale, C.B.,** Controller. [Programmes.
4. **Guy V. Rice, M.A., A.C.A.,** Assistant Controller and Secretary, B.B.C.
5. **D. Millar Craig, M.A.,** Assistant Controller, Scotland.

No single book could adequately record the part played by the broadcast wireless message during the war in this one great work of life-saving at sea. The case of the *Lusitania* remains perhaps most vividly in the memory of the public, but there are hundreds of others, which, from a wireless point of view, and as examples of courage and gallantry, deserve special reference. In the British Mercantile Marine alone, where approximately 6,000 operators belonging to the Marconi International Marine Communication Company saw war service, 348 lost their lives whilst at sea as the result of 1,202 enemy attacks. Many of these young fellows were torpedoed three or four times. A record equally glorious exists in the annals of the Fleet and the Naval Volunteer Reserve.

Two other war-time incidents must be mentioned. On the night of November 7, 1917, there sailed from south-west Europe for America a cargo vessel named the *Ben Ledi*. One hundred and forty miles off the coast she was attacked by a submarine which, having failed with her torpedo, commenced shell-fire at a range of four miles. In the exposed wireless cabin was an eighteen-year-old operator named E. W. Gardiner—a native of Edinburgh. Gardiner immediately broadcast the special signal, and secured promise of assistance from a British destroyer. The captain then advised Gardiner to leave his exposed position and join the remainder of the crew in such shelter as was afforded. Gardiner said that he was also in touch with an American cruiser nearer at hand, and preferred to stay and exchange complete messages.

The submarine changed its fire to shrapnel. One of these shells passed through the wireless cabin. Before much more damage could be done the

American cruiser arrived and saved the situation. When the captain visited the wireless cabin he found the headless body of Gardiner sitting at the desk, and before it a complete log of the messages exchanged between the *Ben Ledi* and its rescuers. Gardiner had saved 45 lives.

A few months before, on May 15 to be precise, some 48 British drifters, detailed to watch the anti-submarine nets in the Adriatic off Otranto, were shelled at dawn by three Austrian cruisers which had sallied forth from their naval base at Pola. They played havoc with the drifters, which were badly equipped for an encounter of this character. Amongst the little vessels attacked were some fitted with wireless gear, and one of these, H.M. Trawler *Floandi* (Wireless Operator Douglas S. Harris), managed to summon British warships, which punished the Austrians and drove them to their shelter. When time arrived for a survey of the damage, Douglas Harris, of the *Floandi*, was found lying forward over his desk shot through the body. His right hand still grasped his pencil which had scored a line across the log as he fell forward in death. Harris's log, showing no sign of nervousness despite the hail of bullets from overwhelming odds, figures to-day amongst the stirring exhibits in the British War Museum.

With such memories as these one hesitates to discuss other aspects of broadcasting during those four fateful years when the clock of civilisation appeared to move backwards. But there are other aspects which should not be forgotten. Some few months before the war-cloud broke over Europe, a German company commenced to build at Nauen,

about twenty miles from Berlin, a wireless station which, from point of view of size and power, was much greater than anything that heretofore had been attempted. It was evident to those thoroughly informed upon the technical position in those days that the commercial traffic of which this station was capable could not pay anything like an economic interest on the capital.

What, then, had the Germans in view? The answer to this riddle came on the evening of hostilities, when a brief message in a German code was rapped forth. This message, long waited for by German ships on all the seas, gave the necessary warning. They made for the nearest neutral harbour. In a few short moments the German Government had saved in mercantile tonnage many times the value of the mysterious Nauen station. From that epoch-making moment Nauen became a world broadcaster.

CHAPTER IV

PEN VERSUS SWORD

NAUEN'S warning message to the German mercantile marine gave but little indication of what was to follow. It was soon evident that the Central Powers had laid careful plans, not only for a stupendous campaign on land and sea, but also for a war in the æther of space. The moment their great fighting machines took up the offensive on the Eastern and Western fronts, Nauen and other enemy wireless stations of lesser power but considerable range, commenced to broadcast military and naval communiqués, having as their object the creation, in neutral countries, of an impression favourable to themselves, and if possible a feeling of disquiet amongst the wireless sections of the Allied armies.

The German Government had long since realised that in the campaign which they were about to undertake their country would sooner or later be isolated telegraphically, and agents were sent to many countries in Europe, Asia and North and South America, to organise means of receiving wireless communiqués and of distributing them to the Press and other institutions influencing public opinion. The French lost no time in countering this movement to the best of their ability, and were fortunate in having at their disposal the Eiffel Tower station, which had at least a European range. This station replied by issuing French military and naval communiqués, and

by answering, to the best of its ability, the unceasing flow of lies from the German Propaganda Department.

But Nauen had more than European range. Her signals could be read without great difficulty in America, and so soon as Great Britain came into the war and the Germans found their several transatlantic cables put out of action, Nauen was placed at the disposal of the American correspondents in Germany and Austria. Night and day the shrill note of this station could be heard radiating, principally for the benefit of Americans, the German version of the European War.

For many months prior to service on the Western Front I was engaged in collecting, editing and distributing to several Government Departments the wireless propaganda of the Central Powers, and therefore have special interest in this aspect of modern warfare.

The interception of enemy wireless propaganda rapidly became a very considerable business. Marconi operators, bound to secrecy, worked in shifts day and night throughout the entire four and a half years, the relieving operator taking up his duties before the man relieved ceased work, so that not a single dot or dash was missed. At first the work of intercepting the enemy messages was perfectly straightforward, as they were sent at hand speed, but as time wore on the Germans found their traffic getting out of hand. They then increased the power of their stations and introduced mechanical transmitters capable of sending at speeds greater than could be dealt with by ordinary means. It requires a very skilled wireless operator to be able to distinguish Morse signals being sent even at forty words a minute; so when the

Nauen speed of transmission passed beyond forty words per minute it became necessary to use high-speed phonograph records for interception purposes. Instead of ordinary headphones, special microphones with valve amplifiers were used. The signals received were made to operate a stylus, which engraved them upon rapidly revolving wax cylinders. So soon as the cylinder was filled it was transferred to another phonograph running at low speed. By this means the dots and dashes, which were originally unintelligible in the headphones owing to the rapid speed with which they followed one another, were made intelligible, and could be transcribed into ordinary script. The wax cylinders, having been checked, were shaved by a special machine, and used over again. It was no uncommon thing during one period of the war, before the Americans joined forces with the Allies, to intercept 12,000 words a day of press matter alone transmitted from Nauen to North and South America under the signature of well-known American correspondents in Europe. I feel sure that such of those reputable correspondents as have taken the trouble since the war to compare their original dispatches with those as actually radiated by the German wireless station have found discrepancies between the wireless version and their own handiwork. It was a translator of wireless messages who, in handling a German communiqué, invented the word "frightfulness," which had so great a vogue throughout the war, the original being "Furchtbarkeit." Incidentally, those engaged on the German communiqués soon found that they contained more information than the Germans really intended to convey. The language employed within them was almost of a barometric character. When

things were going well with the Germans they would use straightforward language about which there could be no question; when they had something upon their mind about which they were uneasy, they did not express themselves as such, but employed German words and phrases which might be taken in more ways than one. So it became possible, to some extent, to read between the lines.

Early in 1916, when it was evident that this German wireless propaganda was actually having influence in certain quarters, a colleague made a journey to Petrograd and to Bucharest, to persuade the Russians and Rumanians, who were also possessors of wireless stations of considerable range, to follow the German example and broadcast by wireless their official communiqués, and such replies to the German propaganda as might be thought advisable. We in England arranged to listen for these communiqués. This development caused some uneasiness in various quarters, because these wireless versions from the Allied Eastern fronts arrived and were available for the Press of this country ahead of the cable versions. Furthermore, from time to time most interesting news was broadcast by wireless, which, by reason of censorship, did not reach this country through other channels. But adjustments were soon made by which those who had been dependent on the cables for their news from Eastern Europe, were able to enjoy also the advantages offered by the interception of the broadcast message.

On July 18, 1916, the main news page of one great London daily was almost filled with news received by wireless; no other channel being quoted.

Many chapters might be written on this subject, showing how, sooner or later, almost every country

involved in the World War used their wireless stations for providing those outside the war with the fullest possible information likely to be of advantage to its own particular side; and how, as this wireless campaign was intensified, the several countries, England excepted, were not content in transmitting in their own language only, but repeated what they had to say in the languages of those countries which they specially wished to reach. The interception of Russian communiqués was particularly interesting, because the Russian alphabet, having several more characters than the alphabets of the other warring countries, the Russian stations had to employ a number of dummy signs as make-weights, mostly accented vowels, so that even a Russian himself, seeing one of these messages, found difficulty at first in translating it.

The editing of these messages was naturally not without incident, and I recall the Galician town of Lemberg, which, having appeared in the Russian communiqués as Lwow and in the German communiqués as Lvoff, on another occasion arrived in Italian under the guise of Leopoldville. The Russians, too, gave us an anxious moment on one occasion by talking of Constantinople as Tsartown.

One wireless broadcast message, of special interest even to this day, was the cryptic radiogram from Nauen on the morning of April 29, 1915. It ran as follows:

"*From Berlin Foreign Office*

"*To Botschaft, Washington.*

"669 (44-*W*) *Welt nineteen fifteen warne* 175 29 1 *stop* 175 1 2 *stop durch* 622 2 4 *stop* 19 7 18 *stop LIX* 11 3 4 5 6."

This message showed so marked a departure from the "Auntie ill" type of communication that some young American journalists on the staff of the *Providence Journal*, who had specialised for months in the interception of the Nauen programmes, put it aside for further reference. When the fateful news arrived of the sinking of the *Lusitania* they set out at once to see how far the two events might be associated. In this they were successful, for they learned, by discreet inquiries, that Prince Hatzfelt, of the German Embassy, had spent part of April 29 in search of a copy of the *New York World Almanac* for 1915.

Here was the key. The *Welt Almanac*, examined in the light of the figure groups, which were references to pages, lines and letters, revealed the following:

"Warn *Lusitania* passenger(s) through Press not voyage across the Atlantic."

Less than a month later the great Cunarder was lying at the bottom of the ocean. Was the torpedoing of the *Lusitania* accidental?

The possibilities of broadcasting, even within the limits of wireless telegraphy, which had been so forcibly demonstrated during the early phases of the war, were immediately grasped by the Russian revolutionaries after the Kerensky rebellion.

One of the first messages to be broadcast from the Moscow and Tsarkoe Selo high-powered Russian stations was a call to all wireless operators within Russia and others intimate with wireless science, to attend a conference, having as its object the development of a system for broadcasting revolutionary propaganda throughout the Russias and beyond. From that day the Russian stations became doubly

active. Transmitting in several languages they made repeated violent attacks upon the *bourgeoisie* of all countries, and also provided most glowing accounts of the developments of their conception of the new era. Some of these communiqués were remarkably frank, and gave in unhesitating terms the Bolshevik leaders' criticism of weakness in their own organisation. They also broadcast the story of the murder of the Tsar, Tsarina and Royal family, the most tragic story ever transmitted across the æther.

Throughout the war period all wireless messages broadcast by the belligerents were, of course, the subject of strict censorship. No one outside the control of the Services was permitted to possess a wireless receiving set, and those who intercepted for the Government Departments were not allowed to convey to the Press the information they possessed, except under the authority of the censor. Life in those days was little short of a nightmare lest some piece of news received by wireless should pass unauthorised to the public. The completeness of this veil of secrecy can best be judged by the remarks of Admiral Sir Douglas Brownrigg, in his entertaining volume "The Indiscretions of a Naval Censor."

Sometimes the attitude of the censor was puzzling. On one occasion the Germans announced by wireless the sentence of ten years' imprisonment each on two of our flying officers, following a charge of distributing pamphlets over the German lines. This wireless message was undoubtedly picked up in every European country, but its publication in England was forbidden. Five days later an identical story, which arrived from Germany by a private route, was given to the country through the Press.

But the Censor, with all his seeming eccentricities,

was a friend in disguise, how great we only realised some time after the Armistice, when the day came for the demobilisation of his department. On that day the authorities placed upon my own head the responsibility for seeing that the wireless news messages from Russia were handled with discretion. Many illuminating sidelights on the real state of affairs in Russia were provided through the Bolsheviks' own wireless communiqués.

I wish it were possible to set out in detail other parts played by wireless during the war. It is well known that intrepid operators were taken aloft in the darkness of night, released from aeroplanes in black parachutes, and left to their own resources behind the enemy lines, where, aided by portable wireless apparatus, they gleaned and transmitted information necessary to the Allies. How many of these daring men succeeded in their astounding enterprise, and how many perished has not been told. Equally extraordinary were the more technical feats accomplished through the wireless medium. The ability of skilled British observers to record beyond question the movement, over only $1\frac{1}{2}$ degrees, of a wireless station hundreds of miles away, was indirectly responsible for the Battle of Jutland. That Captain Round and a number of assistants had been operating wireless direction-finding stations on the East Coast during the war was known to many engaged on the wireless side of warfare, but it remained for Admiral Sir Henry Jackson, two years after the conclusion of the war, to make partially public the true story. He told at a meeting of the Institution of Electrical Engineers how Captain Round reported unusual signals from the principal wireless ship in the German fleet, which was then

(May 30) at Wilhelmshaven. An exact reading was taken of the direction from which those signals were coming. Later in the day it was noticed that the ship (the *Bayern*), and those answering her, had moved 1½ degrees—in other words, they had taken up a position in the Jade River nearer the open sea. On the strength of this data, Admiral Jackson, then First Sea Lord, was able to give anticipatory orders to the British Grand Fleet, and in Sir Henry's own words, "the famous battle of Jutland was indirectly brought about by the careful and accurate work of Captain Round and his staff."

There exists, I am told, in a strong room less than a mile from Charing Cross, the manuscript of a book which is unlikely to be published in the lifetime of the present generation. It may never see light. Within are set down in considerable detail some of the most romantic stories imaginable. They are on record, and that is all.

CHAPTER V

FROM TELEGRAPHY TO TELEPHONY

As to-day we are talking freely of the time to come when we shall be able actually to see, perhaps with mixed feelings, events happening at distant places, so, from the earliest days of wireless telegraphy, imaginative folk spoke of a time when it would be possible to convey across space not merely Morse signals but actual verbal and musical sounds.

The scientist, as distinct from the dreamer, found one serious obstacle to the wireless transmission of complex sounds. This lay in the fact that the Hertzian waves in general use for wireless telegraphic purposes up to the outbreak of war were intermittent and of ever-changing form, not continuous and consistent in form.

An indication of what would eventually be possible was given by Professor Fessenden in 1902, when he succeeded, through the agency of a small high-frequency spark machine, in transmitting "intelligible" speech over one mile of space.

I am not certain whether it was this prospect of wireless telephony or a feeling that continuous waves might prove more efficient than intermittent waves for telegraphic purposes that prompted an English scientist, Mr. Duddell, unfortunately now dead, to devise in 1900 a really workable means of creating continuous æther waves. Mr. Duddell discovered that if certain modifications were made in

an electric circuit containing an arc lamp, such as was freely used for street lighting a few years ago, and still is in use in some places, there could be set up in this circuit continuous oscillations, which, in turn, were capable of producing continuous ætheric waves.

Mr. Duddell's original invention was improved upon by a Dane named Poulsen, and eventually some very high-power wireless stations were erected employing "arc transmission."

About the same time it was discovered that the same continuous waves could be produced by mechanical means—by electric generators run at very high speeds—but progress in this direction was slow at first owing to the unusual strains set up in the rapidly revolving machinery.

Long before the war, then, the first great essential for wireless telephony had been found. What had hindered progress?

Before answering this question let us survey the processes involved.

The first essential for wireless telephony is a constant wave ripple across the æther of space—not a leisurely affair, such as one sees following in the wake of a boat or spreading in rings from any point of disturbance in a pond, but a very rapid unbroken train of ripples. (The distance from the crest of one wave to the crest of the next is spoken of as the wave-length.)

In the case of the ordinary broadcasting stations of the B.B.C., which have wave-lengths varying from 300 metres to 500 metres, the frequency of these ripples varies between 1,007,000 and 605,000 per second.

The æther therefore in the neighbourhood of one of our relay stations is suffering every second during

programme hours the sort of punishment which might be expected from 200,000 Carpentiers each in the pink of condition. Small wonder, then, that Captain Eckersley often receives complaints of howling!

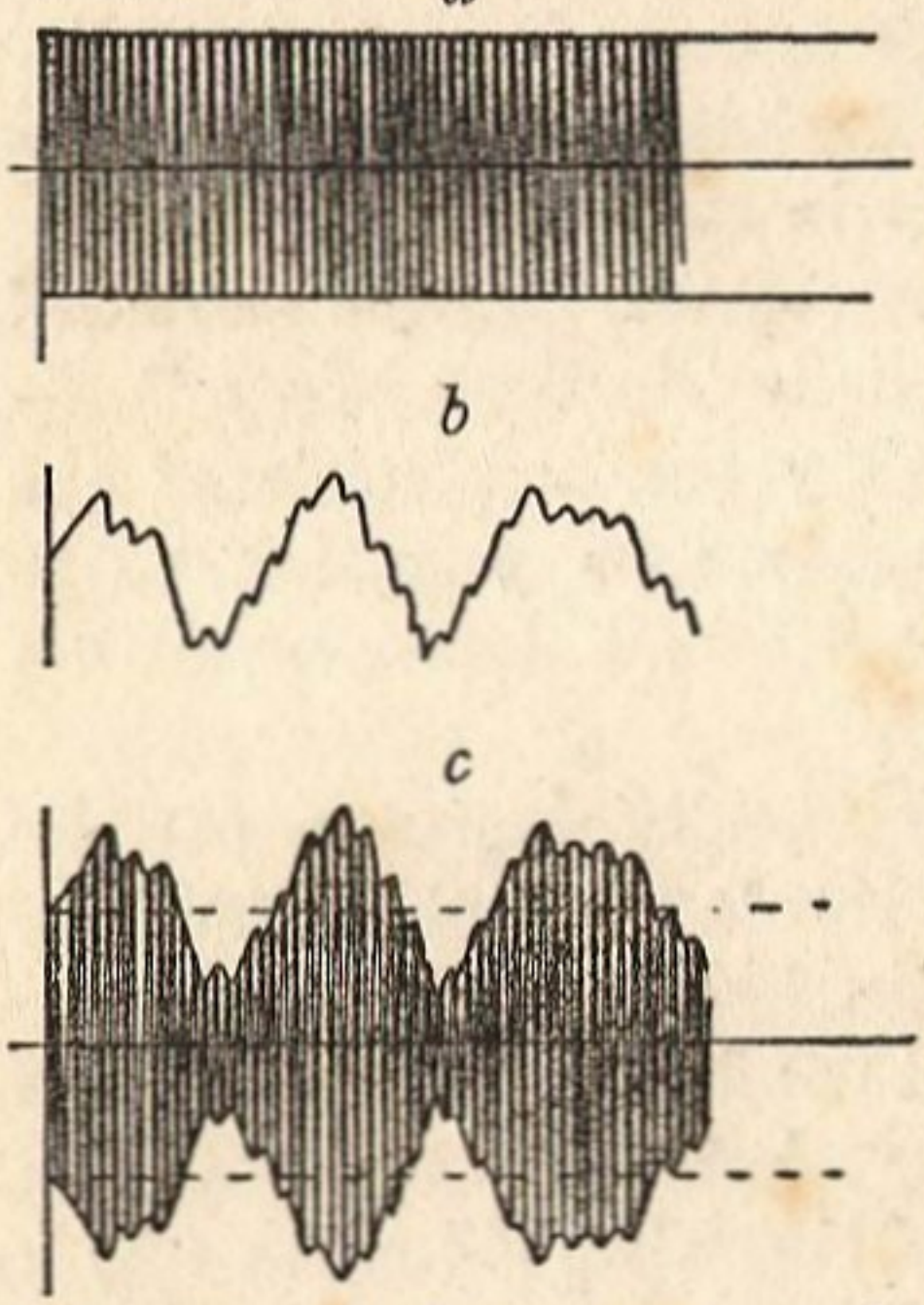
On to this bridge of high-speed unbroken ripples, which are spreading outwards in all directions at the speed of 186,000 miles per second, is superimposed an electrical counterfeit of the sounds from the studio. The impulses in this counterfeit are of much lower frequency, ranging—except in quite unusual cases—from 100 to 5,000 beats per second. These electrical counterfeits of the speech or music "modulate" the continuous wave. They vary the amplitude of the high-speed ripples and create new wave-forms, in which the original ripples become but component parts.

A clearer idea of what really happens can be seen from page 36: (*a*) represents the continuous high-speed ripple which forms the bridge across space between the transmitting and receiving stations; (*b*) an example of the peculiar wave-form set up by a simple sound; and (*c*) the result of throwing (*b*) on to (*a*).

I can well imagine, despite all that has been written here and elsewhere, that perplexity may still exist in the minds of those who have not been trained scientifically as to the ability of the ear to be influenced by oscillations which are really built up from groups of more rapid oscillations. Some assistance may be obtained by referring to a similar, though not exactly parallel, effect upon the human eye. In the reproduction of photographs for the illustration of books and newspapers it is now the common practice to employ what are known as half-tone blocks. These are plates of zinc or copper in which the surface has been broken up into fine dots by a photo-

mechanical process. In rough newspaper printing fifty or sixty dots per inch only are used; in the finest art printing there are as many as 400 dots per inch in each direction.

Look at any of the photographs facing page 20. The unaided eye is given the impression of a photograph containing an unbroken image ranging from white through gradations of density to black.



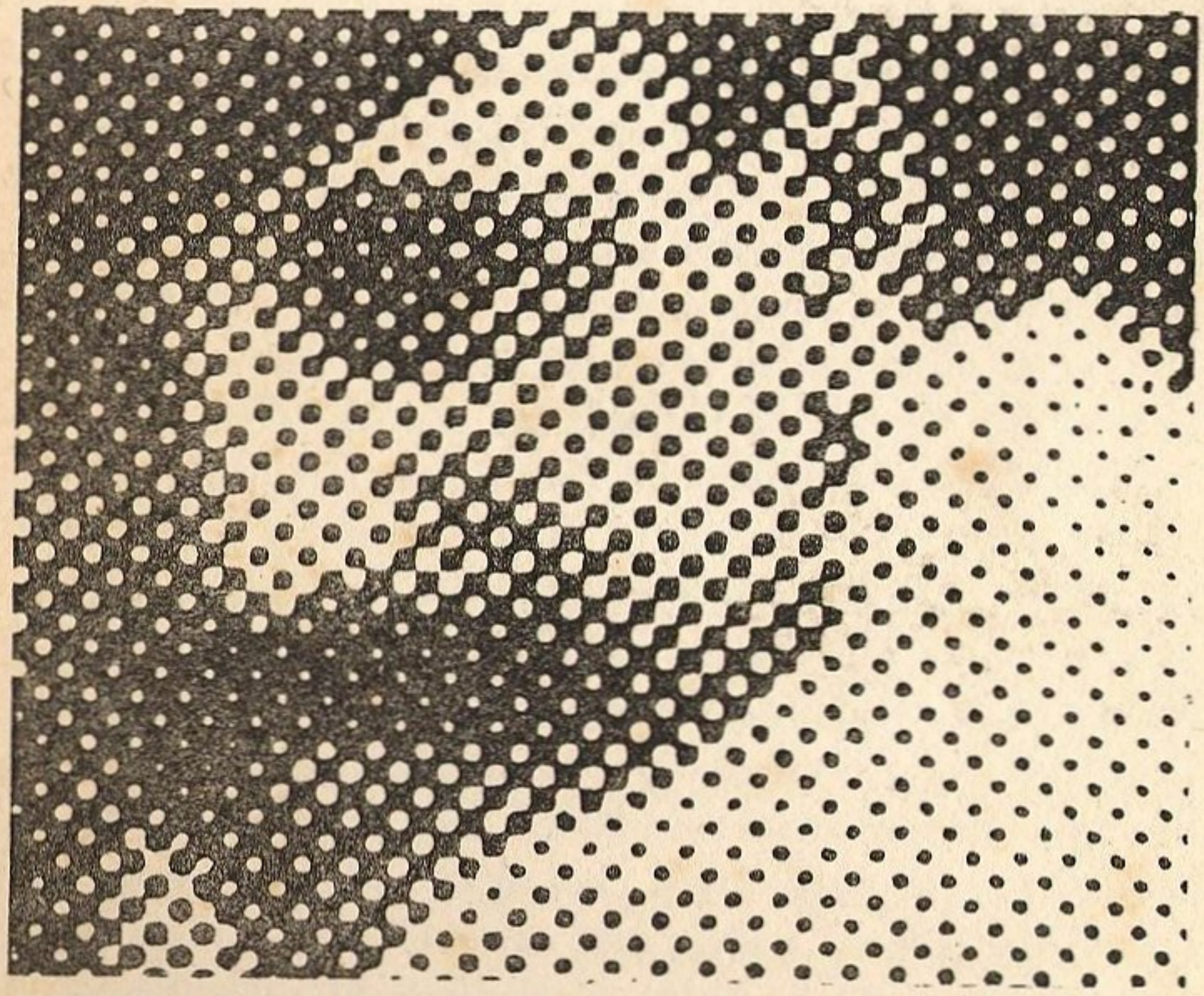
Diagrammatic Representation of Broadcasting Waves

Now place a magnifying glass over the photograph, and the result is similar to what, in a greater degree, is shown on p. 37. We see that the "high-light" impression is actually produced by regular but numerous pin-points of ink, and that the shadows are similarly produced by so large a number of dots that they almost run into one another. If such an illusion for the eye can be created by the employment of, say, only 133 dots in a lateral inch, small wonder is it that electric waves rippling across space at 1,000,000 beats per second are capable of being moulded, as it were, into all the gradations of musical sound. Broadcasting is based on an acoustical illusion.

The human ear is not responsive to fewer than 40 beats per second. Perhaps it would be more correct to say that vibrations taking place less

rapidly than 40 to the second do not produce what we term a "musical" note.

An instrument, a vase on the shelf, a piano string, or the reed of a clarinet vibrating at 256 beats per second gives us the middle C of the piano. The top note of a piano (hardly recognisable as a musical



Magnified image of half-tone block. [*Hold ten feet away to get effect.*]

sound) represents about 4,000 vibrations to the second. The highest note in an orchestra is probably one played by the piccolo flute, representing nearly 5,000 vibrations per second. A few sensitive persons are able to distinguish sounds produced by vibrations as rapid as 15,000 to the second. Animals, especially cats and dogs, can hear sounds produced by much

more rapid vibrations, and it is a curious fact that the tuning-fork giving 15,000 vibrations—which only a limited number of persons can hear—when it is bowed by a fiddle bow will drive almost frantic a cat or a dog. It is generally accepted that many other forms of life communicate amongst themselves only by "sounds" consisting of such rapid vibrations that they are outside human hearing.

We have seen that continuous waves form an essential foundation for the fabric of wireless telephony; we have learned that means for producing these waves have existed since 1903. The obstacle to further progress must have been a formidable one.

The trouble really lay with the microphone—that part of the telephone termed the mouth-piece.

The electric currents produced in a telephone transmitter under the influence of the human voice are very weak. In order to modulate the continuous wave of a wireless telephony station having a really useful range, a much more powerful current is necessary than can be provided by the ordinary microphone. Several devices were invented for overcoming this difficulty, ranging from multiple microphones to electrified jets of water, but they either became hot and erratic or broke down under lengthy operation.

The position was completely changed by Dr. Fleming's invention of the "thermionic valve," and its subsequent development by De Forest in America, by Round in England, and by other prominent workers in various countries. By means of the valve it became possible to amplify weak currents to almost any degree without altering their characteristics.

CHAPTER VI

ALADDIN'S LAMP

THE wonderful little electric lamp which you see glowing in all sensitive receiving sets bids fair to be the Cinderella of electrical science. Its use already extends far beyond wireless telegraphy and telephony.

The "valve" consists of a metal filament which can be heated by an electric current in the same way as the filament of an ordinary electric incandescent lamp. This filament is immediately surrounded by a coil of wire termed a "grid," and at a greater distance by a metal "plate." The "grid" and the metal "plate" are connected to a point outside the containing globe, and the bulb is exhausted to a greater degree of vacuum than an ordinary electric lamp.

When a filament is heated by the passage of an electric current from an accumulator, the white-hot filament—or in the more modern "dull emitter" valves, the red-hot filament—becomes a fountain of those minute electric charges known as electrons. These electrons are almost human in behaviour, inasmuch as they can be attracted by electrons of an opposite character and repelled by electrons similar to themselves. When a valve is used for detecting wireless waves, the outer plate in the valve is charged by means of dry cells with electrons capable of attracting those sprayed out by the incandescent

filament. The sprayed electrons, however, only succeed in getting as far as the grid or spiral wire surrounding the heated wire, and once they have taken up their position there they shield the fountain for the time being.

If, however, there arrive down the aerial wire, as the result of an electric wave thrown out from a distant station, electrons of an opposite character to those already on the grid or barrier, then the newcomers neutralise those on the grid and allow the fountain to get to work and discharge an electric spray across space. A very delicate balance can be arranged, such a balance that the arrival of a few electrons down the aerial wire will release many times their equivalent of electrical energy. Thus it comes about that the valve is able to magnify or "amplify" the wireless waves received in an aerial.

Sufficient has been stated to indicate that as the character of these valves depends upon such factors as the sizes and separating distances of the components, they must be treated carefully if constant efficiency is required.

Other types of valves, through slight modifications in their construction and by their use in other wireless circuits, can be made to perform different functions. In a transmitting station they can be employed most effectively as the producers of the electrical oscillations which give the blows to the æther and send the continuous waves across space. In another form they can be made to convert the oscillating currents created by an ætheric wave into a current flowing in one direction only. In this capacity they are known as rectifiers or detectors, about which more will be said later. For an adequate study of the use of these valves in their

several capacities I would refer you to the many technical works upon the subject.

Now for a glimpse of broadcasting in practice. In a large room known as the studio, specially draped to eliminate those reflected noises which give to any room of considerable size that sense of "hollowness," there is placed at a suitable point what is known as the microphone.

The microphone is the apparatus which receives the sounds and converts them into electrical equivalents. These very feeble counterfeits of the studio noises are led away to a quiet room, where there are a number of magnifying valves, each of which, having magnified the microphone current, hands it on to its neighbour for similar treatment. A large number of valves are employed in this process, because it is found that by giving each valve a little work and by not employing it to the limit of its powers the risk of distorting the electric current is much reduced. This series of valves is known as the microphone amplifier, and the current which leaves the amplifier is strong enough to give in a pair of headphones as loud a reproduction of the studio sounds as it is comfortable to hear.

The currents thus produced are sent by wire, either overhead or underground, to the wireless transmitting station.

This station in the main consists of an instrument where large valves (some as big as Rugby footballs, or, if they are made of silica instead of glass, as big as the average earthenware drain-pipe) are engaged in converting the electric current received from a power station into the rapid electrical impulses which, striking the æther, set up the ripples across

space. There are also other valves, through the medium of which our magnified counterfeit of the studio noises is thrown on the top of the continuous ripple.

Let us now for a moment go to a distant point where our studio noises are being picked up by some listener whose receiving apparatus is tuned into sympathy with the transmitter. Generally speaking, this listener employs an outdoor aerial. This aerial is placed as high as possible, so as to get the maximum effect from the ætheric wave. The crest of this wave striking the aerial creates an electric current within the aerial. In a minute fraction of a second the trough of the same wave reaches the aerial, and the current is reversed.

If one were able to place the headphones into direct contact with the tuning apparatus, without any other agent, such as a valve or a crystal detector, it would be found impossible to hear anything that is happening in the studio. This is due to the fact that the headphones contain iron plates or diaphragms, which are made to vibrate under the influence of electro-magnets. The magnets, in turn, are controlled in their action by the current from the wireless receiving instrument. These diaphragms are incapable of responding to the rapidly oscillating current produced in the aerial wire by the æther waves—they are paralysed by the rapid changes. If those oscillating currents can be converted into currents going in one direction only, then the diaphragms will respond to their influence.

In every receiving set, therefore, there is inserted what is termed a "detector," the function of which is to accept the direct impulse and reject the "back lash." The detectors most in favour to-day consist

either of one of the forms of valve already referred to or of crystalline substances, natural and artificial. Some crystals rectify when in contact with others; some work best when in contact with a piece of metal. Perhaps the most common of all the crystalline substances is galena, one of the natural forms of lead, and this galena is generally placed in contact with a metal wire, which is commonly known as a "cat whisker." An ideal crystal combination for careful persons is that of the minerals known as zincite and bornite.

The crystalline detector generally used at sea (when crystalline detectors were the fashion) consisted of a piece of carborundum, produced by fusing together coke and sand in an electric furnace, used in conjunction with a piece of steel. A most excellent detector this proved, but in order to give it a maximum sensitiveness it was necessary to employ a local battery. For this reason carborundum is not popular for broadcast telephony.

The complete process of wireless telephony, we may say, consists of producing an electrical counterfeit of a sound, of throwing this counterfeit across space on top of a high-speed ripple, and in reconverting the impulses from that ripple as received at a distant point into a direct electrical current, such as will set into motion, through the medium of small electro-magnets, the diaphragms of a pair of headphones. These diaphragms, beating the air in sympathy with the microphone at the transmitting station, reproduce sounds exactly equivalent to those made by the voice or instruments in the studio.

CHAPTER VII

SETTING THE SCENE

ALTHOUGH, as has already been indicated, sounds were transmitted wirelessly across space by the use of the electric arc, it was not until 1913 that serious experiments were made for the design of small-power wireless telephone sets intended for commercial purposes. This work took place simultaneously in several countries. The Germans experimented with a valve known as the Lieben, and on June 21, 1913, succeeded in communicating telephonically between Berlin and Nauen. Within a year it was possible to hear telephony from Berlin in London.

Mysterious voices were also heard at various points in the Midlands, voices speaking in English, but the secret was kept until a later date, when it became known that experiments by Mr. Ditcham (who later became associated with the Marconi high-power tests at Chelmsford) and others were being conducted between Letchworth and Northampton.

In 1914 wireless telephone sets, having a working range of 30 miles, were being made by the Marconi Company in England, but they were capable of being heard on sensitive apparatus over much greater distances. American engineers also "got busy" on the same subject.

Then came the World War, when, amongst the belligerents, the newer science of wireless telephony had to stand down whilst the more tested telegraphy was developed for special needs of fighting services.

Senatore Marconi, however, demonstrated in 1914 the feasibility of maintaining telegraphic communication between two Italian war vessels over an interval of 45 miles.

In America, the research upon telephony was able to proceed unhindered for at least two years, and during that time very considerable headway was made. Progress in the United States was also aided by the fact that in so vast an area of country under one control it had been possible to develop a very highly organised land-telephone service. Exceptional facilities existed for research in the employment and manufacture of sensitive telephone microphones.

So it happened that in October, 1915, the American Telephone and Telegraph Company, working in conjunction with the Western Electric Company, startled the world by transmitting speech and music from the United States naval station at Arlington to the Eiffel Tower, 3,800 miles distant, employing for the purpose no fewer than 300 transmitting and modulating valves.

A few months later there came also from America the first news of wireless being applied by experimenters in their homes for the transmission and interchange of music.

Wireless telephony played no serious part in the war, although shortly before the Armistice plans were well laid for its use upon aeroplanes to assist in the direction of gun fire, but no sooner had peace been declared than the several countries competing in the development of commercial wireless apparatus returned to the problem.

In March, 1919, Captain Round, of the Marconi Company, transmitted good speech *during daylight*

from Ballybunion, in Ireland, to Louisburg, Cape Breton Island, 1,800 miles, with an electrical output from his generators of only 2.5 kilowatts. (The electrical equivalent of the power of an average motor-cycle.) The aerial employed was 500 feet high, and the wave-length 3,800 metres.

In America the idea of using wireless telephony as a means of radiating music and entertainment had taken hold of the imagination, and all that was needed was really reliable apparatus. This, through the absence of restriction, was soon forthcoming. In this country, owing to its proximity to a highly unstable Europe, the military and naval authorities considered it essential to prohibit for some while wireless experimental work by private persons. Those engaged in the commercial development of the science were allowed greater latitude, and the result was that within little more than a year from the signing of peace, British wireless telephones were being manufactured in considerable numbers for delivery in China—some 200 sets, each having a range of upwards of 50 miles, having been ordered for the establishment of a chain of stations across the Chinese empire. But these stations were not intended for broadcasting. They were to work between definite points and to confine their activities to the transmission of speech.

Late in 1919 there were signs that America was going to make a great bid for the world markets in wireless telephones, so it became necessary for English manufacturers to make it quite clear to all countries that only the restrictions placed upon wireless telephony in Great Britain were responsible for the relatively little prominence given to British wireless activities. It was decided that the best way to



Photo: "Daily Sketch" Studios.

1

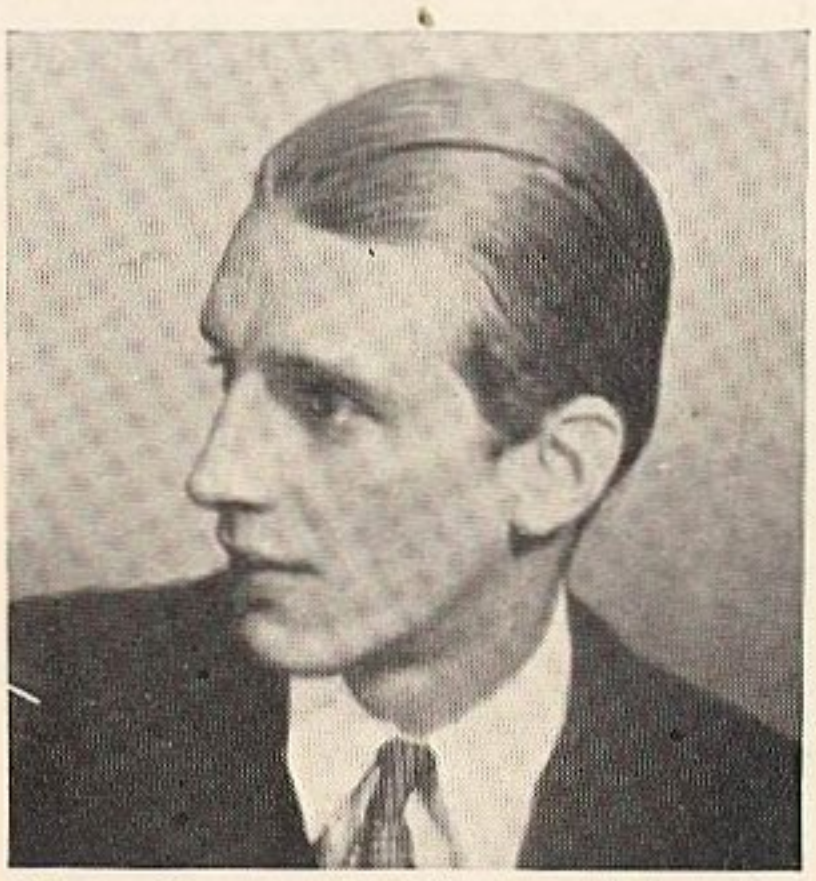


Photo: Maurice Beck & Helen Macgregor.

2

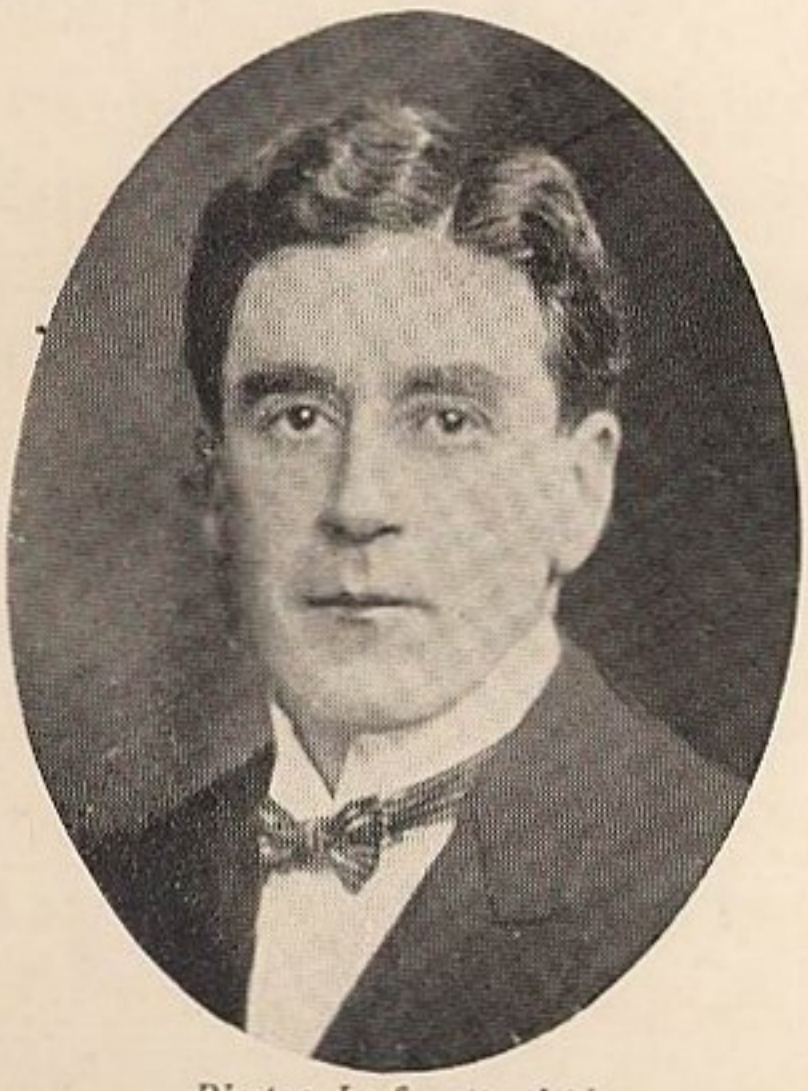


Photo: Lafayette, Ltd.

3

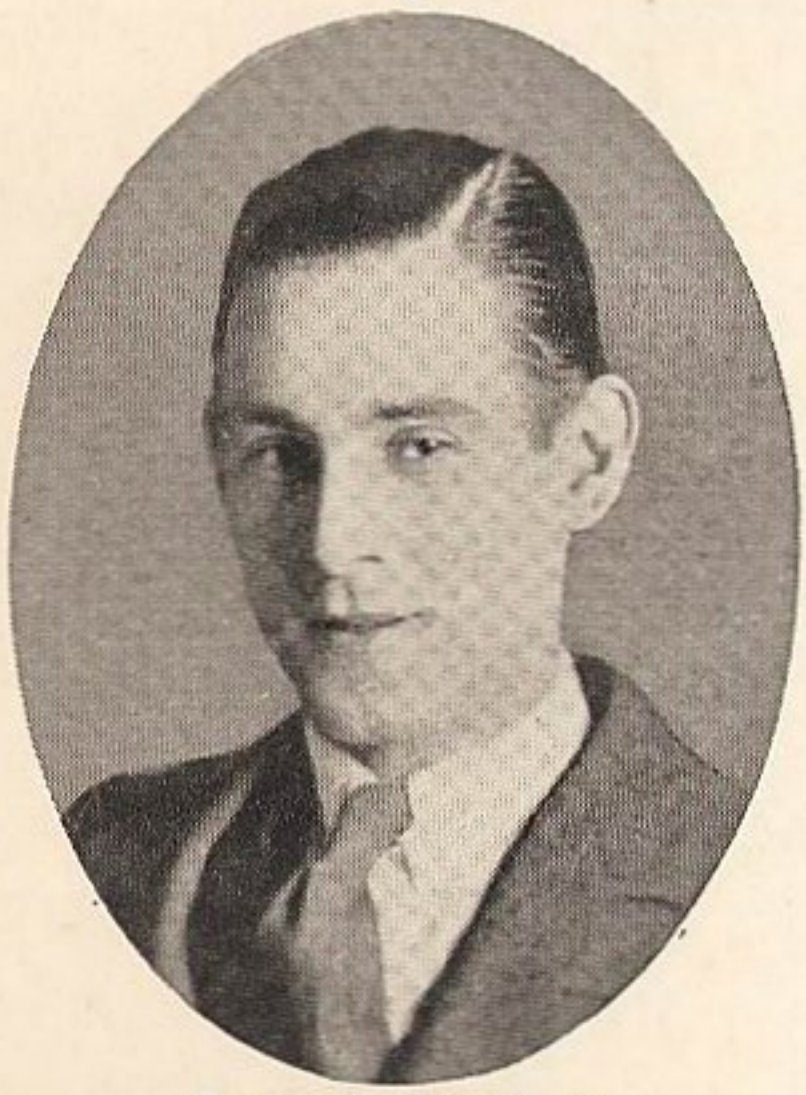


Photo: A. Handford.

4



Photo: W. Nicol Smith, Glasgow.

5

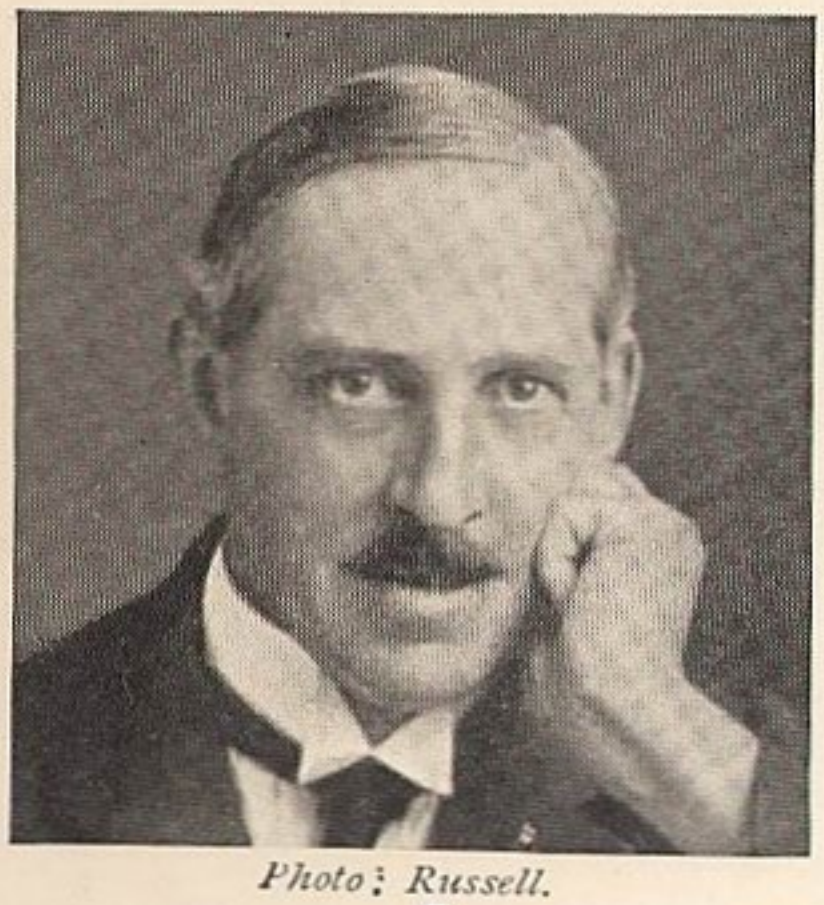


Photo: Russell.

6

1. **Percy Pitt,** Musical Controller, B.B.C.
2. **Capt. C. A. Lewis, M.C.,** Organiser of Programmes.
3. **Major Corbett-Smith, M.A.,** Artistic Director.
4. **L. Stanton Jefferies, A.R.C.M. ("Uncle Jeff"),** Director of Music.
5. **R. E. Jeffery,** Dramatic Producer.
6. **J. C. Stobart, M.A.,** Director of Education.

convince foreign countries of British knowledge and skill would be to erect a station of such power that speech and music could actually be transmitted to those countries. This was done. A set of 6 kilowatts was built at Chelmsford, which, operating upon an aerial suspended between the two 450-feet masts, to be seen just outside the station at that town, succeeded in communicating easily with Madrid. A larger station was then built at the same spot, this of 15 kilowatts, and from February 23 to March 6, 1920, two daily programmes—each of half an hour's duration, consisting of news and vocal and instrumental selections—were radiated in all directions on the same wave-length as the Poldhu station, which, at that time, was employed for transmitting news to ships telegraphically. The programmes were received on ships over 1,000 miles distant, with relatively insensitive apparatus. They were heard on crystal sets by a limited number of persons in various parts of England, and some 300 or 400 experimenters display with pride to-day souvenirs in which are printed their observations on that occasion.

The distinction of being the first artist to broadcast from Great Britain to a foreign country fell to one who has already passed away. He was Mr. Edward Cooper, an employee in the mounting shop at Chelmsford, the possessor of a tenor voice of more than average quality. The first woman artist to broadcast under similar conditions was Miss Winifred Sayer, also of Chelmsford, one of the staff of the Hoffman Manufacturing Company, Limited. The first recruit to the noble army of announcers was Lieut.-Commander W. T. Ditcham, of the Marconi Research Department, already referred to in connec-

tion with earlier experiments. Mr. Ditcham's nightly recital of the railways of Great Britain and their London termini gave much amusement to those who listened to the tests of 1920.

This experiment, of course, was far too good to pass unnoticed by the Press, and the *Daily Mail*, which for some years had taken a keen interest in many branches of applied science, asked Mme. Melba to broadcast, which she did. There were no "tuning buzzers" in those days. The few hundred experimenters who adjusted their receivers to 2,800 metres on the evening of June 15, 1920, heard promptly at 7.10 p.m. something infinitely more beautiful than a note of mechanical origin. It was a prolonged trill from the throat of one of the sweetest singers of the century. Five minutes later there rippled across the æther the stirring sounds of "Home Sweet Home," then "Nymphes et Sylvains" in French, and "Addio" from *La Bohème*.

Next day there arrived from most European countries telegrams containing expressions of wonder and appreciation. At Christiania the signals were so strong that the operator at the wireless station some distance from the town relayed the music by telephone to the principal newspaper offices. In France a phonograph record was actually made in the operating room beneath the Eiffel Tower.

Several other demonstrations were given from Chelmsford during the year. One concert was heard in its entirety at the aerodrome at Sultanabad, in northern Persia, much to the astonishment of the commanding officer and members of his staff. Similar signals were received on a ship in New York harbour, and the Chelmsford wireless telephone was freely talked about throughout the world. Laurenz

Melchior, a Danish operatic singer of international fame, was also amongst those who broadcast from Chelmsford in the summer of 1920.

In view of the stir which had been created by the "stunts" at Chelmsford, the time had obviously arrived to show those responsible in a large degree for the education of the public that the wireless telephone was something more than a plaything, and was rapidly approaching a point when it would take its place in the lives of the people. The Marconi Company erected two stations, each of 6 kilowatt capacity, one at Poldhu, in Cornwall, and the other at St. John's, Newfoundland, and with the consent of the Canadian Pacific Ocean services the company installed a third set of lesser power on the *Victorian*, which, as already stated, carried the British delegates to the Imperial Press Conference. It was whilst in charge of the demonstration on the *Victorian* that there happened what I still regard as my most romantic wireless experience.

On the second day of the voyage, early in the morning, we called up Poldhu and obtained the usual acknowledgment. Being satisfied that all was well, we invited the newspaper proprietors and editors aboard to give us, if they so wished, during the day, some messages for their papers to be dispatched telegraphically. No restrictions were placed on the number of the messages or their length. The editors took us at our word.

Late in the afternoon, when I was "resting," owing to some discomfort caused by a light ship facing a strong head wind, news arrived that some twenty-three persons were anxious to send messages to their offices in England. So up I went to the special telephone cabin and started to call Poldhu.

Then happened what the novelist is pleased to call "death-like silence."

For twenty minutes I tried to coax Poldhu into a reply. My temperature rose, my heart sank, and in a state of perspiration I began to wish that wireless telephony had remained unthought of for another century. Feeling less than the dust and about to abandon the effort, I gave one more shout: "Hallo, Poldhu!" (which subsequently became a sort of slogan on the ship); to my great astonishment a loud voice replied through the headphones I was wearing:

"Hallo, Burrows! I hear you are in difficulties."

The voice was certainly not that of anyone at Poldhu, so I immediately replied:

"Yes; this is Burrows, but who are you?"

Back across hundreds of miles of land and ocean came the answer:

"I am Round, speaking at Chelmsford. I heard you calling me, and gathering that you are having difficulty with Poldhu we are prepared to help you."

To cut short a long story, Captain Round, despite atmospherics, which were fierce that summer afternoon, took the whole of our messages without error and forwarded them to their several destinations. He told me later that it was a pure accident that he happened to have tuned in on the *Victorian's* wavelength at the time I was calling. The explanation of Poldhu's silence was that she had been requested not to transmit, as a French barque had gone ashore on the French coast, and it was essential that there should be no interference with the wireless traffic concerning the rescue.

During this voyage the *Victorian* broadcast at intervals throughout the day and night gramophone

records and other less musical sounds by the two Marconi engineers, Messrs. Tremellen and Allnut, and myself. Our audience consisted of ships dotted about the northern Atlantic over a radius of nearly 800 miles, and it was a common thing, after such items, for the regular wireless operators in the wireless telegraph cabin to come to us with Morse code requests for encores from several points of the compass. The records which appeared to give the greatest pleasure to the North Atlantic audience on those starry nights, were: Harry Lauder's "I Love a Lassie," Kreisler's "Caprice Viennois," Alma Glück's rendering of "O Sleep, why dost thou Leave Me?" and Cobb's "On the Road to Mandalay."

(It will be seen that the same catholicity of taste is to be found in mid-ocean as on land.)

Whilst the *Victorian* was ploughing her way westward, Chelmsford was experimenting in broadcasting news, and at certain prescribed hours we were able to listen and hear those epoch-making tests. The arrangements for receiving these news bulletins in the various newspaper offices throughout Great Britain were made so hastily that there was insufficient time for a mastery of the various difficulties experienced through local electric disturbances, and so it happened that whilst at some distant places the news was received in entirety, at others there were serious interruptions.

As the Post Office at that time did not permit the transmission and collection of news by wireless telephony this idea of disseminating news to newspaper offices was abandoned.

Many distinguished visitors from foreign countries expressed a desire to learn something of this develop-

ment of high-power wireless telephony, and I retain particularly vivid memories of two demonstrations arranged at short notice. The first was for King Alfonso of Spain, who is ever anxious to make himself fully acquainted with the latest scientific inventions. For this demonstration a sensitive receiving set with a frame aerial was placed in a room in the Strand, and Chelmsford was asked to transmit an emergency programme. Alongside the frame aerial was laid out a map of England, showing the relative positions of London and Chelmsford.

The Chelmsford station was in those days transmitting on a wave-length of 2,800 metres, which was relatively close to that of the Eiffel Tower.

King Alfonso arrived to the minute, was shown into the demonstration room, and the peculiar function of the frame aerial was explained to him. He was informed that when the frame was turned in the direction of Chelmsford he would hear the telephony from that station, but when it was turned at right angles to Chelmsford he would have silence.

His Majesty donned the headphones and turned the frame towards Chelmsford. An expression of astonishment passed over his face. Then he swung the aerial at right angles to Chelmsford, and immediately broke into excited comment.

"How funny," he exclaimed, "when I turn the aerial *that* way it is telephony; when I turn it *this* way it is telegraphy."

He was correct. At the moment Chelmsford was transmitting for the demonstration the Eiffel Tower had commenced her eleven o'clock message to all stations, and the frame which had brought in telephony when pointed to the direction of Chelmsford was also picking up telegraphy when pointed to the

direction of Paris. Upon its directional qualities, however, there was no question.

A little later another distinguished visitor was given a similar demonstration. This time it was Prime Minister Nitti, who was representing the Italian Government at the International Congress of Allied Countries. Again the frame aerial was employed, this aerial consisting of a few turns of cotton-covered copper wire around a framework about 3 feet square.

Signor Nitti entered the room in a jocular mood. The function of the frame aerial was duly explained. Pointing to the wire on the frame, the Italian Minister exclaimed:

"The music—it is both by Marconi and Macaroni."

A little while later a demonstration somewhat the reverse of those just described was arranged between Chelmsford and Rome. The Italian journalists in this country were invited to telephone a number of messages by wireless to their editors, and shorthand writers were assembled near Rome to receive these messages. The majority were delivered without incident, but one young journalist was so overcome with the novelty of the experience that he delivered his message in excited tones at something approaching 250 words a minute, whilst thumping the table and gesticulating wildly.

This was too much for the note-takers in the Eternal City.

CHAPTER VIII

"1922"

THE year 1920 also marked the starting-point of a boom in broadcasting in America. For some months past a number of small stations both in the United States and Canada had been transmitting occasional programmes with the object of interesting experimenters. These programmes were just a mixture of music and Morse signals. In Canada, at any rate, nothing more was then permitted. I remember visiting one of these stations in Montreal in the autumn of 1920 and found there an able and enthusiastic staff bound hand and foot by Government regulations.

The first regular broadcasting station to be established in the United States was that of the Western Electric and Manufacturing Company at East Pittsburg, Pa. This station, which was operated at the outset under the call 8 Z Z, is the station well known as K D K A, now working under increased power. The formal opening was on December 21, 1920. The regular nightly programme for some time consisted of the transmission of selected gramophone records.

It was ten months before any other station was operated.

Numerous newspapers and business houses soon saw in the broadcasting medium a wonderful means for advertising their activities. Unhampered by the

restrictions still prevailing in England they equipped their buildings with aerial masts and transmitting apparatus, and commenced programmes of news and musical entertainment, and "Young America," always thirsting for something new, lost no time in taking advantage of this new form of entertainment. It mattered not whether one station overlapped another in wave-length or in hours of transmission, or whether the performance of a classical masterpiece was followed by an appeal on behalf of somebody's soap or pickles. It was all part of a new game.

By the middle of 1923 over 500 broadcasting stations of varying powers and quality of programme were in operation, and had collected around them an audience of approximately two million listeners. Some business houses spent vast sums upon their wireless equipment, even to the extent of duplicating every part; others suddenly found that their expenses were more than they had anticipated, and that the desired advertisement had been obtained. These quietly retired from business, leaving their audiences to their own devices.

This unsatisfactory state of affairs has compelled the American Government to make a thorough investigation of the conditions of broadcasting in the United States, and to frame regulations for its future conduct. The regulations will undoubtedly prove helpful to those stations which from the first have honestly studied their audiences, and have provided programmes of high quality and a great variety of interests. Meanwhile Holland developed a keen practical interest in broadcasting by instituting at Amsterdam two commercial services, one for the frequent broadcasting of exchange rates and stock

market quotations to banks and business houses, and the other for the radiation of news to newspaper offices.

It is an ill wind that blows no one any good. Irritating though it had been for those in Great Britain who were alive to the possibilities of broadcasting to remain inactive whilst the subject was being freely discussed throughout the world, the American experience provided a valuable lesson. It showed the dangers which might result in a densely populated country of small area like our own, if the go-as-you-please methods of the United States were copied.

How were these dangers to be avoided?

The alternatives which came to mind at once were the placing of broadcasting entirely in the hands of the State—an idea still receiving serious consideration in some of the smaller countries of Europe—or the granting of broadcasting rights to a limited number of companies working under a measure of Government direction. From the earliest days the latter system found favour in Great Britain.

It must not be imagined that broadcasting developed in this country by a simple wave of a wand. The process was a tedious one. Prejudices had to be broken down, and very definite evidence provided at all stages that the old-time fears were groundless. In the first instance, largely through the influence brought to bear by the Radio Society of Great Britain, a limited number of licensed experimenters were granted permission to make transmitters with small-power wireless telephone apparatus. They were allowed 10 watts, or about one seventy-sixth of horse-power in electric energy, and

were only permitted to transmit music for test purposes. Some quite excellent performances were achieved. The telephony could often be heard at very considerable distances, and the number of tests requiring the assistance of gramophone records seemed somehow to increase week by week. I regret that space limitations do not permit of a detailed list of these early stations and their owners.

Occasionally a station of higher power than the experimental 10 watts would be granted permission for special demonstration purposes, and then those who had spent their savings in constructing receiving apparatus to listen to small-power stations had the time of their lives.

In March, 1921, the Radio Society of Great Britain made representations to the Post Office, pointing out that the conditions governing the restrictions on wireless telephony in this country no longer prevailed, and that they would welcome some development which would enable the experimentally minded to use their skill in the design and perfection of wireless apparatus. After various discussions occupying the remainder of the year it was agreed that a small broadcasting station of 100 watts should be allowed to transmit from one of the Marconi Company's research stations at Writtle, near Chelmsford, the conditions being that part of the half-hour should be devoted to telephony and part to the transmission of Morse signals, and that between each transmission of seven minutes' duration there should be an interval of three minutes. Captain P. P. Eckersley happened to be in charge of the Research Department in question, and within a very short time from the receipt of the official permit to go ahead the Writtle station, with the call letters **2 M T** (Two Emma Toc, as it was

termed in signalese), began to function. But for the purpose there were no funds worthy of mention, and as one of the conditions of operating forbade advertising by wireless, there was little opportunity of securing assistance under the pretext that a performance by wireless would result in considerable publicity. Occasionally it was our good fortune to come across sporting souls who would give up their Tuesday evenings, take train to Chelmsford, and shake the æther for the sheer love of the thing, but more generally the contributions from London to the Writtle concerts were packets of gramophone records.

But good fortune assumes many disguises. This very absence of material help from London proved the making of the Writtle station. Captain Eckersley, who until then was known only to his most intimate friends as a fount of spontaneous humour, became in a few weeks the talk of Wireless Britain. The Writtle concerts always contained a surprise—a burlesque of something deadly serious, a totally unexpected remark in a transmission of otherwise normal character, or some audacious performance, such as the playing of a gramophone record which had been pivoted at some point other than its centre. How many will be able to forget the one night of grand opera from that Essex village, when the whole company of star singers, instrumentalists, scene-shifters and property men consisted of three, at least one of whom was engaged in transmitting mock interruptions?

Writtle, on October 17, 1922, established the record of being the first British station to broadcast a play, excerpts being given from *Cyrano de Bergerac*.

In the spring of 1922 a rival to Writtle appeared

in the field at uncertain intervals. This was a station known as 2 L O, a 100-watt set contained in a small teak cabinet, and housed in the cinema theatre on the top floor of Marconi House, London. This set, which was of a number of standard transmission products, was used for demonstrations to distinguished visitors, principally from foreign countries. The licence for 2 L O contained a series of restrictions. For a long time no musical sounds might be transmitted, only speech, and at the end of every seven minutes' transmission there had to be three minutes' interval, during which the operator was compelled to listen on his wave-length for messages from Government stations telling him to cease work. These messages never came.

After a while the restriction on music was removed, and permission was obtained from time to time to illustrate by transmissions from this station lectures being given in the London area on wireless telephony, but, with the limited aerial allowance and the heavy screening, the signals from the original 2 L O could only be received within 30 or 40 miles' distance, except with the use of very sensitive apparatus—in fact, the 100-watt station at Marconi House was more difficult to receive in many parts of England than the station of less power at Writtle.

In the summer of 1922 there came indications of a changed attitude towards broadcasting by the English Post Office, the Government mouthpiece in wireless affairs. At once the Marconi Company's engineers commenced work in the designing of what they considered would be the Government's idea of a British broadcasting station. Valves and condensers and inductances and many other fearsome and wonderful things were assembled in a room adjacent

to the cinema theatre at Marconi House, and the little aerial above gave place to one more nearly resembling the substantial aerials used in war-time for the interception of enemy messages. Then came a series of tests, in which the music was provided by gramophone records. The next day's mail and many mails after brought letters from all parts of the country, from the Shetland Isles, from northern France, and even farther afield.

It was evident that an interest had been aroused which could no longer be neglected. Eminent persons wrote in asking that transmissions might be given to aid charities in which they were interested. In one or two instances, in order to show their sincerity, they actually provided the artistes. The artistes taking part in the first real concert from 2 L O were Miss Beatrice Eveline (cellist), Miss Ethel Walker (pianist), and Mr. Chas. Knowles. This was transmitted on June 24, 1922. Applications were made to the Post Office for permission for these special transmissions, and with very few exceptions were granted. A limited number of stunts also received sanction. The first of importance, arranged at the suggestion of the *Daily Mail*, consisted in the broadcasting of a running description of a fight at Olympia between Kid Lewis and Georges Carpentier on May 11, 1922. The fight, however, did not run for very long.

On another and later occasion we transmitted at short intervals throughout two days the progress of the air race around Great Britain, and I received the following "testimonial" from a lady listener:

"DEAR SIR,— You will be pleased to hear how much I have enjoyed your news of the air race. I

have enjoyed equally the three-minute intervals, which have given me time to reach the kitchen and baste the joint for dinner."

Somehow a number of people appeared to derive great pleasure from our early transmissions. From the time when we commenced to broadcast actual artistes to the absorption of broadcasting by the British Broadcasting Company at the end of the year, Mr. L. Stanton Jefferies, who prepared and conducted the musical side of the programme, and myself, were the recipients of thousands of appreciative letters and many monetary gifts for charities to be ear-marked by ourselves.

Looking back to-day I am satisfied that novelty covers a multitude of sins. Two minutes' transmission to-day of a technical quality such as then existed would bring us violent criticism from all parts of the United Kingdom.

From this time onwards our activities received ever-increasing attention in the Press and in public, and many of the foremost actors and actresses gave their services for charity. Our autograph album would make many a collector green with envy. On a single page are such names as Billy Merson, Huntley Wright, Derek Oldham, Harry Welchman, A. Emmett Adams, Ben Williams, Sybil Thorndike, Florence Smithson, Winnie Collins, Ivy Tressmand, Margaret Campbell, Gladys Ancrum, and Winifred Davis, whilst others who took part in our early programmes included George Robey, W. H. Berry, Kinsley Lark, Edna Best, Margaret Balfour, José Collins, and Cecilia Farrar.

In the autumn of 1922 2 L O had a following of possibly 30,000 licensed listeners and a total audience

of about 50,000 persons, but these were spread throughout the country, and were in the main wireless experimenters possessing multi-valve sets.

The greatest event of this period was the broadcasting of an address by H.R.H. the Prince of Wales on October 7, 1922, to those scouts and scouters who had not been able to attend the great rally on the afternoon of that day at the Alexandra Palace, London. In those days we employed for transmission purposes a microphone of very similar construction to that still favoured in the public telephone service, a robust instrument, well suited to speech, unsuited for vocal or instrumental music, and nothing like so sensitive as the microphone now in use. For effective speech this microphone had to be held anything between three inches and one foot from the speaker. To-day, when broadcasting plays, the speakers are often twenty feet from the microphone, and in the broadcasting of operas some of the singers are "up stage" probably twice that distance from the receiving instrument. As no two voices are exactly alike in strength and quality it became necessary for us to make special tests beforehand, and so in the evening previous to the Prince's broadcast we were granted the honour of a rehearsal at York House. A few words from His Royal Highness were sufficient to show that he possessed a broadcasting voice of really exceptional quality, and by five tests we found the ideal distance at which to work. The test served a double purpose, for the next afternoon at the Alexandra Palace His Royal Highness spoke to 50,000 scouts through a similar microphone, his voice being magnified by valve amplifiers and passed through five or six groups of loud-speakers arranged

at intervals along the southern slopes of the Palace grounds. This was the first occasion on which so great a number of persons had been able to hear simultaneously and clearly in the open air the voice of a member of the Royal Family.

The wireless broadcast from York House, St. James's Palace, in the evening was equally successful. His Royal Highness, sitting at his writing-desk in his study, spoke into a microphone, which was connected by about four miles of telephone line with Marconi House and operated the 2 L O transmitter. Within two or three days reports had been received from scout clubs and private individuals over the greater part of England and Wales, confirming the impressions we had obtained regarding the excellence of the Prince's voice. My memories of this historic occasion are intensified by one of those gracious acts for which His Royal Highness is so well known. Three days later there unexpectedly arrived from the Prince's private secretary, Sir Godfrey Thomas, a letter containing the typescript of my preliminary announcement from the Palace with the Prince of Wales's autograph.

Since that occasion the speeches of His Royal Highness at various functions have been broadcast, with the usual comments upon the exceptional quality of his voice.

All through the summer of 1922 reports were appearing in the papers from time to time that broadcasting would become a regular feature within a few days. When in the autumn the country found itself still without regular transmissions signs of restiveness became apparent. Attacks were made in various directions—upon the Government, the Post Office, and the leading electrical firms known to

be interested in wireless telephony. The delicacy of the situation was not generally understood. The facts were, that quite apart from the desire of the Government and the Post Office that the broadcasting stations should be free from the irregularities so apparent in America, the patent situation required much clearing up, as the Marconi Company claimed to possess the rights of many master patents governing wireless telephony. There were also two groups of manufacturers desirous of erecting stations. The first indication that some agreement had been arrived at between this company and other electrical corporations appeared in various newspaper announcements that an experimental broadcasting station would commence tests at Trafford Park, Manchester, on September 24, that this station would be operated by the Radio Communication Company and Metropolitan Vickers, Limited, and that its call letters would be 2 Z Y. The first serious evening concert at 2 Z Y took place on October 31, the artistes being Messrs. Black, Nightingale, Bennie and Wright.

A feature of the Manchester transmitter was the introduction by the Radio Communication Company of silica valves (valves encased in transparent cylinders of silica instead of glass), which by reason of their heat-resisting properties were able to take heavier electric loads in relation to their size, and were reputed to have exceptionally long lives.

A short time later further interest was given to broadcasting in the London area by the appearance on the æther almost nightly of a second London station, having not quite the power of 2 L O. This station had the call letters 5 I T, and it was soon evident that in the broadcasting of certain musical sounds it had some advantage over its rivals. The

station was operated from Norfolk Street, Strand, by the Western Electric Company, a British company associated with an American company of the same name.

Now, whilst to this day British wireless engineers refuse to admit that wireless science has reached a higher point in other countries than our own—in fact, they jealously nourish the faith that Britain still leads in this direction—they were prepared to admit that in the matter of telephone transmitters the engineers of the United States had wider knowledge, and had created finer instruments. Such a state of affairs was only reasonable, for, as has already been indicated, the United States of America were in the unique position of forming a continent of vast extent under one Government. This gave unhindered opportunities for the development of telephonic communication over many thousands of miles and for the study of the special problems relating to long-distance operating. Microphones were evolved of a sensitiveness unnecessary for the relatively short-distance work within the British Isles. The result was that the Western Electric Company of America possessed a microphone eminently suited to broadcasting and without rival elsewhere. The salient feature of this microphone was a steel diaphragm of extreme thinness (about that of a cigarette paper), stretched under considerable strain in a heavy metal frame and establishing contact with carbon granules on each side. The particular virtue of this stretched diaphragm was the fact that it was free from resonance up to about a frequency of 2,800 beats per second, which meant that it would receive the highest notes of a soprano without causing any blurring.

CHAPTER IX

"B.B.C."

APART from the commercial organisation likely to be of value to the British broadcasting movement, fifteen or sixteen other groups or individuals applied for the right to broadcast within the British Isles, and many conferences were necessary in order that justice should be done to all of these. These discussions extended from May 15, 1922, until the beginning of November in the same year. The result of these conferences was the formation of the British Broadcasting Company, the initial capital of which was guaranteed by six great concerns. By this happy arrangement the British broadcasting movement had at its disposal from the outset the combined resources of the several interested organisations.

As soon as the company was registered and the licence from the Postmaster-General finally ratified, the whole of the electrical trade of Britain was invited to take an interest. This state of affairs still exists, and 1,500 firms are now registered as shareholders.

It is not my intention to give in detail the terms of the original licence or the revised terms suggested by a Government committee later in 1923, and subsequently approved. They can be obtained from the Stationery Office or any depot for Government publications. The point of outstanding interest is that they give to the British Broadcasting Company

a definite licence until the end of 1926. The licence requires the company to maintain an adequate chain of stations. It forbids the use of these stations for advertising purposes, and compels the company to return to the General Post Office any balance of revenue over expenditure that may exist after an allowance has been made for depreciation and a maximum dividend paid of 7½ per cent. on the capital. It will be seen, therefore, that the British Broadcasting Company is not in the position of a profit-making concern; it is really a public utility service.

For some time between the Government's decision to sanction broadcasting in Britain and the registration of the company, the preliminary work was carried on by a provisional committee, the moving spirit in which was Sir William Noble, who had recently retired, with well-deserved laurels, from the post of Engineer-in-Chief to the General Post Office, and all are agreed that Sir William's tact played an important part in removing many obstacles from what promised to be a difficult task. The first transmission in which this Broadcasting Committee took an active interest was from the London station, 2 L O, on November 3, 1922, when the ambitious experiment was made of radiating in London a speech delivered in Bristol by the Lord Mayor of Bristol, and conveyed from Bristol to 2 L O on a Post Office telephone line, employing "wired wireless." The term may appear contradictory, and convey but little to the uninitiated, as "wired wireless" is a development, which, although theoretically abounding in commercial possibilities, has, so far, not made the progress that was anticipated. The theory is that by transforming ordinary telephonic speech from

the low (audible) frequency up to a higher (wireless) frequency, this frequency can be superimposed without mutual interruption upon a telephone wire already conveying a message at audible frequency, and that by a reverse process of gearing down at the receiving end one can regain audibility. By a further elaboration of "wired wireless," that is by employing several transmitters tuned to different wireless frequencies, it is possible to conduct many conversations simultaneously over one telephone wire and yet retain secrecy.

On this occasion the Lord Mayor of Bristol spoke by "wired wireless" along a trunk line carrying other conversations, and actually operated the transmitter at 2 L O, so that his voice was radiated over the kingdom by "wired wireless." His speech was introduced by Sir William Noble from London, and was replied to by the Lord Mayor Elect of London, who was sitting at a microphone in the Mansion House. The event had peculiar interest, inasmuch as the Lord Mayor Elect was present some forty odd years before at the first demonstration in England of the ordinary telephone. The demonstration concluded with a recital of Dickens in Bristol and the playing of a violin. Whilst the speech quality was such that all words could be understood, the quality of the musical reproduction was not good.

Meanwhile, the Western Electric station, first tested out in London, had been installed temporarily at the works of the General Electric Company, about $3\frac{1}{2}$ miles north-east of Birmingham. A small canvas-lined studio had also been built in one of the offices of the Research Department of Metropolitan Vickers, at Trafford Park, near Manchester.

November 14, 1922, was the day chosen to com-

mence British broadcasting in the official sense. It was the day of the declaration of polls in connection with the General Election, and the news for that evening consisted in the main of election results. The next day the Birmingham station, 5 I T, began to operate, and within a week 2 Z Y had also joined in the work. The London station continued in my charge (Mr. Jefferies arranging the musical programmes and sharing in the pleasures of the children's hour). Birmingham fortunately secured the direction of Mr. Percy Edgar, already well known in the Midlands, and Metropolitan Vickers appointed to the Manchester station Mr. K. A. Wright, a young graduate of Sheffield, who, since his earliest days with the firm, had shown a keen interest in music and its propagation by wireless.

One cannot look back upon those early days without a smile.

In three different parts of Britain there were functioning nightly three groups of men who had never met, who had no precedent to work upon, and not the faintest idea of what the future would bring forth in the matter of a balance-sheet. They had, however, a common enthusiasm for their work, a desire to demonstrate to the public the extraordinary, but in the majority of instances unsuspected, possibilities of broadcasting; and in view of the financial uncertainty they had the delicate task of obtaining the best available artistes at the lowest possible fee. We in London well remember, too, that as no permanent appointments had been made, and we had no desire to burn our boats, the broadcasting duties were carried out for some six weeks in addition to our ordinary office routine.

There was, however, one point at which the three

stations worked in unison, and this was the radiation of two nightly news bulletins, specially prepared by Reuter from material supplied to them by the Press Association, the Exchange Telegraph Company, and the Central News, and from Reuter's own foreign news correspondents. This arrangement was the outcome of conferences between the Postmaster-General and the two societies protecting newspaper interests. The news in those days and for months to follow was telephoned twice nightly from Reuter's to the provincial stations over the ordinary trunk lines at the standard rates.

But London, Birmingham and Manchester were not capable of providing an adequate service for the whole of Great Britain. Such a service could only be given, when employing transmitting stations of limited power, by throwing a chain of stations across these islands from north to south, the sites being so selected as to give to a maximum number of people the possibility of receiving the programmes on small and inexpensive apparatus. The Postmaster-General stipulated for a chain of eight main stations. In addition to London, Birmingham and Manchester, Newcastle, Cardiff, Glasgow, and Aberdeen, and a site on the south coast were suggested and approved. The engineers who selected the Newcastle site promised that the Newcastle station should be operating before Christmas, 1922, but had forgotten to communicate their promise to those more intimately associated with the organisation. A promise is a promise, and so directly the facts became known speedy action was necessary. Mr. J. C. W. Reith, now managing director, who had been appointed general manager a few days before, was known to be coming south from Glasgow. The situa-

tion was explained to him by telegram, and an appointment was made within a few hours. Newcastle, under the direction of Mr. Tom Payne, had its first concert, as promised, on Christmas Eve, but the studio was a stableyard and the transmitting apparatus was carried on a motor-lorry.

The initial appointments to headquarters staff were:

General Manager, Mr. J. C. W. Reith.
Secretary, Mr. P. F. Anderson.
Deputy Director of Programmes, Captain C. A. Lewis.
London Station Director, Mr. L. Stanton Jefferies, and myself Director of Programmes.

The post of Chief Engineer was also offered at the time to one familiar with practically all departments of wireless practice, but the strong vein of caution in his character prevailed, and the post remained open for some weeks until offered to and accepted by Captain P. P. Eckersley.

CHAPTER X

THE FUN BEGINS

With these appointments there ended the first short chapter in British broadcasting, one rich in memories for those who took part in it. Already one realises that the stunts in those days, which set half the papers in the country talking, were often trivial things compared with what has happened since, and have yet to happen; but it has also to be remembered that we had to work with relatively primitive gear in rooms not built for the work, and practically without funds. There was one thing that everyone possessed, enthusiasm, that master antidote for late hours and irregular meals.

I am sure no one in this world could have had a happier time than we did at 2 L O during the several months of 1922, in which the station was tuning up for her more serious work. Our unseen audience, although only a few thousand strong, consisted in the main of wireless enthusiasts who understood our difficulties and who were always ready to give advice and sound criticism. They were a typical British sporting community, open handed, highly appreciative of all our efforts, and always ready to take their share in any development work in which they could play a part. One evening I opened the programme by reading those lines from Longfellow, so singularly appropriate to broadcasting:

As one who, walking in the twilight gloom,
Hears around him voices as it darkens,
And seeing not the forms from which they come,
Pauses from time to time, and turns and hearkens.

So walking here, in twilight, O my friends!
I hear your voices, softened by the distance,
And pause, and turn to listen, as each sends
His words of friendship, comfort, and assistance.

. . . . . .

Therefore I hope, as no unwelcome guest,
At your warm fireside, when the lamps are lighted,
To have my place reserved amongst the rest,
Nor stand as one unsought and uninvited!

Within ten minutes (almost a record time for a trunk call over so great a distance), the telephone bell rang in the adjoining room. It was a message from the far side of Liverpool: "Would Mr. Burrows like to know how much the 2 L O transmissions are appreciated at our fireside? If so, will he listen for a minute? We are going to place our telephone mouthpiece beside the loud-speaker on our mantelpiece." And in less than thirty seconds, sitting in the neighbouring room to our studio in the Strand, London, I was able to overhear from this Lancashire fireside what was actually happening within three yards of me, but out of earshot owing to the thickness of the wall.

Early tokens of appreciation were received from a Cambridgeshire village, from a Canadian ex-soldier who had lost his health in the service of his country. He had been badly gassed on the Western Front, and was lying in a hut in a field on the Cambridgeshire heights. From the garden surrounding his hut there came to us regularly freshly cut flowers, a thank-offering to those whose voices and whose music had

brightened his bed of sickness. Almost with the same regularity came other gifts of flowers from a little niece in the hills of North Wales, who listened to our early efforts in the children's hour, and whose childlike freedom of expression took this practical and delightful form. The most valuable orchids would not have been more carefully tended or more closely treasured than the flowers from Cambridgeshire and Wales.

Morning after morning brought us packets of letters couched in baby language, smudged with ink and finger-marks, and bearing many characteristics of a genuine outpouring of the heart.

We have often talked of fairyland in the children's hour, but it was, indeed, a fairyland with which we were in contact in 1922. I would not suggest for one moment that the child attitude towards broadcasting has changed since then. The uncles and aunts are still the recipients of many delightful little tributes to their efforts to entertain; in fact, these tributes are often embarrassing, as they are not invited, and any reference to them must naturally bring uneasiness to these little hearts, equally charitably inclined, which are unable, for financial or other reasons, to express their feelings in the same way.

It was for the amusement of these dear little folk that the first specially written wireless play, *The Truth about Father Christmas*, was broadcast (with effects) in this country. This was performed in the London studio at 5 p.m. on Christmas Eve, 1922, with the writer in the rôle of Father Christmas. The authoress was Mrs. Phyliss M. Twigg, of Ventnor, whose interesting series of stories, the "Tales of a Fairy Dustman," was also broadcast

at a later date. The first religious address was also given to children the same evening by the Rev. John Mayo, vicar of Whitechapel.

But our early post-bag was by no means confined to correspondence from youthful listeners. Hour after hour letters rolled in from all parts of the country, a number of them distinctly humorous in character, others so strange as to leave one guessing about the mentality of their authors. There was the quite common case of persons complaining that broadcasting was injuring their health. One correspondent declared that she had seen birds drop dead in hundreds when flying in line with wireless waves. Another wrote to thank us for saving his valuables from the attentions of a burglar. He had been sitting listening for some time. At the interval he took off his phones and went into another room, only to interrupt a visitor who was under the impression that the house was empty, and whose sole interest appeared to be in the collection of the jewellery it contained.

Then we also had visitors.

One morning a gentleman of position walked into my office and offered in all seriousness to pay the expenses of sending a message to Mars. We were unable to oblige, as he indicated that it was necessary that our wave-length should be raised for this particular message to 35,000 metres. To show the bona fides of his desire he produced the typewritten text in what was stated to be the orthodox Martian language.

Less than a month later a dapper little man, a stranger, but with a familiar name, was announced. He said that his business was urgent.

However busy we were, we always endeavoured to

extend the courtesy of a hearing to visitors. Entering my room this gentleman apologised for taking up the time of one so fully engaged. His story, he said, was a long one, but could be boiled down into one sentence. His wife had been abducted that morning, together with many thousands of pounds, which were the joint property of the couple. Would I broadcast the facts?

Here was a poser. About the genuineness of my visitor there appeared to be no question, but was British broadcasting at its outset to become a sort of verbal personal column or a lost property office? It was lunch-time, and my mind worked rapidly. Turning to my visitor, I suggested that he should see the Chief Commissioner at Scotland Yard, and if Scotland Yard considered that national interest would be served by broadcasting the facts we would readily do so.

No more was heard, but next morning the newspapers reported the discovery *in the sea on the South Coast* of someone having the same name as my visitor the previous day.

About the many inquiries received from sentimental folk regarding the ages and domestic life of the early broadcasters we will say nothing, except that some of those communications certainly added to the joy of living in those times.

The opening of chapter 2 will never be forgotten by those personally concerned. For some weeks between the formation of the Provisional Committee and the actual registration of the company I had been concerned with a few others in the selection of a site for headquarters. The engineers had limited the area of search to one-mile radius from the

Aldwych—a smaller distance if possible—as this was considered the maximum length of telephone land line that could be employed between the studio and transmitting station without serious risk of distortion.

Some strange places were visited. One of them which remains vividly in my mind was a gold "flatting" mill, lying in Hop Gardens just east of St. Martin's Lane, in the heart of theatre land. In this mill, which apparently had been in operation for hundreds of years, gold rolling and beating had been undertaken, and on the conclusion of operations every piece of flooring had been torn up and burned, with the object of recovering the precious metal. The result was that the building resembled in many respects one that had been gutted by fire. Exposed to view in the base of the building was a basin-like formation, which had been moulded by the hoofs of horses walking round and round a capstan, providing the power for the mill, in the days previous to steam, London is, indeed, a wonderful city. How little we know of what is happening behind the walls in many of its best-known thoroughfares.

After much tribulation and argument as to whether the British Broadcasting Company would really be able to afford it, a limited number of rooms were secured on the second and top floors of the western and northern wing of the Institute of Electrical Engineers, at 2 Savoy Hill, but these rooms required many alterations and certainly decoration, as they had not been in use since the war.

By kind permission of the chairman and directors of the General Electric Company we secured the loan of a room and a little ante-chamber on the second floor of this company's headquarters in Kingsway.

In this one room there crowded together the secretary, the programme department, the accountants, and all the typists, roneoing and filing clerks. The general manager occupied the adjacent cubicle. We were joined at a later date by Captain Eckersley, who had been appointed chief engineer.

Six telephones were allowed us, and these rang almost continuously throughout the day. In addition to this a queue of manufacturers, retailers and others were waiting at all times for information respecting licences, transfer of sets, or some other aspect of broadcasting with which they were interested, and so persistent were our visitors in their desire for information that it became necessary to erect barriers between them and the distracted staff. Throughout the day we worked like lunatics in a pandemonium such as I hope may never fall to anyone else's experience, and at five o'clock, or thereabouts, such of us as came within the category of "uncles," dashed down Kingsway to our temporary studio to give a few cheery words to the children of the British Isles, or, at any rate, to such as came within range of the London station.

We had no Press representative in the early days, and it fell to the programme department to supply, as far as lay in our power, the ever-increasing thirst for news. Even here we must have appeared as maniacs rather than as reasonable beings. We had extraordinary interruptions, ranging from men who had discovered a wireless means of putting an end to all future wars, to palmistry experts who were prepared to give us the true stories of our horrible pasts and an indication of the future. Needless to say, in view of the hectic life we were living we accepted the invitation so far as it applied to the future.

As the work increased so the staff increased, and there arrived a time when literally it became necessary to place one's hat on the top of one's walking-stick against a wall in order to find room for it.

Things might have been easier in these early days except for a singular stroke of "fortune," which gave an impetus to the broadcasting movement, but at the same time created difficulties in a quarter from which they had been least expected.

Amongst the keen amateur wireless transmitters at that time was Mr. W. J. Crampton, of Weybridge, a consulting engineer, whose professional activities extended to Covent Garden Theatre as well as other important places. Mr. Crampton suggested that it might be possible to arrange to broadcast excerpts from the performances of the British National Opera Company about to take place at Covent Garden. We met at lunch at the Metropole, and I naturally seized upon the idea, as it appeared to have remarkable possibilities. Time was short, but the opportunity was too good a one to be missed. Western Electric microphones were hired for the purpose, and Sir William Noble obtained the immediate assistance of the postal authorities in installing a special underground line between Covent Garden and Marconi House. This line, about a quarter of a mile long, encased in leaden tubing, was completed under the supervision of Mr. Rumaine in thirty-six hours, and we were thus able to broadcast to the far Shetland Isles the grand opera from the Royal Opera House. Extracts from nine operas were radiated during that first season, which culminated in performances in which Mme. Melba herself took part, and their intelligibility to the masses was helped by the use of a supplementary microphone in the prompter's box,

where the story of the play was outlined by Captain Lewis before each act. The entries and exits of the principal characters were similarly announced from time to time. The idea, however, did not find whole-hearted support in really musical circles, and we received a letter one morning threatening death by shooting if any interpolations were made during *Valkyrie*. As our days were already lively enough without any shooting incident, *Valkyrie* passed uninterrupted.

The novelty of grand opera by wireless produced a great sensation, and within a few days suggestions, not altogether uninspired, were received from various quarters for the broadcasting of other performances in the great London halls and theatres.

Again the General Post Office engineers showed how smartly they could work, and within a few weeks quite a network of special lines for broadcasting purposes was in existence beneath London's pavements. Pantomime, musical comedies, and other musical plays were broadcast in turn, giving delight not only to listeners, but also to box-office officials. As a result of broadcasting excerpts from three plays we were able to trace from the written evidence of listeners the sale of over 3,000 seats to persons who otherwise would not have visited the theatres concerned, and in one case, that of *Battling Butler*, we received a letter stating that solely as the result of broadcasting twenty-one seats had been booked by the writer. Being keen on confirming this we telephoned to the box-office. The facts were admitted.

Then suddenly there came a complete reversal of policy on the part of the theatre managers. Instead of advances being made to us for the broadcasting

of plays it was publicly announced that the Theatrical Managers' Association and other kindred organisations had decided that none of the plays produced by their members should be broadcast, either from London or from the provincial stations.

The action taken compelled the British Broadcasting Company to seek its own means of providing dramatic performances by wireless. It hastened the development of a new technique.

The B.B.C.'s earliest serious efforts in this direction took the form of scenes from a number of Shakespearean plays performed on Shakespeare's birthday by members of the British Empire Shakespeare Society, under the direction of Professor Acton Bond. Later in the year three or four of Shakespeare's masterpieces were transmitted wirelessly. In this Miss Kathleen Nesbitt collaborated with Captain Lewis and took a prominent part. The plays were a source of much pleasure to those who are interested in Shakespeare.

Then Mr. Milton Rosmer produced a wireless version of Gertrude Jennings' farce, *Five Birds in a Cage*, which is built on the situation following a breakdown in a tube lift. Mr. Nigel Playfair followed with three short plays, one specially written by a young playwright who had been successful in *Grand Guignol*, depicting the plight of two lovers who find themselves in a mine disaster. I think all who heard this first attempt at building up a really dramatic situation entirely by sound effects will admit that it was very thrilling, and opened up a wide range of possibilities. A few weeks later Mr. Lewis Casson, the husband of Miss Sybil Thorndike, another skilled producer, still further developed the technique with a variety of plays. His outstanding

effort was a masterful treatment of Maeterlinck's *Death of Tintagiles*, and I do not fear contradiction when I express the doubt whether this play could ever be so effective on the stage as when heard across space by wireless.

Finally, early in the present summer the Broadcasting Company offered money prizes for plays specially suitable for broadcasting, the conditions being that the company should hold the broadcasting rights for Great Britain of the successful plays for a period of twelve months after the date of the first performance by wireless. This competition brought forth 900 entries, some, as had been expected, being quite unsuitable for broadcasting and of doubtful value to any other artistic medium, but it also had the desired result in producing a number of really promising efforts, and of indicating the whereabouts of talent which, with a little special training, is likely to produce a really healthy growth of British wireless dramatic works.

An experiment was also made in providing a natural background of sound to a specially written episode. For this purpose a fancy-dress ball at Covent Garden was chosen. A box was taken at the theatre, and a mock "proposal" was broadcast from the box, with all the sounds of revelry in the background. The little episode, specially written by Captain Eckersley, was successful, even to the extent of annoying a few who lacked the sense of humour, and it is highly probable that many wireless plays of the future will have as their setting the actual sounds occurring in everyday life in such a place as may be chosen for the play in question. This does not mean that a little romantic sketch centred around a holiday at the seaside would require the performers

to make a special journey to the coast. The performers would remain in the studio, but the engineers would go to the coast and place a second microphone within sound of the waves, of the pierrots, and such other noises as contribute to the conventional holiday. The piecing together of the dialogue and the natural setting would be the work of a control engineer, sitting in the studio ante-room. By the use of levers controlling resistances he would cause the sound of the sea to become prominent or to fade into the background, according to the requirements of the situation. In many cases there will not even be land lines between the distant microphones and the studio. The necessary sounds, possibly street sounds or the noises of the railway station, will be picked up and broadcast by a portable wireless transmitter, received wirelessly at the studio and employed as required.

I can imagine an interesting competition being centred around the employment of a portable wireless station. For this purpose the station might be travelling around London to various localities having distinctive noises, the listeners being invited to state where the transmitter happened to be at certain specified times during the evening. I wonder whether the sense of hearing is as easily deceived as the sense of smell?

Do you remember the game of childhood, that of trying to identify, when blindfolded, the contents of a number of small bags hung from a line?

About this same time it became evident that on the purely musical side of the programmes there were going to be complications, quite apart from the usual problems surrounding rights of performance. Certain concert organisations proclaimed their halls

"out of bounds" for broadcasting purposes, and indicated to artistes that if they accepted engagements under the British Broadcasting Company they need not look for engagements at the halls under their control.

There was a British organisation, including several artistes of considerable reputation, which was sufficiently well equipped to make a stand against this new threatening of tyranny. This was the British National Opera Company. The principals of this company met and threw in their lot with the B.B.C.

I would like to place on record at this time the names of those of the B.N.O.C. who stood by us in those difficult days. They were: May Blyth, Gertrude Johnson, Doris Lemon, Beatrice Miranda, Constance Willis, William Anderson, Walter Hyde, William Michael, Robert Parker, and Andrew Shanks. Other well-known London artistes who helped us in those days included Carmen Hill, Daisy Kennedy, Gladys Palmer, Winifred Fisher, Sophie Rowlands, Beatrice Eveline, Grace Ivell, Vivienne Worth, Helena Millais, Kenneth Ellis, John Huntingdon, Tom Kinniburgh, Joseph Farrington, George Parker, Harold Williams, John Van Zyl, Maurice Cole, John Henry, Chas. Penrose, Ronald Gourley, Vivian Foster, Chas. Wreford, and Messrs. Pitt and Marks. Many other artistes enjoying popularity in the provinces also willingly gave their services to the B.B.C.

Meanwhile the majority of music publishers, although insisting, through various organisations, upon the payment of royalties for the privilege of broadcasting their works, decided to give broadcasting a trial. Our argument was that, by broad-



Photo: Reflex Studios, Parkstone

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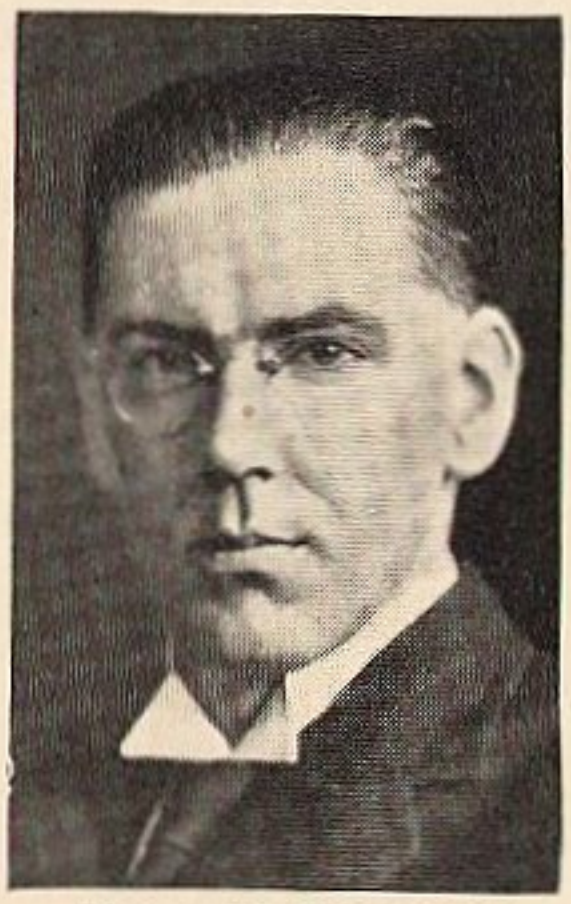


Photo: W. Nicol Smith.

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Photo: Allied Newspapers, Ltd.

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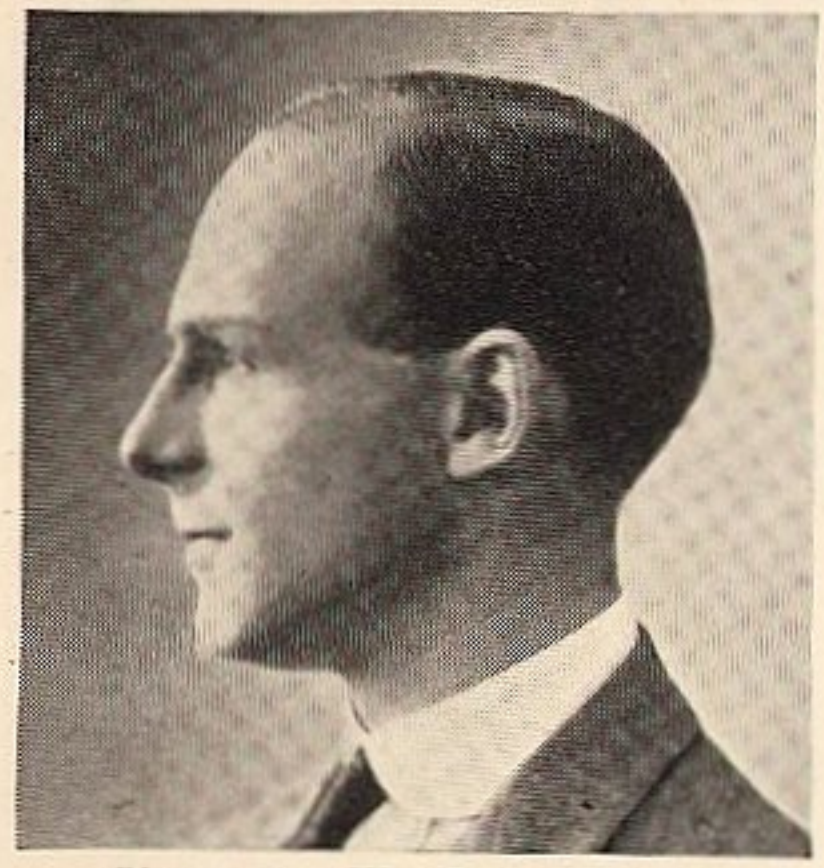


Photo: Hay Wrightson, London.

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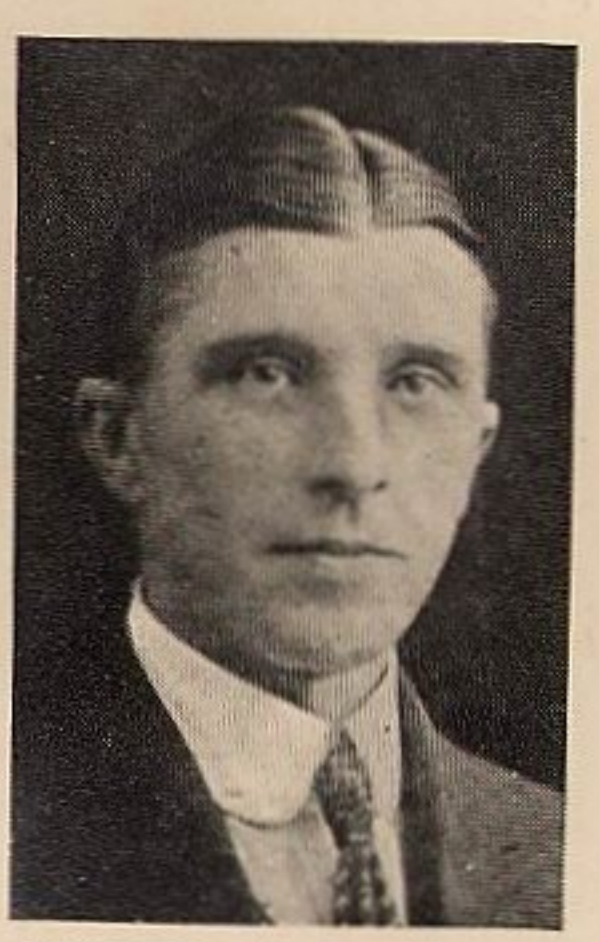


Photo: Jas. Bacon, Newcastle.

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Photo: Archie Handford.

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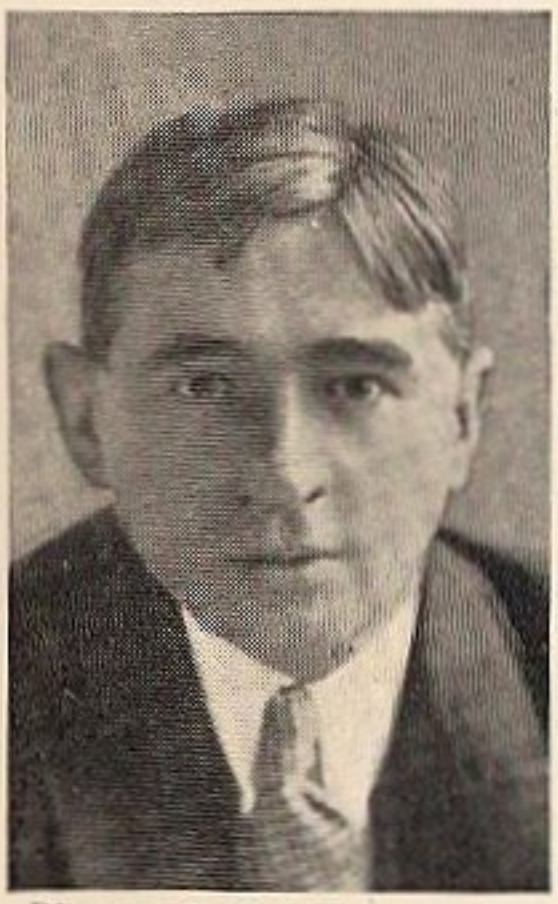


Photo: Archie Handford.

8

1. **B. Fryer,** Director, Bournemouth.
2. **H. A. Carruthers,** Director, Glasgow.
3. **B. E. Nicolls, M.A.,** Director, Manchester Station.
4. **Percy Edgar,** "Uncle Edgar," Birmingham Station.
5. **R. F. Palmer, B.Sc.,** "Uncle Rex," Director, London Station.
6. **W. Lynch Odhams,** Director, Newcastle.
7. **H. Parker,** Editor, "Radio Times."
8. **W. C. Smith,** Publicity Manager, B.B.C.

casting music of merit, whether of the simple or more complex order, the public would be educated to a fuller enjoyment of musical performances, and with this growth of interest they would be freer in their purchase of musical compositions. This argument has been borne out in practice, and applies not merely to printed music, but to permanent records of musical performances for gramophone reproduction.

At the same time that the concert agents were emphasizing their opinion that broadcasting meant ruin to the British music trade, letters giving evidence to the contrary were arriving from all parts of the country. The first and most striking came from a Midland town about 100 miles from London, where a business man in his luncheon hour entered the local music-shop and asked for a copy of a well-known descriptive piece which had been played on the previous evening by the band of the Royal Air Force. The music-seller expressed regret that he was out of stock, but said he could obtain the piece in a day, and then as an afterthought he said to the would-be purchaser:

"Do you happen to have a wireless set? I ask this because you are the thirteenth person this morning who has ordered the same piece."

Later on a music-seller, whose shop is within sight of St. Paul's Cathedral, told a visitor that he could almost indicate the broadcasting programme of the previous night by his sales on the following day.

A third and even more gratifying indication of what broadcasting was doing for the music trade came to us in the early summer of 1923, from the manager of one of the most important music publishing firms in the United Kingdom, who informed us that whatever might be said to the contrary

broadcasting was increasing the demand for printed music.

After all, this was only to be expected. There are many examples of the stimulus given by applied science to partially developed human desires. It cannot be said that the growth of tube railways, motor-omnibuses, or taxi-cabs has resulted in an injury to any one of these types of public transit. On the contrary, they have assisted one another in developing the travel habit, and whilst many a Londoner would be more fit physically if he returned to the old-time practice of walking over short distances, he prefers to-day to jump into a taxi or a tram or omnibus, or dive underground into a tube railway when he has to make a journey of more than two or three minutes' duration.

There is, of course, the argument of the concert agent, that a great artiste would lose drawing power in the case of concerts where high charges were made for admission, if he or she made everyone familiar with his or her powers through the broadcasting medium.

This I believe to be a fallacy.

If an artiste really possesses exceptional powers, and these are made familiar to the public by broadcasting, there will be an instant demand by the public (whose musical outlook is growing wider every day), to see that artiste in the flesh, and hear the performance at close quarters. I can no more believe that a real lover of music would be content to sit at home and listen to Tetrazzini, Paderewski, or Battastini than that a follower of grand opera would be satisfied for all time by the wireless version, however correct that version may be from a purely musical point of view.

The world's greatest musicians have attained their recognised positions in their respective spheres not purely on their technical ability, but because in the interpretation of the composer's art they bring into play exceptional powers which combine together to form what we term "personality." A broadcast performance can only indicate the existence of a distinctive personality and whet the curiosity of the listener. Who would suggest for a moment that Caruso, Gallicurci, or Alma Glück suffered one iota as the result of the gramophone records literally broadcast throughout the world? Yet those records have an advantage over the broadcast performance in that they can be repeated over and over again in the home of their possessor.

CHAPTER XI

A NIGHT IN THE STUDIO

LET us spend an evening in the studios at 2 Savoy Hill. I say studios because there are two in London, each possessing special characteristics, and therefore used as occasion requires. For the sake of this illustration we will take an evening when the programme includes both plays and music, apart from the usual informative talks and routine transmissions, such as news bulletins, weather forecast, and time signals.

For some time before our arrival the caretaker and commissionaires have been putting the final touches on the rooms, running the fans at full tilt to ensure that the air is as fresh as possible, placing the sitting accommodation according to official instructions, fixing the music stands where required, and making certain that every light is in order.

We will visit first of all the large studio on the first floor. This is the newer of the two, and was constructed in the late autumn of last year, when experience had shown that the first studio, two floors above and immediately under the roof, was really too small for the variety of performances then being given and also too heavily damped with drapery to please the average listener. The new studio, which is about 45 feet by 30 feet in size has only one thickness of drapery, and has just a suspicion of resonance. But what instantly strikes the visitor is not only the ample dimensions, but the unusual

and pleasing decorative scheme. The walls, about 18 feet high, are draped in a French grey, an almost neutral colour. On each of the longer walls have been built two full-length dummy windows, draped with long curtains of a fascinating emerald shade. The windows have a background of silver foil, and in front of the window-frame there hangs an orange-coloured network. Surrounding the windows and hidden by the emerald drapery are numerous electric lamps, giving a blaze of light. The total effect is one of a flood of golden sunlight. The carpet is patternless, but of a deep, restful blue, whilst overhead is a canopy of stone-coloured canvas, supported by a framework of Florentine coloured carving, representing garlands of flowers and fruit. Two grand pianos, differing in "brilliancy," are there for the choice of artistes. A set of tubular bells stands in one corner. Various lounge chairs and divans are placed against the wall, and at intervals are tables carrying vases of quaintly designed artificial flowers. On the wall at the south end of the studio hangs a chronometer.

The microphone, on its four-legged trestle with rubber-tyred wheels, stands about 6 feet away from the south wall.

The story of this microphone, which is gradually being introduced to all stations, is itself one of the romances of wireless. It is not in the nature of English engineers to admit defeat by America, but there was no question that when broadcasting commenced in this country the Americans had an easy lead with their stretched diaphragm microphone. This was sufficient. Captain Round, whose work in connection with the Battle of Jutland has already been described, immediately threw aside other im-

portant research, and retiring into obscurity worked day and night with the object of restoring once more the British lead. Taking as a basis a war-time invention by a Mr. Sykes, he had developed in a few weeks an instrument which is generally regarded as surpassing in performance anything yet evolved elsewhere. This is an electro-magnetic microphone, which not only gives faithful reproduction throughout all musical frequencies, but is free from hiss when the currents coming from it are highly magnified. It consists of a pancake-shaped coil of very fine aluminium wire suspended between the central pole-piece and pot-shaped outer container of a powerful electro-magnet. The sound waves shaking the pancake coil create within that coil electric currents which are perfect electrical counterfeits of the original sounds. These currents are subsequently magnified as described in another chapter. In order that the microphone shall be free from influence other than the studio sounds, the Marconi Company suspend the electro-magnet in a sling of soft spongy rubber.

On the western wall, within a few feet of this microphone, hangs a pair of headphones and an electric bell-push. Over the double-folding doors at each end of the room are electric lamps with red bulbs.

It is five minutes to seven. The announcer, with a packet of documents in his hand, containing, if he is fortunate, the first news bulletin, runs down the broad stairs from his office above, assures himself through the commissionaire that everything is ready, and arranges his papers on the piano nearest the microphone. He looks at the clock, which

approaches half a minute to seven, and stepping across the room picks up the headphones, by which he is able to judge what is being transmitted. He hears the conclusion of the shrill buzzing sound which is radiated for two minutes to enable valve users to adjust their sets to their most sensitive positions.

Suddenly the chimes of Westminster break upon his ears, followed by the deep, sonorous and slightly harsh note of Big Ben. As this great bell shakes under the seventh blow he returns the headphones to their rest, and looks towards the entrance door. The red light flickers, an indication from the engineers that all is clear, and they are awaiting the studio transmission. A double press on the bell-push gives to the engineers their desired signal, and they in turn respond by switching on the red light permanently. Red lights are also automatically lighted outside and in the room above the studio. They ensure silence around the studio.

The announcer takes a chair, seats himself in front of the microphone, crosses his legs, and starts off with the well-known formula:

"This is the first news bulletin, copyright from Reuter, Press Association, Exchange Telegraph Company, and Central News." Then, with apparently as little effort as though he were reading aloud to a friend or acquaintance, he details the events of the day.

But I have omitted a point of interest.

Were not the first words, "London calling the British Isles?" If London is calling the British Isles, then this must be more than an ordinary happening. It is. We are witnessing what is known as a simultaneous broadcast.

For this purpose the microphone in the studio is connected, through the amplifier, not merely with the London station, or the London station and its satellites at Edinburgh, Liverpool, Plymouth, Leeds, Bradford, Hull, Nottingham and Stoke-on-Trent, but with every other broadcasting station in the British Isles. It is linked physically by thousands of miles of copper telephone wire, passing over mountains, down valleys, along coasts, and across moorlands to counties as remote as Aberdeenshire and Devonshire.

Here we have a young man, seemingly undisturbed by his responsibility, seated maybe in a negligent attitude, addressing an unseen audience of perhaps two or three million persons. Many a distinguished visitor in the studio has been more impressed by this incident than by anything else he has seen.

But there is another side to the picture, with which in the past I was only too well acquainted. Announcers, being human, may not be equally affected by the responsibilities of their position when addressing the British Isles. It is, in fact, a good thing for them if they do not give a thought to the dimensions of their unseen audience, but content themselves with reading what they have to read in the best English at their command.

Just imagine the position in which the announcer often finds himself.

He is handed the latest news bulletin, partly complete, about five minutes before it is due to be delivered. In that five minutes he is called upon to discuss some unexpected detail in the running of the night's programme. The first paragraph which comes to his attention is one perhaps dealing with a political crisis in Czecho-Slovakia. Half a dozen

place names, strange to the eye, and looking as though they had fallen accidentally from a child's alphabet box, are scattered throughout the paragraph, together perhaps with the names of native budding politicians. News paragraph number two tells the story of another earthquake in some part of Japan.

So there you are. On the one hand you have the announcer sitting in a negligent attitude before the microphone, and at the other end millions of people ready to catch him up, and amongst them some who will write next day, even to the chairman of directors, suggesting an immediate change of staff and the substitution of one who will be so well educated that no place, name or surname in this world of ours is strange to him.

I am prepared to assert that there is no more exacting test of physical fitness and nervous condition than the reading of a news bulletin night after night to the British Isles. Billiards, rifle shooting and golf are all fairly good tell-tales of general health and confidence, which is governed by fitness, but let a man be worried with a slight catarrh of the throat or a roughness due to London smoke, and his uneasiness will betray to listeners before he has spoken a hundred words.

The B.B.C. has been told that it possesses the greatest influence over the speech of the British people. This is an awful thought, but as it possesses more than an element of truth the company is ever vigilant for men who can be relied upon to do justice to this responsibility. Trials have been given to many persons. Some of the most promising have failed because their voices, pleasant in ordinary conversation, contain characteristics which are irritating

when listened to by wireless. Others, starting off with all the confidence in the world, have lost their nerve under the exacting ordeal, and have gone from bad to worse. For the few who have survived, be charitable in your thoughts. They are but human.

Midway through the news bulletin the studio door opens, despite the printed warning: "Entrance is forbidden while the red light is burning."

A cheery soul steps quietly in.

This is the typist-stenographer, who receives the official news bulletins from Reuter, and distributes the district news to the several stations by private wire, according to the requirements of the evening. She also brings the S O S or distress messages from their various sources. At this moment she is bearing one for the recall of an only child to her father in some remote part of the country. It is perhaps the sole survivor of many of a similar character, as the urgency is certified by a medical officer, and all other means of communication are known to be closed at the moment. At the end of the news bulletin this S O S is read slowly, so that every detail may be memorised by listeners in the area to which it particularly appeals. Of the urgent messagès broadcast by us from our various stations I could tell many interesting stories. For the present purpose one will be sufficient.

The first studio at 2 Savoy Hill was opened officially on May 1 last year. This studio was actually in use for an entire programme on Sunday, April 29, upon which Sunday evening I happened to be in charge. A few moments before the minister was due to deliver an address bearing on Industrial Christian Fellowship a telephone call came from the Middlesex Hospital, confirmed by a medical

officer, giving information to the effect that there was lying very seriously ill a man whose nearest and dearest relative was living in the little village of Flitwick, near Ampthill, in Bedfordshire, which village was entirely isolated at that hour on Sunday evening. We broadcast the message as received.

Within a few minutes no less than thirty persons had thrown aside their own particular plans for that evening's comfort, had taken the light to the garage, started up the car, and had set out upon a forty-mile journey to the village in question. High-powered cars, low-powered cars, cars of the nobility and cars of the struggling tradesmen, were all racing into Bedfordshire on the same mission. They were all too late.

A local motorist, hearing the message by wireless at the same time as those in London, had also taken out his car, driven straight to the village in question, found the person required, and had deposited her at Luton in the next train for London within the space of about forty minutes. The information that this person was on her way to London was broadcast before the evening programme closed, and the meeting between the dying man and his relative took place before midnight.

The first news bulletin is finished; the S O S has been read with deliberation, everyone present inwardly expressing the hope that it may be successful in its object. It is fourteen minutes past seven. The announcer intimates that there will be an interval of one minute. (What irritating things these intervals are.)

During those few short seconds a distinguished speaker, probably the greatest authority on the sub-

ject to be discussed, is introduced for the first time to the microphone. He is informed exactly as to the strength of speech required, the distance to stand from the microphone, and the necessity for avoiding the rustling of paper, as the microphone is singularly sensitive to noises of this character. With these few instructions he is announced and left to his own devices, except that the manuscript which he reads has been previously submitted to the company, and must be strictly adhered to.

Judging by the condition of many new-comers at the end of their broadcast talk, the experience of the first address before a microphone must be a very considerable ordeal. Invariably the first remark after mopping a perspiring brow is: "Was that all right?"

There are, of course, various forms of this expression of anxiety, and one story is told concerning a Sunday evening when I happened to be in charge which is certainly correct in the material employed, though I cannot guarantee the narrative in entirety. It refers to the spring of 1923, when a well-known bishop was giving the customary religious address. His peroration concluded as follows: ". . . And if we obey these laws, etc. etc., we shall all meet in Heaven." And then, turning to me, he said:

"I don't think I spoke too long, did I, Mr. Burrows?"

A listener asserts that I pulled out the switch at the end of the words, "I don't think."

It is quite true that in the early days of broadcasting we had a switch upon the microphone which made or broke the circuit, but as this contact-breaking gave a sharp click in the headphones the practice was abandoned in favour of a system whereby the



Photo: Archie Handford.

London's Main Studio.

energising current for the microphone is gradually reduced, and an effect is obtained similar to the fading out of a picture on a cinema screen.

In twelve minutes our distinguished speaker has told his story. We have three minutes, therefore, in which to prepare for the evening's musical programme.

The double doors at each end of the studio are thrown open. At one end there files in the orchestra, normally about twenty-three strong, but augmented on this occasion to nearly fifty. These take their seats at points decided upon at the rehearsal earlier in the day.

It will be noticed that whilst the orchestra contains all the usual instruments of a musical combination of this character, including a harp and all those miscellaneous accessories, such as triangles, cymbals, etc., which are known technically as "The Kitchen," there are no bass viols. Instead of these there will be found in the centre of the second row, almost facing the microphone, an instrumentalist nursing what appears to be a cross between bagpipes and two stout bamboo poles. This is known as a contrafogatto. It is really a wood-wind instrument, capable of producing similar effects to those sounds usually created by the double bass. The employment of this peculiar instrument is not common to all stations, Manchester, for instance, finding that it can give a satisfactory radiation of the double bass.

From the other end of the studio there file in rapidly, as if under military control, the chorus and the principals for the work to be performed. The places, previously allotted at rehearsals, are taken. The conductor mounts a rostrum, gives a few final

words of guidance to principals and players, and indicates that he is ready to commence. The engineers have been warned, the lights switched on inside and outside the studio, as an indication that the microphone is in touch with the outer world, and the performance is put under way.

These preparations have been completed in the three minutes' interval.

Generally speaking, vocalists and the piano are placed from 15 to 20 feet from the microphone, the orchestra at not quite so great a distance; in fact, the fiddles and some of the wood-wind instruments are not more than 12 feet from the microphone. The announcer works at from 3 to 5 feet, so it will be seen that the singing voice creates much more powerful air waves than the speaking voice.

Meanwhile preparations have been pushed forward in the upper or original studio for a short drama, dependent mainly for its success upon various noises. Some of these noises, like those representing the splashing of water, are actually obtained by the use of a lead tank of water about 8 feet long and 5 feet wide. Other sounds are made by a collection of devices in an ante-room, which remind one of an old-time marine store; rotating cylinders, gripped by bands of canvas, which create the effect of violent winds; large, shallow drums covered with coarse buckshot, which, when tilted systematically, reproduce with singular faithfulness the breaking of waves and their backwash on a beach; a second rotating drum, against which is pressed a pair of roller skates, is used to create the impression of a railway carriage bumping over the joints in the rails as the train travels along at high speed. Stout sheets of metal are waiting to be shaken in the storm scene,

and hollow pipes with chains and percussion instruments of various kinds are also there to assist in the illusion of "noises at a distance."

The producer is waiting in the studio for the warning signal. The performance in the room beneath has just ceased. A red light flickers before the small company of actors, and silence follows. The announcer, breathless after his race up the several long flights of stairs, rushes in, gives a brief description on the microphone of what is about to happen, and leaves the studio to the players.

I do not doubt that many persons are under the impression that the broadcasting of drama is a simple business, and that all that is needed is a small company of capable players with voices sufficiently distinctive to enable the listener to grasp readily who is who, and that possibly one reading is made, seeing that no dramatic action is necessary.

This might be the case in rare instances where a piece is so written that there is no need to translate action into terms of sound, but, generally speaking, much preparation is necessary. A great variety of sounds are needed to compensate for the absence of stage colour. These sounds have to be most carefully adjusted in intensity to obtain the desired effect, and above all, they must happen at the psychological moment. Hours and, in some instances, days of rehearsal are necessary, and even then the producer is left with some misgivings.

In this upper studio, for the purpose of drama, a slightly different arrangement is made with the microphone, and by the use of a more sensitive instrument, or the readjustment of the microphone circuit, the actors are kept at a more distant point, some 20 feet away. This arrangement has the advan-

tage that a player may, if he so desires, employ gestures and turn his head to the right or left of the microphone without becoming inaudible.

The variation in intensity of accompanying sounds is obtained by opening and shutting the doors between the studio and the property-room. Some of the instrumental music in Shakespeare's plays is performed in a room outside with the door open two or three inches only.

I have already referred to the heavy draping of the older studio. In this room, which is about 20 feet by 40 feet, and not more than 10 feet high, there is four tons of drapery, the ceiling and the walls being covered by seven layers of canvas, each separated by an air space of about one inch. The result is that sounds passing other than direct to the microphone from their place of origin are absorbed by the canvas and not reflected, as in an ordinary room. The microphone, therefore, deals only with pure sound, and not a confusion of sounds arriving from various parts at different times. This, whilst being very interesting scientifically, is not a source of pleasure to the artiste, and in the case of musical performances is not altogether appreciated by the listener.

The artiste has the impression of working on a mountain top. His voice sounds strange and singularly lacking in its customary strength, which leads to uneasiness and a desire to remedy a seeming defect. The voice is forced slightly, and a roughness developed which is not usual on the concert platform. For this reason the echoless studio has fallen out of favour for musical performances.*

* At the moment of going to Press it has been decided to dismantle the echoless studio and build a second larger one, together with additional offices on the north-west corner of the

Let us imagine that it is approaching 9.30 p.m., and that our play has come to an end. For some few minutes the announcer has been anxiously watching the clock, lest by any miscalculation the play should overlap the time set apart for the broadcasting, throughout Great Britain, of Greenwich mean time. There has been no error of judgment, for the play has come to an end at 9.28, exactly as calculated when the piece was first examined for broadcasting purposes. The announcer warns all listeners that in so many seconds there will be broadcast the standard time signal for 9.30, that this will be indicated by six musical dots, and that the last dot gives the half-hour. Having so done, the matter becomes one purely for the engineers, who switch into circuit first the chimes from Big Ben and then without a moment's hesitation the private line from Greenwich Observatory. A few moments' silence, where the moments are like minutes, follow, and then come the melodious notes of the bells followed by six crisp squeaks, unromantic noises, having a very considerable value for an ever-increasing number of persons.

The squeaks are made as the pendulum of the clock, which sets the time for the whole of the British Empire, swings to and fro.

Until Greenwich joined forces with the B.B.C. no means existed by which every person in the British Isles might secure absolutely correct time from British sources. The only alternative was for the possessors of wireless receiving apparatus to tune

Institution of Electrical Engineers, facing the Chapel Royal. A block of flats on the site was destroyed by a German bomb during the war. With the construction of this new studio there passes from view the last of London's war ruins.

their sets to the wave-length of the Eiffel Tower and follow every morning or evening the small train of signals, mostly in Morse characters, sent out from that station. The world has long been indebted to the French authorities for the service performed from Paris to European countries and to ships at sea, but it is only fitting that Britain should have a service of her own, as Greenwich mean time is the recognised time standard amongst the majority of civilised people. The Greenwich signal is now radiated each day at 1 p.m., and at least once each evening.

In the summer months this time signal is broadcast simultaneously to all stations at 10 o'clock instead of at 9.30, the object being that listeners may enjoy the summer evenings and the longer hours of daylight, and yet be able to hear these time signals and other items simultaneously broadcast. Not only is the time signal placed at a later hour, but the second news bulletin and also the second informative talk.

With the second talk finished a return is generally made to the musical programme, thus fulfilling Longfellow's prophecy that

> ". . . the night shall be filled with music,
> And the cares that infest the day
> Shall fold their tents like the Arabs
> And as silently steal away."

CHAPTER XII

BEHIND THE SCENES WITH THE ENGINEERS

THE business of broadcasting is by no means an affair for the studio only. Between the microphone and the listener are several important links, dependent in a great measure upon human skill and watchfulness.

The feeble electric currents—most wonderful electric counterfeits of the complex sounds in the studio—are of insufficient strength as they leave the microphone to modulate the electric waves radiated by the transmitting stations. They have to be amplified, and in their amplification the greatest possible care has to be taken to make certain that each characteristic receives the same treatment, and that there is no accentuation of the high notes to the neglect of the lower ones, or vice versa. It is possible, as most people are aware, to obtain a very considerable degree of amplification with the use of one or two valves, but it is really a very difficult thing to procure absolute equality of treatment under these conditions.

The wireless engineer, therefore, is more concerned with perfect results than initial expenditure. He employs many valves rather than few, and arranges that each valve shall not be forced in its functioning beyond a point where it gives the best possible results. These valves are arranged in two groups. The first is placed in an observation

chamber immediately adjoining the studio. The valves are encased in a metal box, which screens them from any possible foreign electrical interference. These valves strengthen the microphone current sufficiently to make it independent of any influences which might exist in its journey from the studio to the control-room in another part of the building.

This control-room is the "nerve centre" of broadcasting. It is a spacious room situated as far as possible from any source of electrical disturbance. It is well lighted, and the floor covering is placed on a thick layer of felt, so as to minimise noise or vibration caused by the movement of the engineers. On one side of it is arranged a further series of amplifying valves, and alongside these various electrical indicators, which inform the engineer-in-charge of the intensity and quality of the amplified currents.

One engineer sits throughout the evening in front of these indicators with headphones clamped close to his ears, so that not only can he follow every detail of what is happening in the studio, but can also anticipate to some degree any exceptional demands made upon the microphone, for, wonderful though this instrument may be in its conception and action, it has not the adaptability to circumstances of the human organs. The eye, for instance, has an iris which accommodates itself to the amount of light to which it is exposed.

Look at your friend's eyes in a partially lit room. You will see that the iris has expanded, giving to the retina an increased sensitivity. Switch up the lamp suddenly and the iris will instantly contract, thus protecting the retina from such an excess of light as may be harmful.

The microphone has no brain and nervous system

to assist it in this way. It accepts the sounds just as they are carried by the air waves from their source. At one moment it may be concerned with delicate passages which are little more than a musical whisper; at the next it may be subjected to the rattle of drums, the clashing of cymbals, or the unrestrained *fortissimo* of a large choir. Seeing that our amplifying valves are arranged to give equal magnification to all the variations, there is very considerable risk that on occasions the magnified current may reach a quantity which will overpower the transmitting station. The controlling engineer, therefore, sits with his right hand on a control, which, operating resistances and other devices, enables him to maintain something like a fair balance. He is helped in this work by a careful placing of artistes and instruments, and also by the experience gained during rehearsals. On very special occasions he is provided with a score of the music being performed, so that he can anticipate crescendos and diminuendos.

But there are times when, despite these precautions, or through lack of facilities for rehearsal, he is unable to cope with an exceptional situation. One such occurred in the first year of broadcasting during the performance at the Regent Theatre, London, of *Robert E. Lee*. At one point in the act then being broadcast a pistol was fired. This had not been reckoned with, and before the controlling engineer was able to respond to the intensity of the sound such a large amount of energy had been released that the choke-coil at the transmitting station was overwhelmed and broke into flames. The transmission was automatically interrupted, and many minutes elapsed before these parts of the transmitting gear could be replaced and the broadcasting resumed.

The experience was a useful one, and incidents of this character are sought beforehand and methodically allowed for.

Sufficient has been said, I imagine, to indicate that the broadcasting engineer, by reason of the delicacy of his instrument and the variety of stress and strain to which it is likely to be subjected, has not only an exacting task to perform, but a very real need for adequate reserves. On another side of the control-room is a complete duplicate set of control apparatus, which can be brought into action in a matter of seconds only. There must never be any question that this apparatus is capable of taking up the work, and for this reason systematic inspection, almost akin to a drill, exists. To ensure that every engineer in the company's service is kept thoroughly conversant with each integral part of the transmitting apparatus, he is never engaged on the same section of the gear in two successive programmes, but passes in a definite rota from one duty to another.

On a third side of the control-room is stationed that portion of the electrical system which perhaps has the greatest appeal to the imagination. This is the switch-board for simultaneous broadcasting, the terminal point of miles of trunk wires connecting physically the London microphone, not only with its ever-growing family of relay stations in such distant places as Edinburgh, Sheffield, Plymouth, Liverpool, Leeds, Bradford, Hull, Nottingham and Stoke-on-Trent,* but also with the eight provincial stations, ranging from Bournemouth and Cardiff to Belfast and Aberdeen. Each of these trunk lines is

* Other relay stations are now under construction at Dundee and Swansea.

attached to a separate valve amplifier and controlling gear, which not only assures sufficient energy to overcome the resistance offered by the great length of overhead wire, but enables the engineers to adjust intensity to varying local conditions. Furthermore, each line is separated from the other by the amplifier, so that they may not react one upon the other. It can well be imagined that a line passing through, say, 100 miles of country over which a rain storm is raging may have a different electric character from another one crossing country which is dry. I am not going to suggest that there is an exact parallel between simultaneous broadcasting and a battleship in action, but there are occasions when it is not wise for anyone not actually engaged upon the duties to enter that hall of mystery, the control-room. Our engineers are models of politeness, but they also are human.

The fourth side of the control-room is occupied by wireless apparatus for receiving from the London station the æther waves as they come back to the studio. There is the loud-speaker, keeping all on duty informed upon the quality of the wireless as distinct from the microphonic transmission. Here, perhaps, we may discover, amidst this weird and wonderful array of scientific devices, a little touch of romance. If we look closely we shall probably find that facing the loud-speaker is a telephone mouthpiece, and a question tactfully put will reveal the fact that this is intended to break the monotony of the night-work of the lady telephonist on the switchboard in the central office below.

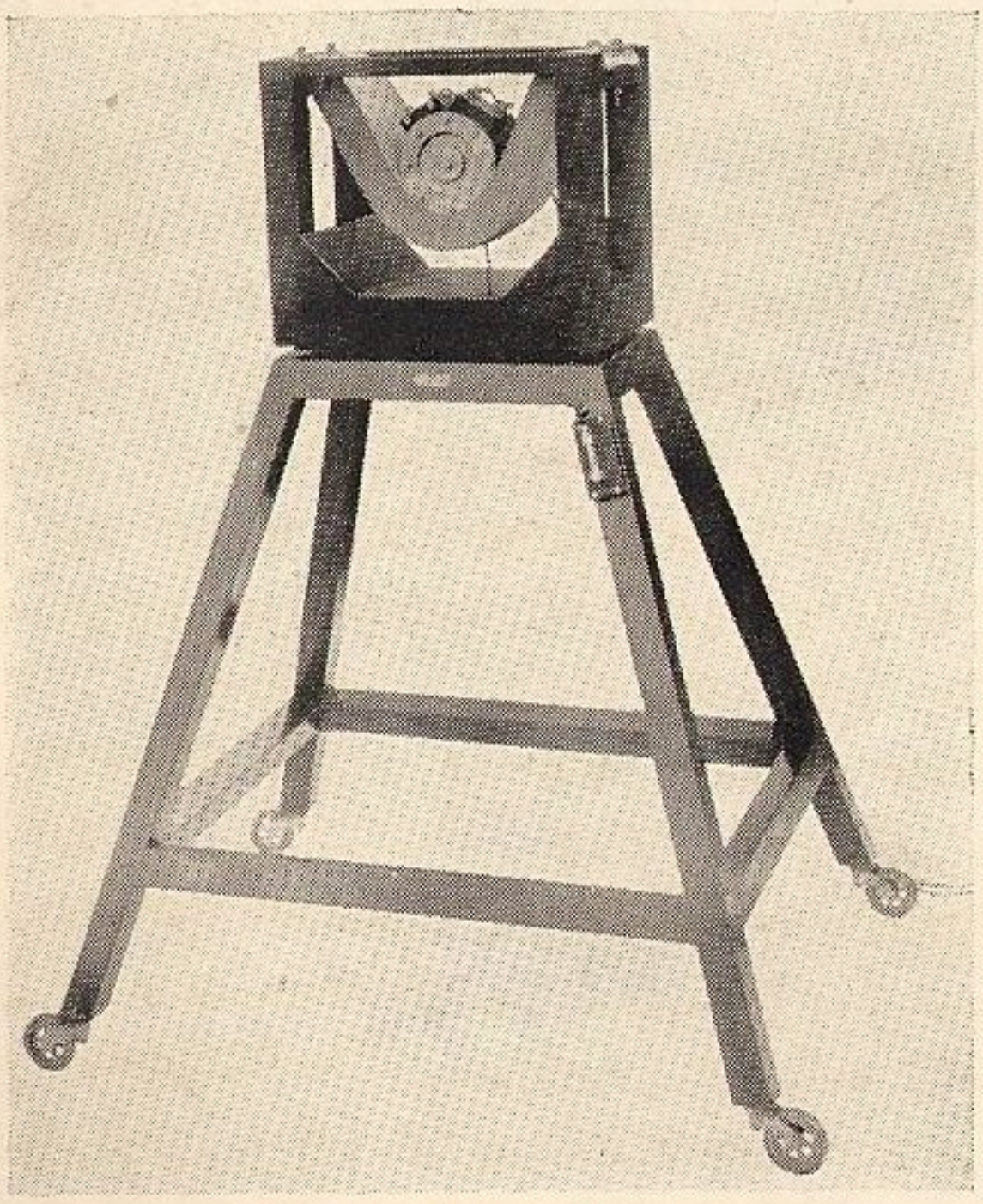
There is little that can be said about the part actually played by the transmitting station during a wireless programme. The functions of this station

have already been explained. Electrical currents of high voltage or great intensity are employed, and the accidental touching of certain wires might easily result in unconsciousness or even death. As a precaution against such an accident the most dangerous portions of the apparatus are railed off. This, however, is not considered sufficient safeguard, and it is the practice of the B.B.C. to have two engineers at the transmitting station throughout programme hours.

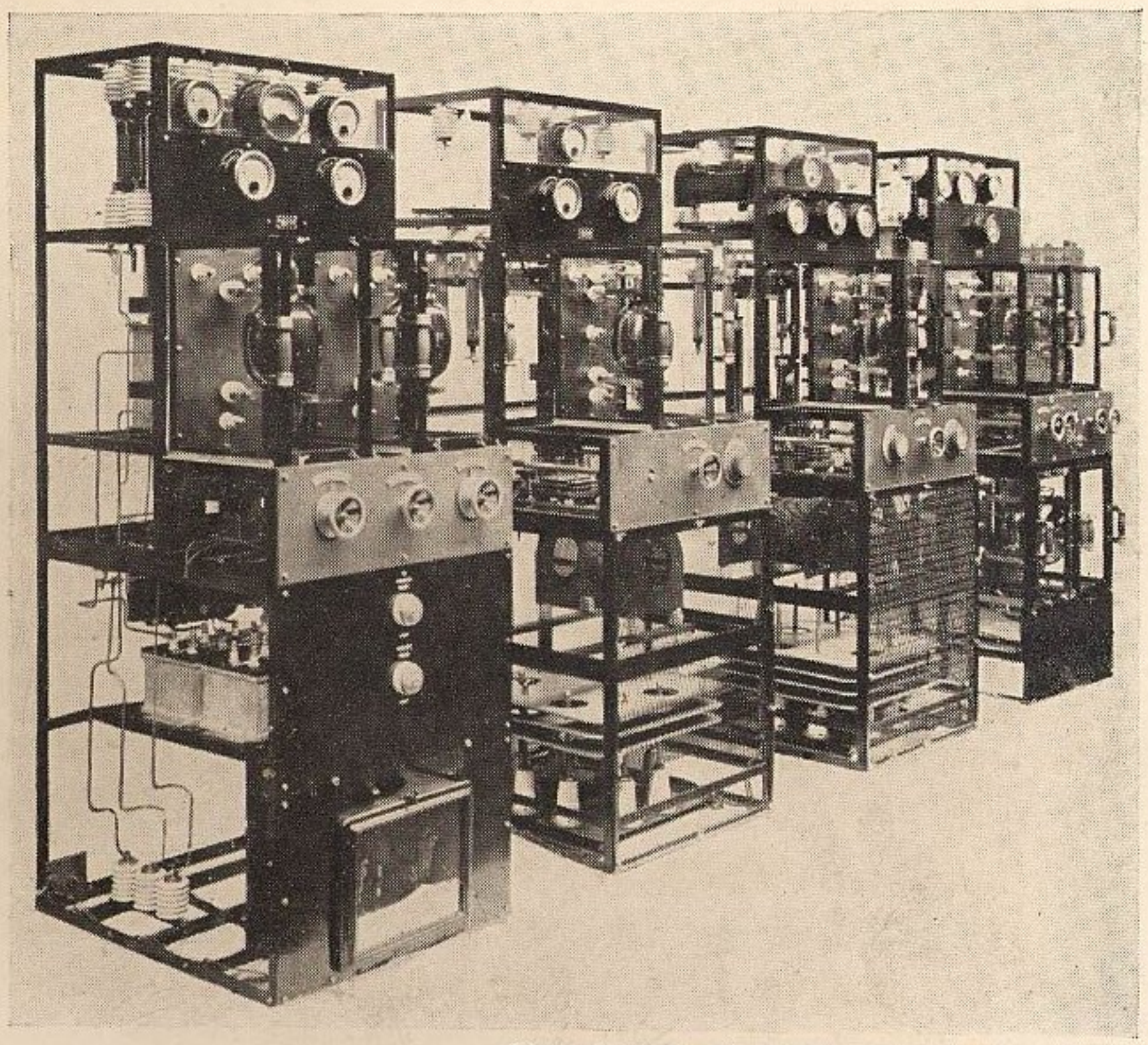
Generally speaking, the work is not heavy in this department. It consists chiefly in keeping a keen eye on the small recording instruments to see that the "feeds" are maintained at the right degree, and in keeping a log of any fluctuation. What is demanded, however, is, besides a general alertness, ability to grasp a new situation, to act promptly in emergency, and quickly to "sense" the source of trouble should there be one.

A wireless transmitting station differs materially from most mechanical and electrical plants. If we except the valves there are practically no visible indications of the cause of trouble. A film of dust between two points, so thin as to pass unnoticed, may break down insulation and completely alter the character of the set. Two wires, originally placed a definite distance apart, may become slightly bent; this again may change the behaviour of the entire instrument. Things like these do not happen every day, but when the fault develops no time must be lost in discovering its whereabouts and restoring balance.

There is something uncanny about a broadcasting transmitting station when it is in operation. Firstly, the big valves emit a light which differs from that to



Studio Microphone.



Photos by Marconi's Wireless Telegraph Co., Ltd.

Typical Broadcasting Transmitter.

which one is usually accustomed. This light is not exactly phosphorescent in character, although it reminds one of the light of a glow-worm on a gigantic scale. There is also a steady hum from the transformers used to lift the electrical voltage as it arrives from the power station to that required for broadcasting purposes.

But the glow of the lamps, which are in many cases as big as Rugby footballs, and the hum of the transformers are not the only influences which make the visitor conscious of the unusual. He feels that, despite the absence of an outward and visible sign of great activity, he is present at the fountain-head of a mystical power. This is confirmed by the many weird effects which can be demonstrated by the engineers if they have the leisure for the purpose.

A long glass tube with a metal cap at each end is carried to within a few feet of the valves. Its character suddenly changes from a commonplace thing to that of a rod of fire, the whole space within the tube being filled with a throbbing luminosity. Another proof of the energy which is surging around is provided by a little electric lamp stationed within a few feet of the transmitting station, burning steadily, as though fed by a fully charged accumulator. This lamp has no battery to feed it, but gathers the necessary energy across space by means of a receiver in tune with the transmitter. It is the tell-tale whereby the engineers may be certain that their wave-length is remaining constant. The slightest alteration from the wave-length allotted to the station and the lamp dims accordingly, or is extinguished entirely.

It is this ability of tuned receivers to collect energy in the electrical field of a broadcasting station

which has prompted many folk to write of the day when electrical energy will be projected wirelessly from place to place as a commercial proposition. The prospect does not fill me with pleasure. I have a certain uneasiness as to what may happen to materials and beings which may find themselves in the line of fire when such a practice becomes common.

Somehow, the man who uses the word "uncanny" when talking about a wireless broadcasting station is right. It is from such a station as this, with its monotonous hum, its weird lights, and its highly scientific and unromantic atmosphere, that the sweet notes of the nightingale were caught up out of a Surrey garden in the middle of May and projected across stormy seas and wind-swept mountains to a Swedish home, as well as to thousands of homes in the crowded cities of this country. Through the medium of ten such founts of energy in the early summer the voice of His Majesty and of the heir to the throne gave pleasure for the first time to millions of hearers. Who knows what is yet to follow?

There is one other link in the chain of broadcasting to which more than passing reference is due. This is the system of trunk wires, the property of the General Post Office, set apart each evening for the broadcasting service. These wires, it has to be remembered, have not been specially constructed for our use—years would be necessary for such an undertaking. They form part of the standard equipment of the telephone service of these islands, some of them erected many years ago to meet requirements vastly different from those which they are now called upon to fulfil. They are not consistent in character throughout their whole length; they pass

over hill and across dale, exposed in many places to the full force of gales and to damage by falling boughs or dislodged rock. They run parallel with many others of their kind, some conveying high-speed messages in Morse from law courts to the printing presses in provincial newspaper offices; others bearing conversations between distant points, messages which mean fresh work for thousands, or fresh hope for a sinking heart.

In order that these various means of communication may not impress themselves one upon the other the parallel wires are made to cross at intervals, as close observation will show. By this means and by much care and ingenuity on the part of ever-vigilant officials it becomes possible for a small voice in London or in some remote provincial city to command the attention of millions of its fellows.

Government officials cannot be said to suffer from the flattery of the man in the street, but it may be honestly asserted that every member of the broadcasting staff in the United Kingdom is full of praise for the attention given to the broadcasting service by all grades of the administration and engineering staffs of the General Post Office. A fault has only to be pointed out at any time between five o'clock—when the trunk lines are handed to our engineers—and the transmission of the last "good night," and instant attention is given to the trouble. Often five or six different lines are offered for trial in place of a defective one. Yet, while paying attention to our requirements, the G.P.O. does not allow broadcasting to interfere for one moment with the more serious needs of the British public.

CHAPTER XIII

BUILDING THE PROGRAMMES

THE provision of nightly entertainment for something approaching a million homes, ranging from the palace to the humblest cottage, is not a simple matter. Recognition has to be given to the fact that in a single stratum of society there is a large variety of tastes. Even in the average family will be found a wide divergence of interests, ranging from all that is light and flippant to those things which are learned and abstruse. It has also to be remembered that these preferences for light entertainment or for serious informative matter are not peculiar to any one section of the community; that the homes of many working-class men are rich in popular editions of serious publications, and that even amongst great musicians there are a number who find interest in jazz or trick music of a similar order.

It is the business of the programme department to preserve, as far as is humanly possible, the broadest outlook, but whilst giving careful attention to every criticism to avoid being drawn away from its ideal by flattery or by violent language.

The actual task of the programme department of the B.B.C., quite apart from the peculiar difficulties already referred to, is certainly an unique one. It consists in the provision annually of about 20,000 hours of ever-changing entertaining and informative matter, each item of which, whether it be taking

place in Aberdeen or in Plymouth, is so timed that the individual programme of which it forms a part can be dovetailed with another at any desired point.

No other entertaining organisation in the world has so complex a task. Even in the United States, where broadcasting has two years' seniority, no company has to concern itself with so many different programmes, or with (what is even more difficult to handle) the interlacing of local programmes with those radiated from a central point.

As many persons have expressed an interest in the means by which our programmes are compiled, it is proposed to indicate in more detail than would otherwise be necessary, the routine employed at the moment of writing. I say deliberately "at the moment," because in a work like this, which is without precedent and is constantly expanding, the organisation is continually undergoing revision. All that we are still doing is necessarily in the nature of an experiment, and, whatever individuals say to the contrary, it must be so—in the interests of the public generally—until such time as experience has given us a definite solution of our peculiar difficulties.

At present, for instance, we are wrestling with the subtle question whether our programmes should be of the scrap-book character or possess continuity. On the one hand, we have the experience of the British gramophone companies, which in a quarter of a century of contact with the public have found it inadvisable to produce in large numbers records which will play for more than five or ten minutes. Yet, on the literary side of things we have an ever-increasing demand for the novel and serious book, requiring for their full enjoyment long sessions of close reading. Quite apart from these conflicting

facts there is the necessity for considering the peculiar demands made upon a household where wireless is installed. In the majority of homes, where the head-phone is of necessity the more popular, it is unfair to expect the whole family to sit silent throughout the entire evening listening to a programme in which each item bears a close relation to the preceding one. Again there is much to be said for the artist who insists that the full beauty of the best work cannot be appreciated by the performance of snippets, amidst other items of a totally different character.

Even a partial solution to this problem is not possible until two or more types of programme are being performed simultaneously over the same area. Then we can give continuity of interest to those who have been educated to an appreciation of continuous thought, and a miscellaneous programme for those who, through various circumstances, derive from variety the greater pleasure and benefit.

We are still faced with difficulty in obtaining a true estimate of the wishes of our listeners. We differ temperamentally from the Americans, who readily express themselves when called upon to do so. We broadcasters are not in the fortunate position of newspapers or places of entertainment, which have their circulations and box-office returns as evidence of their success or failure.

When we introduce a new artist or a new idea we obtain the next day, or the day following, a few letters of criticism or congratulation, as the case may be, sometimes both. The vast majority of folk who were listening, hundreds of thousands of them perhaps, remain silent, and we are left guessing. It must not be imagined that with these peculiar difficulties before us the programme organisation is con-

tent with bewailing its position, neither does it meet at its several conferences with a feeling of infallibility and satisfaction at the work accomplished. Every detail is handled with deadly seriousness, and nothing is attempted without an exhaustive discussion of the pros and cons.

The organisation at the moment is as follows:

There is a control board (consisting of a controller and three assistant controllers), which views everything from the view-points of general policy, finance and engineering feasibility. There is also a programme board, of which the Director of Programmes is chairman (consisting of the Directors of the several branches of programme work and the Organiser of Programmes), who is an executive officer, and acts as a link between the programme board and the provincial station directors. The control board and the programme board each meet weekly in London, but the latter is often called upon to hold emergency sittings. The foundations of many of our programmes are laid three months ahead of the date of performance. The material for these foundations consists of a rota of "feature performances" (such as those arranged for national festivals), opera, groups of short plays, a musical comedy or a symphony concert. The latter may be produced in the studio or broadcast from an outside hall, as in the case of the special B.B.C. symphony concerts at the Opera House, Covent Garden, the Hallé Concerts at the Free Trade Hall, Manchester, and the concerts of the Birmingham Municipal Orchestra at the Birmingham Town Hall. The opera, too, may be a studio production or one actually being performed by the British National Opera Company at Covent Garden or elsewhere,

or by the "Old Vic" Repertory Company at their headquarters on the south side of the Thames. These "S.B." items are additional to certain other features regularly broadcast from all stations, such as news, special talks by eminent persons, and dance music from the Savoy Hotel. Occasionally it happens that the rota of S.B. matter, originally designed to give a maximum of variety, clashes with a performance of grand opera, which, in the interest of the public, cannot be missed. Then, perhaps, we get two performances of grand opera in one week. This state of affairs is balanced out in another part of the year when whole weeks pass without an item of this character.

The detailed arrangement of every one of these simultaneously broadcast programmes is left to an individual or to individuals nominated by the programme board. The amount to be expended is determined by the control board, which sum, like that budgeted to individual stations for their week's expenses, varies from time to time. The final details of the simultaneous programmes are decided upon at least *six weeks* in advance of performance; station directors are at once informed of their nature in order that they may avoid introducing into their own programmes features of a similar character, or any items likely to clash or prove redundant.

Five weeks before the date of performance the London and provincial station directors prepare their local programmes, and the details are sent to headquarters in the *fourth week* before their performance is due. They pass in due course to the control board, and if found in order copies are made and dispatched to the editor of the *Radio Times*, and in the *third week* before performance the final proofs

are sent to press. *It will be seen, therefore, that secretaries of important organisations who are willing that their annual or other special functions should be considered from a broadcasting point of view should communicate with the B.B.C. at last six weeks ahead of the date fixed.*

Quite apart from the question of internal organisation, six weeks is none too great a period for purposes of preparation, as it frequently happens that there are engineering problems concerning trunk line and local line facilities, and also questions of staff and special apparatus. On one occasion recently the London programme for one afternoon and evening included no less than four outside broadcasts, each requiring telephone lines, special microphones and microphone amplifiers, and the necessary complement of engineers.

Of detail work there is no end. One wonders what would have happened had broadcasting been introduced fifty years ago, before the invention of the ordinary telephone, for not only does the local telephone play a very important part in the rapid construction of programmes, but our present system of preparation is largely dependent upon the availability for between one and two hours nightly of the trunk lines connecting together London and the provincial stations.

The Aberdeen station director, for instance, may have a bright idea for a night's entertainment. His first problem is to decide upon artistes who can be relied upon to carry out this idea. He remembers that an item on somewhat similar lines was performed in Bournemouth three or four months before. Immediately five o'clock arrives he calls up Bournemouth through the head office and asks for the

Bournemouth station director's views upon the fitness of the artistes previously engaged to meet the Aberdeen requirements.

On the other hand, Aberdeen may strike out in an entirely new direction, in which case, if he has no one locally who is suitable for the parts, he will ring the musical director at headquarters and ask for artistes from the London contract list. In the summer season this question of artistes is in itself quite a problem. A director may be fully acquainted with the fitness of an artiste to meet his requirements. He telephones to that artiste but receives no reply. He posts a letter the same evening, and a reply arrives about three days later from a seaside resort expressing regret that engagements elsewhere unfortunately prevent him from giving assistance.

We will assume that the difficulty of performers has been overcome, and it is rare that an invitation is rejected except through prior engagement. Next comes the question of the items. All songs and literary matter—of any importance—produced within the last forty or fifty years are legal property. The right to adapt or perform them in public through various media, whether it be on the concert platform, the stage, the film, or by broadcast telephony, is held by some individual, and becomes the subject of a fee. In a limited number of cases the right to broadcast is denied, in a few others a prohibitive sum is demanded, but, generally speaking, no difficulty is experienced in obtaining permission to broadcast the item and in settling terms. In all cases it is absolutely essential that before the programme is submitted to headquarters in the fourth week before performance, the ownership of the performing right

in each item should have been ascertained and an agreement reached. How considerable is the correspondence involved on this point alone must be instantly apparent. In grand opera, for instance, the rights to perform individual arias and excerpts are not always held by the same persons as the rights for the entire performance, and things are therefore additionally complicated. Several experts exist at headquarters for the handling of these problems and for the accountancy arising therefrom.

I sometimes doubt whether these incidentals are taken into account by that type of critic who considers that he is not being given full value for his money, which is only half a sovereign a year.

Alongside the filling in of details for the programmes, the station director is concerned not only with the rehearsal of approaching events, but with the search for new talent. In the early days of broadcasting all these details fell practically on one pair of shoulders at each place, and a week of seven days with fourteen hours a day from Monday to Saturday, and from three to five hours on Sunday was a commonplace experience. As the future of British broadcasting became more apparent and the revenue more certain, an expansion of staff was possible, and specialists were introduced.

To-day each broadcasting station, as distinct from headquarters, has, besides its director, its own musical director, two assistants, and an announcer, and one or more persons specially responsible for such features as the women's and children's hour.

The requirements of Scotland being in many respects distinct from those of England and Wales, the Scottish stations are under special supervision by an assistant controller for Scotland, who is better

able to give judgment by his first-hand experience of current affairs in the north than one surrounded by the distractions of the metropolis. He may also arrange for the special interchange of programmes in Scotland.

As an additional means of obtaining complete unity of purpose and the widest possible interchange of ideas and experience, visits are made from London to the provincial stations at intervals by an assistant controller and by the musical director; a system is also being developed whereby station directors themselves are able from time to time to spend short periods in the territory of their colleagues. Any further expansion of the details of programme work will, I am sure, become wearisome to the reader, and might create the impression that the B.B.C. is a machine rather than an organisation, whose main purpose is the provision of recreative entertainment. I only wish it were possible to invite everyone who has read these chapters to make a surprise visit to the studio. Such doubts would instantly be dispelled. Unfortunately, the time of station directors is so fully occupied that permission for such visits can rarely be given.

CHAPTER XIV

THE CHILDREN'S HOUR

THERE is no section of our programme work upon which more time and thought is spent than that termed the Children's Hour. There is an old saying, as true to-day as at any time in history, that the child is the father of the man, and whatever else happens the officials of the B.B.C. are determined that there shall never be justification for a charge that they abused or misused the trust placed in them for providing amusement and entertainment for the younger generation.

How receptive and sensitive is the child-mind to what is seen and what is heard! What hours of happiness, of pain, or of fear can follow a kind, well-chosen remark, an unwarranted reproof, the telling of a stupid fable! How easily is the whole realm of imagination opened out by a simple idea artistically expressed! I cannot tell you how many conferences have been held on this single matter of the Children's Hour, and what personal sacrifices have been made in the process of development, and are certain to be made as experience shows us the road.

Personally, I cherish no happier memories than those associated with the first few months during which I played the part of the first London wireless Uncle. It was often very late at night before I could find time to examine the little letters—thumb-marked and ink-bespattered letters—written by baby hands, which came daily from all parts of Great

Britain, sometimes buried in boxes of wild flowers, at other times accompanied by sweet-stuffs and even short-cakes from the Highlands. Oh, those autograph books, in which "Uncle Arthur" was expected to write something original, and utterly failed! Oh, the many efforts to extract from that same mystical person replies to questions which had previously baffled the whole family circle! Do I not treasure, even to this day, a baby chest-protector, daintily stitched, and sent to me in mid-winter when my throat was troublesome; or the thrill of one morning in the spring of 1923, when I received a telephone message from Wimbledon Park, asking that I should call a sweet child nicknamed "Booloo," who was hovering at that moment between life and death! It was explained to me that this girlie's spirits had been sustained through a serious operation by the promise that when she was sufficiently fit her wireless Uncle would speak to her. The Uncle did, and from that moment, according to a subsequent report, recovery was noticeable.

No personal credit can be taken for such a result; it would have happened had any "uncle" been in my fortunate position, and it is not surprising that psychologists are following very closely the problem of the influence of wireless transmission on the child-mind, the effect of "the man in the damphone" (loud-speaker), as one little baby remarked.

We were fortunate in having at all stations, from the outset, directors and assistant directors whose hearts were set on giving their best to the Children's Hour. In Birmingham, Uncle Edgar gathered around him a group of enthusiasts, who to this day have never failed to make the Children's Hour one of unalloyed pleasure. Uncle Edgar still has vivid

memories of that occasion on which he dared to appear in the flesh before his wireless nephews and nieces. He alone can tell you what it feels like to kiss in the short space of an hour 800 chubby faces, and to receive as many angelic little smiles.

While Birmingham was building up a special radio circle, now numbering at least 10,000 children, Uncle Humpty Dumpty (a mysterious being who was wrapped each evening in cotton-wool, and only kept from falling off his stool before the microphone by various attendants, including an elephant [Uncle Jumbo]), was nightly entertaining thousands of children in that grim and crowded industrial area, of which Manchester is the centre. What a good thing it was that those delighted children could not see the rough and ready studio, with its packing-cases and hastily improvised properties, with which Humpty Dumpty (Mr. K. A. Wright) gave such delightful performances. Who, too, amongst the younger listeners on the north-east coast will forget many happy hours which Uncle Bert and his staff provided when Newcastle was still hampered by the use of primitive apparatus.

I would not for a moment have the other Uncles think that their work in the early days was any less appreciated. Cardiff, Glasgow, Aberdeen and Bournemouth all contributed in a meritorious manner to the success of this important branch of the work, and the example set has since been carried on by the newer relay stations.

It often happens, and rightly so, that parents spend sums of money on their children's toys instead of on personal comfort and luxury. Is there one of them who has regretted it? Not one. In the same way it is highly probable that before long the

Children's Hour, as conducted by the British broadcasting stations, will prove as costly as any of our sectional activities, and if, as a result, we are assisting the parents of the country in giving to young England a happier outlook on life, a taste of the things which are good and beautiful, what matters the expense?

The problem which ever lies before us in this direction is to present to the child the best that the arts can offer without divesting this important hour of its spontaneity, and those other characteristics which play so great a part in holding youthful interest. Parents may like to know that in the handling of this pleasing but by no means simple problem we have the assistance in London of a strong national advisory committee, which includes amongst its members several famous students of the child mind. The great juvenile movements, such as those of the Boy Scouts and Girl Guides, are also represented.

One ever-present difficulty attending the children's programmes is the adequate treatment of the many charming letters received. Some days hundreds arrive by a single mail at the London and provincial stations. To answer each by post would be to deprive them of their romance. To answer them in detail across the æther would be impossible, owing to limitations of time. We have attempted various expedients and are at a loss for a solution. One thing is certain—birthdays at least must be observed by wireless, and no child must be denied the proper thrill of hunting, under wireless instructions, for the surprise which has been prearranged by parents or a friend.

There are many stories to be told in this connection. I will content myself with one.

Only a few days before writing these present notes there arrived at the office a little epistle in round, childish handwriting, which almost portrayed the bashfulness of its author.

"Will you please call up next Monday afternoon Joan ——" (the surname had been omitted deliberately), "and tell her to look on the window-sill outside. Joan will be seven on Monday."

The little gentleman who wrote this requires no lessons in the gentle art of wooing.

CHAPTER XV

WIRELESS LAUGHTER

BROADCASTING, like nearly all movements having a general appeal, is adding to the gaiety of nations. A glance through the files of *Punch* shows that the Volunteer movement of the middle of the last century was a source of inspiration for many years, not only to that journal but also to public speakers. I remember hearing a few years ago a story told first hand by the late Dr. Warre, then Head Master of Eton, concerning the Volunteer Corps established at Oxford when the Volunteer movement was at its height. Amongst the most enthusiastic recruits in one year was the author of the classic "Alice in Wonderland," Lewis Carroll (G. L. Dodgson), or "Dodger," as he was then known. The master-mind was apt to wander, and so it happened that on one occasion the captain of the Oxford University Volunteers addressed his company as follows:

"On the command, Form fours—Right, the even numbers will take a step to the rear with the left foot and a pace to the right with the right foot. The whole will then turn to the right. *Sergeant Jones will look after 'Dodger,' as he will turn to the left.*"

I wonder what stories will be told of absent-minded broadcasters in a century to come. *Punch* has already had some fun at our expense. Who will forget that cleverly drawn cartoon of the early days,

showing three dignified spinsters being addressed wirelessly by a London Uncle as "Hallo, darlings"? Or a later one based on an aside between precocious young ladies who have been reprimanded by their father. The master of the house is shown leaving the room satisfied that his words have taken effect, but there is no sense of contrition; instead a saucy whisper:

"2 L O now closing down."

Truth is always stranger than fiction, and oftentimes more humorous, and the wireless experiences of broadcasters and broadcatchers alike are rich in funny incidents.

When pressure of work was at its height in the first few months of our activities a letter reached me one morning from a troubled youth living a few miles north of London regarding some indignities which he had suffered from a neighbour. It happened that their gardens were at right angles, and at the end was a common pole which each had selected as a support for a wireless aerial. The complainant had suspended his aerial by the ingenious method of attaching it to half a brick which had been thrown over the top of the post. The idea had been promptly seized upon by the neighbour who, in throwing his brick, had fetched down the aerial already suspended. The process had been repeated by each in turn, with the same result.

For some time I was much puzzled why this letter on this problem of aerials had not been addressed to the chief engineer, until it dawned upon me that as director of programmes it was my business to decide who should throw the next brick.

Even letters containing grievances are not without their humour. One day we received an epistle in the

handwriting of a half-literate person, complaining against his treatment at a provincial studio at which it was his ambition to perform. He pointed out that he had been promised "to be put on the wireless," and not having "seen himself there" had called at the studio to be "audited." Our representative, who was described as "wearing spats," was stated to have been "favourably depressed" by his performance, and had promised that he should be "downcast" at an early date. He hoped that I should recognise this dilatory official of the company by his "inscription." As an additional proof of his fitness to be "downcast," he pointed out that he could be heard across two ploughed fields and a meadow, which he understood was about 400 metres.

The wireless studio still has its terrors for the type of artiste who is accustomed to be greeted by rounds of applause, and the several stage effects which are sometimes arranged to herald a "turn." Small wonder that one of these was almost paralysed by the movements of an announcer who was arranging the microphone before the performance.

"What is he doing now?" said the artiste to his friend.

"Nothing particular," was the prompt reply. "He's getting the *ether* ready."

On another occasion a popular performer, Mr. Norman Long, who was leaving the studio, was greeted by two young ladies with an autograph book, which he duly signed. On handing it back a look of disgust spread o'er the face of its owner.

"You've got what you wanted, haven't you?" said the artiste.

"Oh, yes," she replied, "but we thought you were the announcer."

"I am very sorry," said the artiste, crestfallen.

"Oh, it really doesn't matter," was the quick rejoinder; "*we can tear that page out.*"

With that we pass from the studio to some of the homes of listeners.

The London announcer has just stated that Mr. Allen Walker will talk on the Houses of Parliament, and young hopeful is inquiring *how he will manage to get up there?* "Young hopeful," I suspect, must have heard the smart retort of another child who, learning that a Fellow of the Royal Astronomical Society would speak on "The Moon," instantly suggested that this would be easily the most novel wireless performance to date.

We can, of course, excuse the disappointment of the little girl who, having sat up to hear the nightingale in the Surrey woods, spent a fruitless half-hour near midnight on a later evening in order to hear a fox trot, but ought we to be equally tolerant of the old lady who, upon questioning her daughter as to the item then being performed, and learning that it was Mr. Haydn Coffin, remarked that she was not surprised, as the night was singularly inclement?

Even our educational programmes have not been without their humorous side. Amongst the distinguished persons to take part in an experimental series of transmissions to schools was Sir Johnston Forbes-Robertson, who gave one of his popular lectures upon Shakespeare. In the course of a few posts we received numerous essays from children in various parts of the country. One which arrived from Harlow, Essex, contained the following appreciative and naïve remarks:

"As we talked and thought about the lecture we said it was very good, and we wish to thank Sir

Johnston Forbes-Robertson for giving up an hour of his time just to amuse us boys, time which he could have spent in pleasure.

"We also knew by the expression he used, and how he raised and lowered his voice that he was not standing with his hands behind him just merely talking into the microphone, but, as our head master explained, *he must have been throwing his arms and legs about and making faces*, just how he would have done on the stage."

Less than a month later Dr. G. P. Gooch, famous for his singularly lucid treatment of historical episodes, gave a fascinating sketch of the life of Napoleon. By the next mail there arrived, under the Twickenham postmark, the following:

"NAPOLION.

"Napolion's life is divided into 4 parts called dramas. These are Dawn Dinner-time Afternoon and Bedtime. He was born in a island but was not a Frenchman thogh his mother was a very thrifty and made him a general when he was 26. He was the bigest man in the world and went about overthrowing people but he could not overthrow any english people owing to Nelson being killed in Trafalgar Square. After that he cursed France with a war and drained off all the young blood. Then it got very cloudy and Napolion was on a great hight and went to Mosco but they did not ask for peace so he came back and thousends of his soldeers were perished with cold snow. After that Napolion was sent to a island called Elbow but it was too near France so he came back and went on overthrowing people and put Urope at his feet untill he got to Waterloo were he

met the duke of Wellington who gave him up to a English ship. Then he was sent away to Hellena in the ocean where visitors go to see the house and beat his wings against the bars for 6 years and then died. This is all I know about Napolion. He had two wives one was a empress and the other was a lady.

"P.S. He was a very selfish man and put on his own crown so as not to have to borrow any one elses."

Even our critics from time to time display a vein of humour. One individual, obviously not a lover of syncopated music, made the "generous" offer "to slit the throats of the entire Savoy Band for the sum of 4d."

CHAPTER XVI

THE MEN IN THE BACKGROUND

EACH one of us possesses some strain of curiosity. We want to see the wheels go round.

If our interests are mechanical we dismantle the gear-box of the family car and send for help from a local garage. Should our inclinations be more human, then we seek all that is to be known about the Prime Minister of the day, our principal comedian, and those unfortunate folk whom we are pleased to term our neighbours. As in previous chapters we have made something of a Cook's tour amongst the machinery of broadcasting, so I imagine there are some, perhaps many, who are looking forward to details on the personal side of the undertaking.

Would that I could tell you some of the stories, true, and quite untrue, that are associated with those working behind the scenes in British broadcasting. Here lies my dilemma.

The chairman of directors (Lord Gainford), the managing director (Mr. J. C. W. Reith), and controller (Admiral C. D. Carpendale, C.B.), have each a marked distaste for personal publicity. This I intend to respect.

Lord Gainford, I am sure, will excuse one reference, which I make from the point of view of historic interest.

The railway system of the world was born in England exactly 100 years ago. At that time a letter

sent from London to Edinburgh required eight days for the journey, and a business man was fortunate to get a reply much under three weeks from the time of its posting.

To-day an exchange of correspondence can take place within forty-eight hours, or less than three business days.

George Stephenson, to whose inventive genius this change is largely due, made untiring efforts prior to 1824 to secure recognition of the epoch-making nature of his discoveries. He waited many years for one possessing sufficient foresight and courage to give him the necessary financial support.

That one, to whom with George Stephenson all civilised countries are now indebted, was Mr. Edward Pease, great-grandfather of the present chairman of the B.B.C. A project for a railway between Darlington and Stockton was planned by Messrs. Stephenson and Pease as far back as 1817, but it was on December 30, 1824, that the agreement was actually signed.

Cannot we regard the momentous decision of 100 years ago and the family link between then and now as an excellent omen for the future of British broadcasting?

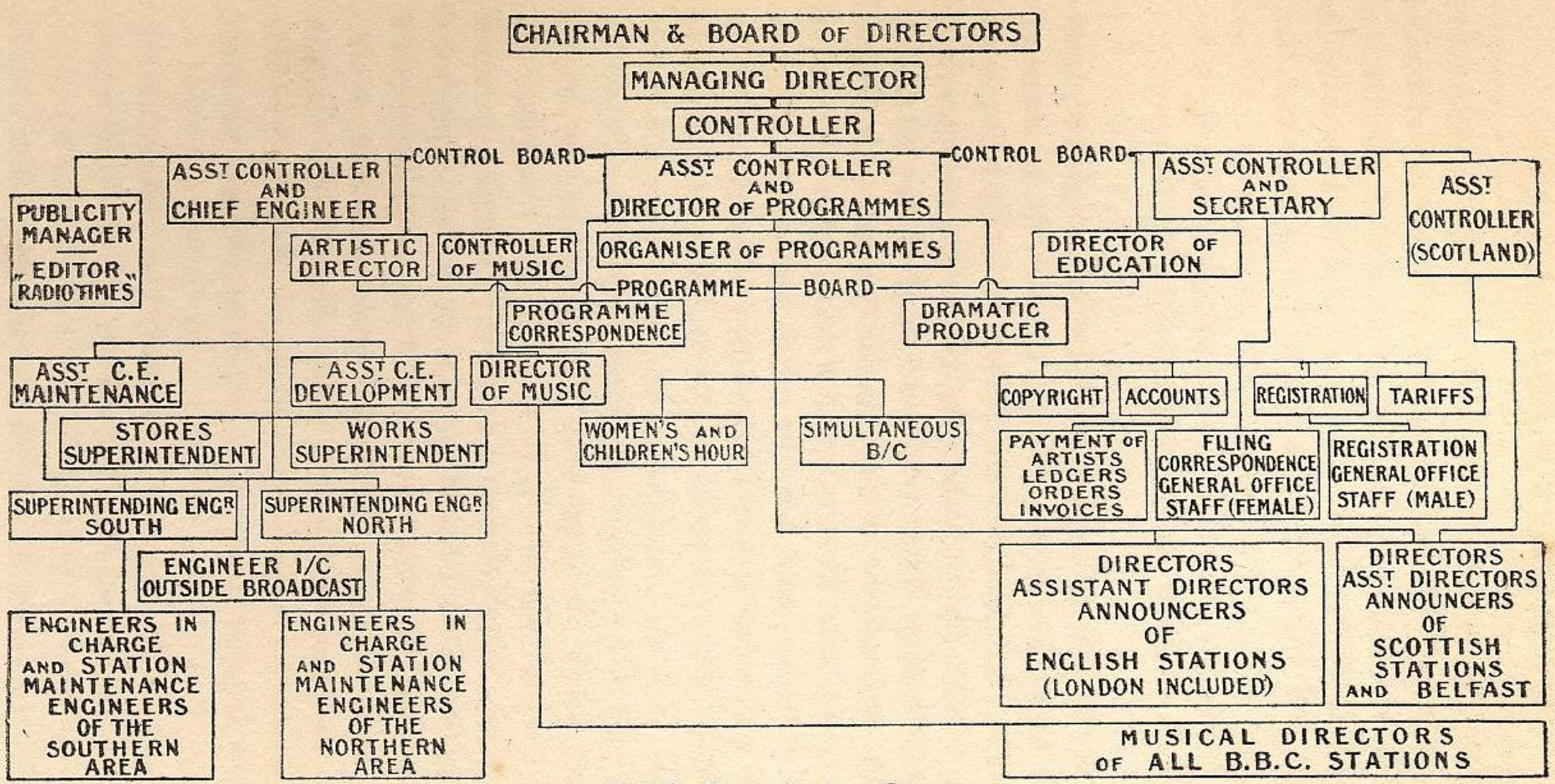
The managing director and controller must forgive me for a few remarks in general terms. These are necessary for a just understanding of the B.B.C. organisation.

Imagine for one moment what broadcasting might have become had it fallen into the hands of persons lacking in ideals. Vulgarity could not have existed for ten minutes, public opinion would have seen to that. But between the things vulgar and the things

which are beautiful are the trivial things—uninspired, characterless things—things which lead one nowhere. These we are all trying to avoid, and the task is lightened by the fact that, working restlessly in the background, inspiring each member of the staff, and watching jealously every assault which may turn him aside from his objective, is a forceful personality—that of the managing director.

The controller personifies the spirit of the great service from which he came. At all the conferences over which he presides one is impressed by the sound judgment of an unbiased mind. When examining the little things that matter no detail escapes his Socratic reasoning. Even in the punctuality of the programmes the handiwork of the controller may be found. Those who have to meet Admiral Carpendale with a good cause need not fear the firm set jaw and the relentless eye. Behind a certain austerity will be found a just and human personality gifted with a keen sense of humour.

Prominent amongst the headquarters staff of the B.B.C. is one whose serenity of manner suggests that life is just a long picnic. This is the secretary, whose smile is calculated to dispel all trouble. Yet whatever may be your impressions of the duties of such an official, I am certain you have guessed but half those of the secretary of the B.B.C., that is, unless your imagination has grasped from previous chapters some of the complications set up by copyright problems and the dovetailing of local with general expenses. Mr. Guy V. Rice has a wonderful mastery over an intricate department. His training at Oxford, his career in the Royal Air Force, and some years of professional experience (he is an Associate of the



B.B.C. Organisation Chart.

Assistants and secretaries to heads of departments, together with the names of individuals have been omitted from the above diagram to secure simplicity. The staff of the B.B.C., exclusive of orchestras and artists on contract, already exceeds 300 persons. There are over 100 engineers.

Chartered Institute of Accountants) have undoubtedly been of assistance, but training without an exceptional personality would not have given to us so ideal a colleague. It is a great pity that Mr. Rice's duties do not bring him more prominently before the public.

The secret of his serenity, I strongly suspect, is to be found in his beloved garden on the Kentish coast.

What can be said about our chief engineer that has not already been repeated hundreds of times? In Captain Eckersley there exists a fascinating and complex study, that of one who shines as an organiser and director of a large and many-sided department, yet at the same time is capable of the most delicious fooling. Captain Eckersley lives half his life in a world of fantasy, and has the good fortune to be able to throw open the doors that others may enjoy what lies behind. There may be many wireless engineers in the world to-day, but I know of none more fitted for the task of chief engineer to the British Broadcasting Company. Life is bound to run smoothly in a department where the chief, in emergency, can produce an evening's entertainment from a damaged gramophone record, two biscuit tins, a prehistoric piano—and himself. If you want to have advantage of Captain Eckersley's merry temperament for many years to come, please—don't—oscillate. If, on the other hand, you would see him at his best in private life, follow him to the moors, but keep behind his gun.

Responsibility for the conduct and extension of the company's work throughout Scotland falls upon Mr. D. Millar Craig (assistant controller, Scotland).

Mr. Millar Craig is also concerned with the inter-

pretation of B.B.C. policy according to the light of Scottish needs, and the safeguarding of the Scottish and Belfast stations and listeners against such disabilities as might otherwise arise through their distance from the Metropolis.

Mr. Millar Craig has amongst his special qualifications for this important work a wide knowledge of his fellow-men, gained whilst handling in Government service the personnel questions involving thousands of people; a keen interest in music (he is holder of the diploma of the Royal Conservatoire of Leipzig); and the several advantages which are generally recognised to accompany University training.

Mr. Millar Craig's time is so fully occupied that he is rarely seen in London, and when he does come he has few leisure moments.

Another fount of energy at 2 Savoy Hill is Captain C. A. Lewis, who came to the company with a fine record in the service of the Royal Air Force and in subsequent pioneer work in China. As my deputy during the first year of the company's existence, and subsequently as organiser of programmes, he has demonstrated an intense enthusiasm and activity. I am certain that if some Government decreed a forty-eight-hour working day Mr. Lewis would be pressing for at least two more in which to obtain that degree of exhaustion conducive to sleep. Impatient with train services he insisted on flying to Switzerland for his summer holidays.

Amidst the mass of detail work associated with the organisation of programmes he has found time for the initiation and development of special features, amongst them studio plays, poetry readings, and critical talks, besides contributing almost nightly to

the Children's Hour in the rôle of "Uncle Caracta-cus." Captain Lewis's success in this direction is evidenced by the variety of charming little presents which grace his room and the heavy correspondence which is addressed to him daily from the London nieces and nephews. In private life Captain Lewis displays the characteristics of a connoisseur having a special interest in the art of the Orient.

What, too, can be said of Mr. Percy Pitt that has not been stated times without number in the musical and daily press of this and foreign countries? It is impossible to think of grand opera in Great Britain without coupling the name of him who is now con-troller of music to the B.B.C. A few minutes only with Mr. Pitt are sufficient for an impression of the vast experience he can bring to bear on operatic and orchestral music generally. Since his resignation from the directorate of music to the British National Opera Company Mr. Pitt has given almost undivided attention to the programmes of the B.B.C. He holds the auditions in the case of artistes of repute or particular promise, indicates the conductors most fitted for a special performance, and examines in the light of his wide and special knowledge the musical make-up of every programme, London and pro-vincial. Occasionally Mr. Pitt conducts a night of operatic or symphonic music from the London studio, but his principal work, like that of several others, is now done behind the scenes.

To Mr. L. Stanton Jefferies, director of music, I tender thanks for his excellent work in the pre-B.B.C. days and in those early days since the formation of the company when the compilation of a good musical

programme was a matter of no little difficulty. Mr. Jefferies has not only great ability, but the tirelessness of youth. Nothing disturbs him. He will jump up from a masterful improvisation at the piano for the amusement of the children to settle a knotty problem in relation to a tour of contract artistes; will answer almost in the same breath a trunk call dealing with the reorganisation of an orchestra at a distant station; and will put down the phone to give a really sympathetic hearing to an artiste who would receive short shrift in many other hands. As a hobby Mr. Stanton Jefferies finds time between his other duties to produce and conduct musical plays at the London station. Some night when a kind soul switches off the lights at a hidden point he may be prevailed upon to take a holiday. Then if he cannot conduct an orchestra he will be found conducting an omnibus. You don't know Uncle Jeff.

Major Corbett Smith is one of the new-comers to headquarters, but is one of the senior officials of the company, having spent over a year at Cardiff as director of the Cardiff station. It was evident from the outset that Major Corbett Smith had a distinctive outlook towards broadcasting and an unusual variety of interests, ranging from music, art, and literature to things naval and military. As the programmes developed so it became evident that an artistic director was needed to clothe ideas in appropriate garments and to link harmoniously together the variety of material which is usually to be found in a night's broadcast entertainment. Major Corbett Smith is a strong believer in continuity programmes on special occasions, and has backed his faith by producing feature nights on festivals such as Empire

Day. These programmes bear the same relation to broadcasting as the old diorama did to other contemporary forms of entertainment. Major Corbett Smith's brain is never resting. He finds recreation in writing books and composing operas.

Mr. J. C. Stobart, the new B.B.C. director of education, comes fresh from the Inspectorate of the Board of Education. It has been my good fortune to have been closely in contact with Mr. Stobart for many weeks during the present summer, and I foretell a great future for his work. The director of education to the B.B.C. has something more than a brilliant academic career. He is able to add to his several scholarly achievements (undergraduate and post-graduate) at Cambridge many years of intimacy with the educational systems of this country, and particularly in recent years a specialised knowledge of essentials for success in the use of applied science for educational purposes. Teachers and all interested in education can be assured of a most sympathetic hearing on matters relating to the informative side of broadcasting.

Two other officials of the B.B.C. who play important parts behind the scenes in British broadcasting are Mr. W. C. Smith, our link with the Press of Great Britain, and Mr. H. Parker, the B.B.C. editor of the *Radio Times*. Mr. Smith came to us from across the Border in the days when the staff was lodged in one room in Kingsway, and I imagine his habit of giving non-stop interviews by telephone hastened our removal to more suitable quarters. A few days were sufficient to show that this very likeable new-comer, with the hall-mark of Glasgow

University and a most creditable record in Scottish publicity, had, to use his own expression, found his wave-length in the "Street of Adventure"—a wave-length to which the newspapers were soon well tuned. Mr. Smith's duties are like those of a doctor. Each evening he leaves the Embankment for the end of a telephone wire in the northern London suburbs. Yet there is always a twinkle in his voice and a twinkle in his eye. Some day Mr. Smith will be found addressing the Speaker of the House of Commons. He will get a hearing.

Mr. Herbert Parker, the B.B.C. editor of the *Radio Times*, can claim perhaps a unique position in British journalism. There is no other instance in the history of periodicals where a weekly publication has grown within a year, by public demand and intrinsic value only, to a circulation for each issue of well over half a million copies. Goodness knows how many persons throughout the breadth and length of these lands ponder nightly over this publication, but I am told that outside Britain, in Norway, Sweden and Denmark the *Radio Times* is more widely read than any other British weekly. The *Radio Times* is not concerned with the technical side of broadcasting or of wireless generally; this is ably handled by the several wireless magazines of great publishing houses. Its main function is the provision in detail, some days ahead of performance, of all the B.B.C. programmes and useful information relating to the programmes in their several aspects. Amongst Mr. Parker's equipment for this special task of providing an interest for all classes are a Cambridge career, a fine war record, and that special knowledge of the ideals of organised labour, such as might be expected

from a nephew of the Right Hon. J. R. Clynes, now Lord Privy Seal and Leader of the House of Commons.

The London station stands apart from headquarters in the B.B.C. scheme of organisation. The fact, however, remains that in providing programmes for the London area and the several relay stations, it caters for nearly three-quarters of the listeners in Great Britain.

The director of the London station is Mr. Rex F. Palmer, a Bachelor of Science of London University, a skilled flying officer in the late war, the possessor of one of the most popular radio singing voices, and a geniality which reveals itself in every word spoken over the microphone and elsewhere. There are many who consider that "Uncle Rex's" appearances before the microphone are far too few. Perhaps this is so, but I would ask such out of the goodness of their heart to remember the strain devolving on one who puts in a long day dealing with the thousand-and-one problems each requiring instant attention in the conduct of so important a station, and not to call on him too often for an evening at the microphone with its exacting requirements. Give "Uncle Rex" the opportunity for a few miles run in the country; you will then hear him at his best.

Collaborating with Mr. Palmer on the musical side is Mr. Dan Godfrey, junior, the London station musical director. Mention is made elsewhere of Mr. Godfrey's good work at Manchester. This he is carrying on with unabated vigour at 2, Savoy Hill, his most recent development at the time of writing being the 2 L O Military Band. I am not going to risk personal injury by estimating Mr. Godfrey's

weight or dimensions, but it is only after a night in the studio watching him at work before the orchestra that one realises the respect with which he is held by opponents on the Rugby field.

Assisting both Mr. Palmer and Mr. Godfrey in the creation of ever-changing nightly programmes is Mr. Kenneth A. Wright, first director of the Manchester station, who is probably already as well known in London as in Manchester as "Uncle Humpty Dumpty." Mr. Wright is a born music lover, but the possessor also of a good sense of public taste.

London has also two announcers who share duties at the week-day and Sunday afternoon programmes. These are Mr. J. S. Dodgson and Mr. J. G. Broadbent. The duties are not as light as some may imagine. Apart from the fact that the programmes commence as early as 1 p.m. on certain days in the week, efficient announcing entails considerable preparatory work.

CHAPTER XVII

PROVINCIAL STATIONS AND PERSONALITIES

WHAT of the contributions made by the provincial stations?

The answer can best be given by dealing with these in chronological order.

This takes us to Manchester.

The story here begins early in 1922, when Mr. A. P. M. Fleming, chief of the research and educational department of Metropolitan Vickers, Limited, assembled a small group of assistants to discuss broadcasting and its technical requirements. The result was that, when it was decided to develop broadcasting in England, this little group (augmented by others who, in course of training or business routine, had paid periodic visits to the United States) had covered much useful preliminary ground. The Radio Communication Company constructed an experimental transmitter at Trafford Park, and Mr. Fleming and his assistants contributed, amongst other things, their special knowledge in the matter of microphones. For a short while the carbon-granule microphone was used. Then, in collaboration with Professor Rankine, of the National Physical Laboratory, experiments were made with a device known as the photophone, in which the studio sounds were made to alter the character of beams of light thrown upon a selenium cell, and for some time after the absorption of the

Manchester station by the British Broadcasting Company this photophone was used in the actual transmission, and to good effect. The instrument, however, was more fitted to laboratory work by specialists than for the more knock-about conditions then prevailing. For this reason Mr. Fleming introduced a magnetophone, more robust in character and well suited to the small studio then in use.

The early months of 1922 at Manchester were not spent exclusively on technical problems. The research department, which contained large numbers of young graduates, men and women, had developed a warm interest in the preparation of programmes, and when the time for practical work arrived the leadership was entrusted to Mr. K. A. Wright, who had proved himself as keen a musician as engineer. Mr. Wright gathered around him support for the musical and children's features in the programmes, and Mr. Fleming, through his keen interest in education, brought aid from Manchester University, and secured a place for serious talks and lectures on languages. The assistance given by Professor Myers, of the Manchester University, in these early efforts undoubtedly contributed to the immediate success of the Manchester station.

With the removal of the studio in the summer of 1923 to the heart of Manchester many of the research staff who had helped in its programmes had of necessity to abandon their parts, but no one who remembers the first six or eight months of Manchester broadcasting will forget the marked family spirit which revealed itself to every listener. Uncle Humpty Dumpty (Mr. Wright), the Sand Man (Mr. Nightingale)—who was heard singing from K D K A (Pittsburg) during one of the transmissions to Eng-

land in the spring of the present year—Mr. X (Captain W. H. Bell), and the "Cloud Lady" (Miss O. Cormack) were studio characters, which, I think, may fairly be remembered in the history of British broadcasting. The cramped little canvas studio, built on a wooden framework within one of the research rooms at Trafford Park, gave little opportunity for ambitious programmes, yet amongst those who paid more than one visit was Isolde Menges, the famous violinist.

Mr. Wright's work in the early days at Manchester did not pass unnoticed. He was soon marked down as one fitted to assist in the greater task of preparing national programmes, and at the earliest opportunity he was called to headquarters. This came when, in the summer of last year, it was obvious that for the convenience of artistes alone the Manchester studio must be in the heart of the city.

The greatest difficulty was experienced in obtaining ideal accommodation, and eventually the top floor of a cotton warehouse in Dickenson Street, adjacent to one of the Manchester electric power stations, was selected. By a system of partitioning this was divided into the usual studio, artistes' room, transmitting room, band room, and office premises for the station director and his staff. The only available lift was a strong but crude-looking affair, used for raising the cotton goods from the lorries to the higher floors. This lift was transformed into something very different each evening after business hours, by the use of easily moved floor-cloth and draperies.

From the first there was some uneasiness about the size of the studio. This was confirmed when Mr.

Dan Godfrey, junior, arrived at Manchester to make a feature of the musical side of our work. In a few weeks Mr. Godfrey was setting the pace for the County Palatine by performing works which had not been heard in Manchester for many years—works which required some thirty or forty instrumentalists for their adequate treatment. Mr. Godfrey, quite apart from forty performers, requires some room, as all his friends will agree, and there was no alternative but to have a telescopic partition between the studio and the artistes' waiting-room, so that these two might become one on special occasions.

Then fresh trouble arose. With the greater studio area and the augmented wireless orchestra sounds began to find their way through the partition between the studio and the transmitting room—an undesirable happening—and as the partition was already filled with sand and other fire-proof blanketing, no immediate way out of the difficulty presented itself.

Mr. Godfrey so developed the musical side of the Manchester programmes that it was decided to have a separate musical department. The excellent work he had done was recognised, as in the case of Mr. Wright, by a call to headquarters to take charge, in this case, of the musical side of the London programmes. Mr. B. E. Nicolls, M.A., a graduate of Oxford, with administrative experience in India and elsewhere, was appointed station director.

The mantle of Mr. Godfrey fell upon Mr. T. H. Morrison, whose distinguished musical career in Great Britain and on the Continent has included the leadership of the Queen's Hall orchestra at the unusual age of twenty-two. For ten years subsequent to this Mr. Morrison was leader of the orchestra at the Royal Opera House, Covent Garden.

Another addition to the Manchester staff about this time was Mr. B. H. Goldsmith, who, besides having considerable business experience in the senior service, takes a special interest in social problems, Manchester has also a specialist announcer, Mr. H. B. Brenan.

With this further increase in staff the whole question of accommodation again came under revision, so late in the present summer a further change was made to still more spacious premises. These are in Orme Building, The Parsonage, just off Deansgate, and form part of a large block abutting on the River Mersey. There is ample accommodation for a large studio, well out of the sound range of other offices, for the present staff and such additions as are likely to be made during the next few years.

Mr. Nicolls, the Manchester station director, is amongst the most fortunate provincial directors.

The features of the Manchester programmes to-day include, as one might expect from the recent history of the city and the broadcasting station, a strong musical side, provided by an orchestra rich in Hallé concert traditions, and a repertory chorus well trained and full of enthusiasm; also, frequent incursions to the field of drama, for which Mr. B. Smythe (Uncle Victor) has been mainly responsible; numerous and highly informative talks (a sequel to Professor Myers's early interest in the station), and a jolly children's hour, in which Miss Rhodes (Aunty Rosalind) and Mr. R. H. Wood—the engineer in charge (Uncle Bob)—play a leading part, often accompanied by the children of Manchester listeners.

Next in order of birth comes Birmingham, to which brief reference has already been made. My



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Photo: "Hugo V. W.," Cardiff.

2

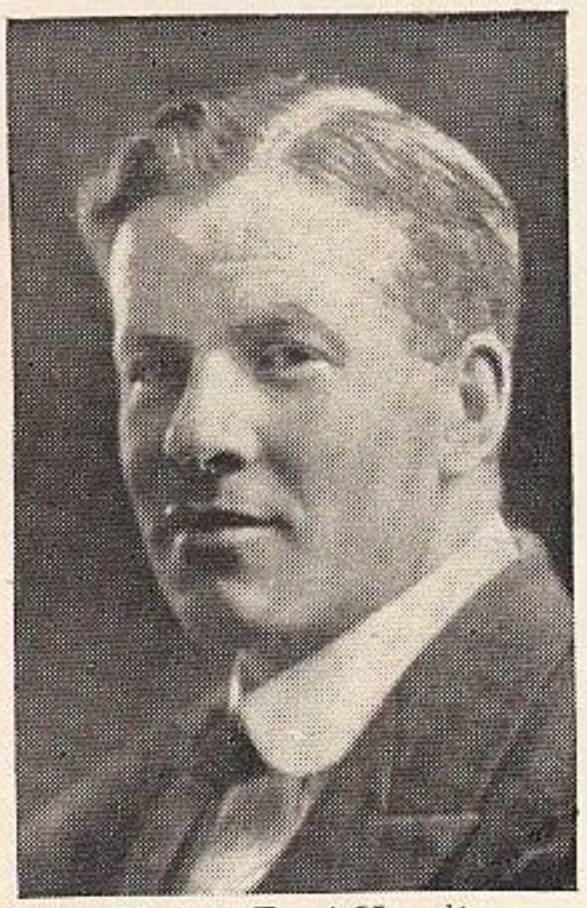


Photo: Fred Hardie.

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Photo: Hulton.

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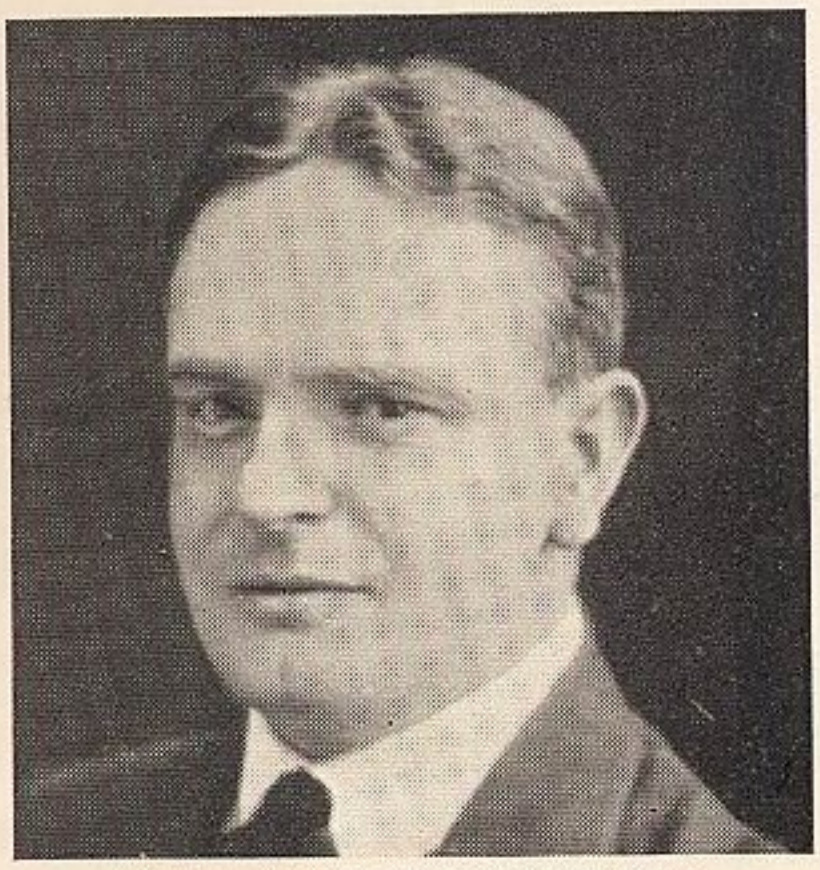


Photo: H. J. Whitlock & Sons.

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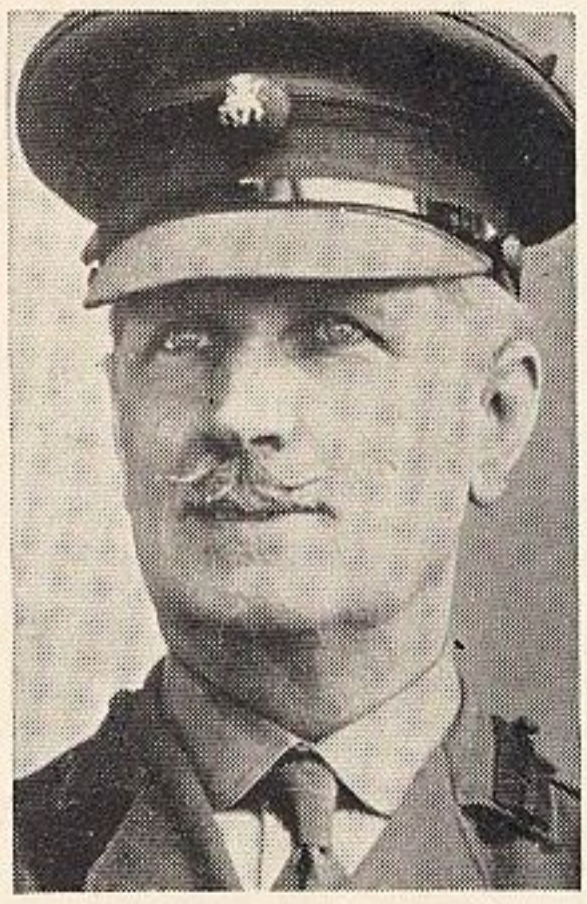
Photo: Hunter's, Buxton.

6



Photo: Imperial Studios, Walsall.

7



8

1. **Major Walter Scott,** Director, Belfast Station.
2. **E. R. Appleton, B.A.,** Director, Cardiff Station.
3. **Neil McLean, M.A., B.Sc.,** Director, Aberdeen Station.
4. **Dan Godfrey, jun., A.R.A.M.,** Musical Director, London Station.
5. **Joseph Lewis,** Musical Director, Birmingham.
6. **T. H. Morrison,** Musical Director, Manchester.
7. **H. W. Braithwaite,** Musical Director, Cardiff.
8. **Capt. W. Featherstone,** Musical Director, Bournemouth.

first introduction to Birmingham came through a report that the new station erected at Witton and equipped by the Western Electric Company, possessed two "Uncles," who were making life in the Midlands well worth living. They were known as Uncle Edgar and Uncle Thompson.

Naturally we in London were keen on establishing the identity of these mystic persons. We found the former to be Mr. Percy Edgar, a native of Stafford, and the latter Mr. Thompson, a Western Electric engineer. Then the time came when Mr. Thompson had to return to his company, and Uncle Edgar, as Birmingham station director, was given the assistance of Mr. Casey, who, like his immediate chief, was a devoted lover of children, and the possessor of an excellent singing voice. These two imbued the whole office staff with the keenest interest in children, with the result that when the children's hour arrived office work temporarily ceased, everyone adjourned to the studio and indulged in a wireless romp; not a romp of incoherent noise, but a sort of communal outpouring of happiness.

The original Auntie Gladys (Miss Gladys Coulbourne) still takes an active part in the children's hour which, with the hour devoted to women's interests, is now organised by Miss D. Barcroft (Auntie Dorothy).

Within a few days the mail-bag for the Birmingham uncles and aunts showed that the hearts of the children of the great Midland centre had been reached, and Uncle Edgar seized the opportunity to cement the friendship once established. The first step was to form a Radio Circle, with special dainty badges of membership; the second, to meet in person as many of the newly discovered nephews and nieces

as possible, the outcome of which is described elsewhere.

The only handicap to the station was the same difficulty which had been experienced at Manchester, viz., that of getting busy artistes to make a journey at night outside the city in which their work is centred. This necessitated a similar early change in the site of the Birmingham studio. Finally, excellent, though restricted, premises were secured at 105 New Street, right in the heart of Birmingham, above a well-known cinema. In this particular studio the artistes are kept informed upon the strength or weakness of their voices (and the necessity or otherwise for moving nearer to the microphone) by a system of coloured signalling lamps operated from the control-room. As this station has a strong repertory company for vocal solo and choral work many of the artistes have become accustomed to taking their instructions direct from the lamps without the need of an interpreter.

Mention of the Birmingham chorus demands instant reference to Mr. Joseph Lewis (Uncle Joe). I am sure he would prefer to be known as the latter. It is difficult to think of Mr. Lewis as an official, though a most effective one he is on the musical side of our work. Mr. Joseph Lewis lives for his art. For many years he has been the driving force in several well-known Midland choral societies. He infects everyone with his optimism and vitality. From the moment you come under the influence of his twinkling eye you realise that here is a man who can get things done, and who will make the task, however great, a pleasant one for all concerned. Mr. Lewis simply *insisted* on joining the British Broadcasting staff, and having got there he immediately

established a repertory company, to which, I understand, it is now considered a great privilege to belong. With its principals, its chorus, and the ever-growing Birmingham orchestra, nothing appears impossible.

The new studio provided the opportunity for a further expansion of the Birmingham feature, the children's hour. The Radio Circle of Birmingham numbers many thousands, but it has something more important than numbers. It has established a tradition for work amongst the afflicted children in the South Midlands. Not only have wireless sets been subscribed for and installed in children's hospitals and the children's wards of general hospitals, but last Christmas no less than 5,000 toys were contributed by the members of the Circle, and distributed by the Aunts and Uncles amongst those who needed them most.

I like in this connection to repeat the story, well known to many, which illustrates the spirit of unselfishness of these Midland nieces and nephews.

When the toys were being collected last Christmas a little girl arrived one afternoon at the Birmingham studio, having dragged up the many long flights of stairs her favourite pet, a teddy bear nearly three feet high. She gave it a parting kiss, and placed it in the forefront of the large heap of gifts. Her mother explained in confidence the nature of the sacrifice. When the child heard the appeal for toys for sick children she turned to her mother and said:

"I must send my *best* toy, mustn't I?"

And her mother, anxious to cultivate this generosity, replied:

"Yes, dear, I would like you to send it, but you won't cry for it, will you?"

"No, mummy," said the little one.

And so it came about that as "teddy" received the parting kiss from his dearest friend, there was neither a tear nor the tightening of a muscle.

At Newcastle the stableyard "fit-up" was, as the posters used to say, "for one night only." Conveniently situated, though limited, premises were found on the western side of Eldon Square, which has since become the site of the Newcastle War Memorial. The first and second floors, with attics, were taken over, but by the time that the artistes' waiting-room and the engineers' control-room had been carved out of the first floor the space available for a studio was limited—sufficient for ordinary solo work and chamber music, but quite inadequate for performances by brass bands, of which that of St. Hilda's Colliery is so excellent an example. It was in this studio that the first station director (Uncle Tom), Mr. Tom Payne, and in succession, Mr. Bertram Fryer and Mr. Lynch Odhams, laboured for over one and a half years. The handicap will shortly be removed, for after a prolonged search, governed by the same limiting factors which had existed at Manchester and Birmingham—viz., freedom from interruption to neighbours, a central position, absence of external electrical interference, and a good cubical area—a new site has been found. There will no longer be any difficulty in doing justice to the big musical combinations, which are the pride of the North.

The Newcastle station, under Uncle Jack (Mr. Bertram Fryer), developed new features. It created a Fairy Flower League in addition to its Radio Circle, in which young children were taught to

develop a real love for animals and flowers, this being the starting-point in a wider scheme for the promotion of unselfishness and a sense of brotherhood. Newcastle also gave her interpretation to the feeling cherished at headquarters that the peculiar facilities offered by wireless telephony should be applied to the widening of the outlook of adolescents, and for the benefit of those in rural areas. To these ends a scholars' hour about tea-time and a farmers' corner were introduced, and I venture to suggest that in a number of years, when the effects of broadcasting will have made their mark upon British life, Newcastle's lead in these two departments will be spoken of in highly commendatory terms.

The informative side of the programmes has benefited from the first by the sympathetic and practical assistance afforded in the early days by Sir Theodore Morison, Principal of Armstrong College, Newcastle.

The need for a Bournemouth director with previous experience in certain departments took Mr. Fryer from the scene of his first success. The directorship fell to Mr. Ernest Lynch Odhams, whose journalistic experience and love for travel have given him a wide outlook on life and a peculiar understanding of human nature. Mr. Odhams (Uncle Jim) has had the loyal assistance, amongst others, of Mr. Parsons (Uncle Charlie), now at Bournemouth, Mr. Richard R. C. Pratt (Uncle Joe), and the announcer, Mr. W. N. Shewen. Among the attractive features recently added by Mr. Odhams to the Newcastle programmes are the plays performed at frequent intervals by the newly formed Newcastle Repertory Company. The children's hour in recent times has

been under the direction of Mrs. K. Latham, a well-known writer of children's stories.

Mr. W. A. Crosse, a well-known local director of music, played a prominent part in the arrangement of the musical side of the programmes for many months.

The transmitting station at Newcastle, which is about a mile distant from the studio, is one of the usual Marconi broadcasting type.

I intend to avoid studiously any attempt to estimate the relative popularity of the British stations, but I think I am on safe ground in stating that the growth of interest in the Glasgow area from the moment that the station was opened in the spring of 1923 was a revelation to everyone. The station director, Mr. Herbert A. Carruthers, was primarily a musician, but knowing intimately the Scottish interest in all matters which count for a wider knowledge, he lost no time in getting in touch with numerous authorities on a variety of subjects.

On the dramatic side Mr. Carruthers enlisted the services of Mr. R. E. Jeffrey, who afterwards became director of the Aberdeen station, and with this combination broadcasting gripped public imagination.

On the purely educational side, in the matter of transmissions during school hours, Glasgow was the first to enter the field, and through the spring and summer of the present year three separate talks by the most eminent authorities were given each week to nearly 200 schools in the Glasgow area. What is more important, the Glasgow education authorities gave assistance to these schools by the provision of the necessary receiving apparatus, and at the time

of writing Glasgow has also a record in being the first and only station to have had (dare I say?) the courage to attempt an entire Greek tragedy, the *Antigone* of Sophocles.

Many persons in the Midlands and in the south of England have enjoyed the Glasgow programmes through a singular directional effect which gives good reception southwards, and also owing to the fact that the Glasgow wavelength stands well away from that of London.

Glasgow provides yet another example of migration from the original studio. That in Cross Street, which served its purpose until the end of the present summer, was inadequate, both from the point of view of the studio and the accommodation of the staff, particularly as Glasgow was also made the headquarters of the assistant controller for Scotland.

New premises were obtained at 21 Blythswood Square, not far distant from the old site, and here there would appear to be ample accommodation for years to come.

The Glasgow transmitting station differs from all others inasmuch as it is on the top floor of the corporation power station at Port Dundas. The final approach is by a spiral staircase of iron, and the hum of the transformers and the weird glow which is thrown over everything by the lemon-yellow lights from the valves, make a fitting climax to the little adventure which the visit to the station entails.

The women's and children's hours at the Glasgow station are in charge of Miss Garscadden, who has mastered the special requirements of the area. While, for instance, women listeners in the London

area are emphatic in the dislike of the broadcasting of cookery recipes, dressmaking hints, and talks upon various household affairs, Glasgow women listeners, who pride themselves on their common sense, are very keen on learning how to improve their domestic knowledge. They are also interested in serial reading, which it is certain would not be so effective in the south, owing to manifold distractions.

In the conduct of the children's hour Miss Garscadden (Auntie Cyclone) has the assistance of the station director (Uncle Bert), Messrs. M. M. Dewar and A. H. S. Paterson (Uncles Mungo and Alex), and the engineer in charge, Mr. Leslie Hotine (Uncle Leslie).

When the engineers commenced their search for a studio at Cardiff in the early days of 1923 there was little indication of a shipping slump in that city, for every inch of office space within reasonable distance of the station and hotels appeared to be occupied. We were compelled to accept a cramped but convenient site over a cinema opposite the castle. The studio was just large enough to permit the swinging of the proverbial cat. Its windows faced the road, and no amount of shuttering proved sufficient to cut out the rumbling noises of trams passing below.

These were the conditions which faced Major Corbett Smith and his two assistants, Messrs. Settle and Page. Yet, despite these handicaps the Cardiff station found no difficulty in developing an individuality of its own. The programmes had each a definite object; the presentation of the best in music, prose or poesy. Another feature of Major Corbett Smith's direction was the talks by Mr.

Everyman on topical subjects, a task requiring no mean knowledge of men and affairs.

The children's hour at Cardiff was mainly in the hands of Mr. Settle (Uncle Norman), Mr. Page (Uncle Leslie)—who came from the London station, migrated to Bournemouth, and is now station director at Hull—and Miss Grimwood (Auntie Betty). Mr. C. K. Parsons has recently joined the staff, from Newcastle.

In our agreement with the proprietor we guaranteed no interruptions by studio noises during the day-time, but it was found impossible to give transmissions of orchestral music and fulfil the guarantee. Eventually a large, centrally placed residence was discovered, with sufficient ground at the rear to permit of the building of a studio to our own specific requirements. The house had been elaborately decorated by one who had had good fortune during the war, and provided sufficient offices for ourselves and other organisations. Major Corbett Smith was called to London to undertake specialised work. The gap at Cardiff was filled by Mr. E. R. Appleton, an Oxford graduate, for a number of years a master at the Royal Naval College, Dartmouth, and later editor of a magazine expressing independent views on literature, art, and music. Mr. Appleton has already given a distinctive character to the Cardiff programmes.

In conformity with a decision that each station should possess a separate director of music, Mr. Appleton was joined at Cardiff by Mr. Braithwaite, from the musical department at headquarters. Mr. Braithwaite, although quite a young man, has had a distinguished musical career, being the youngest Wagnerian conductor, having conducted this com-

poser's operas for the O'Mara Opera Company at the age of twenty-three. Mr. Braithwaite has also been conductor of the Carl Rosa Opera Company, and sub-conductor of the British National Opera Company. With this combination, and the natural interest in choral music to be found in South Wales, the Cardiff station should continue to grow in popularity.

Next, we must go to the farthest north—Aberdeen—that singularly live and up-to-date city which comes as such a surprise to those who visit it for the first time. The studio and offices occupy the first and second floors of a building in Belmont Street, quite near to the railway station. Aberdeen had the benefit of the experience gained in laying out six other stations. It had also the advantage of securing in the first instance a station director with previous knowledge of Scottish broadcasting requirements, gained on the dramatic side of the Glasgow programmes. The station has only been handicapped in one direction, namely, by the limited number of orchestral performers available locally, a fact which made more commendable the work performed for many months by Miss Nancy Lee, as musical director.

Of the Aberdeen station's appeal to children it would be unnecessary to write at all were I certain that all readers had heard the occasional Sunday afternoon programmes from the Aberdeen studio. Mr. Jeffrey was assisted by Mr. W. D. Simpson, formerly of Newcastle, Mr. H. J. McKee (Uncle Harry), Mr. A. M. Shinnie (Uncle Sandy), and Miss Winifred Manners (Auntie Win). The children's hour has always been an artistic affair, and the popularity of Mr. Jeffrey could never have been more

strikingly demonstrated than when he appeared on the platform one Sunday afternoon about midsummer to conduct the community singing by hundreds of children. The broadcasting of community singing, by the way—where thousands of people meet for the first time and sing whole-heartedly numerous well-known tunes—is a special feature of the Aberdeen station which may be copied elsewhere in the future, and may add to the enjoyment of life. A concert of this character, in which 2,000 persons took part, provided possibly the most successful programme yet broadcast in the far north.

Aberdeen, I believe, holds the record of being the first British station to transmit a programme of special interest to a foreign country, and to secure for the purpose an announcer speaking the Scandinavian language. The programme was received and much enjoyed in parts of Norway, Sweden and Denmark.

At the moment of writing a new station director has been appointed to Aberdeen. This is Mr. Neil MacLean, Mr. Jeffrey having been called to London to concentrate on the dramatic side of S.B. programmes.

Each station reviewed so far has been shown to have originated some special feature. What has been the contribution of Bournemouth?

Firstly, Bournemouth represents the high-water mark of technical efficiency amongst the first eight stations. It was conceived at the time when the financial future of the B.B.C. was assured. It has the advantage of a transmitting station free from surrounding buildings, erected upon the company's

own ground, and possessing an aerial system entirely independent of existing chimneys. There is hardly a country in western Europe or on the coast of the Mediterranean where the Bournemouth programmes are not clearly received under favourable conditions.

Secondly, Bournemouth has had from the outset a station director who had made good in perhaps the most silent area in Great Britain. The Northumbrians are not people to make a fuss. They are honest, hard-headed folk, who appreciate a good performance, but reserve their comments for a bad one. Mr. Fryer found at Bournemouth a studio and offices which were certainly at that time the most attractive in the country, and he instantly set out to give programmes worthy of the premises. In this he has undoubtedly succeeded, with the active assistance of Captain Featherstone, who for many months coupled the posts of conductor of the Bournemouth Military Band and that of musical director of the Bournemouth station.

There has been from the beginning an unfailing series of attractive concerts. "Uncle Jack," as Mr. Fryer is known, has repeated at Bournemouth his Newcastle idea of a Fairy Flower League, which he prefers to regard as a juvenile League of Nations, and he is certainly justified in the title to the extent that the Bournemouth League possesses members in Denmark, France and Spain. Already the Bournemouth children listening to the local wireless programmes are responsible for the provision of flowers for hospitals and needy sick folk, and committees to arrange for distribution of these flowers exist in many localities quite distinct from Bournemouth itself. "Uncle Jack" is looking to the day when the Fairy Flower League will have its own guest-house for

children, who otherwise would not see the country or the sea, and he believes that this idea will be taken up throughout the country. The Uncles supporting Mr. Fryer in this work for the children are Uncle Alfred (Mr. Goddard), Uncle Rob (Mr. Keen), and Uncle Ray (Mr. Raymond).

Bournemouth has already many novel programmes to its credit, the most successful being, without doubt, that in which pictures by famous painters were translated into sound, graphic descriptions being supported by realistic noises. At the moment of writing Bournemouth hopes to be the first station to transmit the "atmosphere" of a British seaside resort—from the sound of the military band, the promenading on the pier, the concert parties on the sands, to the actual roar of the breaking waves.

A ninth main station is coming into action at the moment of writing. This is to serve that portion of Ireland which is still proud to be recognised as part of Britain. The Belfast station has yet to make history, and everyone is looking forward confidently to some distinctive programmes from Mr. Walter Montagu-Douglas-Scott, the station director, Mr. E. Godfrey Brown, the music director, and his staff at their studio 31 Linenhall Street. Mr. Scott takes up the direction of this station after a distinguished career as traveller and diplomat. His familiarity with life in most European countries will undoubtedly become apparent as the programmes develop.

It is uncertain whether Belfast will be able to contribute to the simultaneously broadcast programmes until a system of wireless relays has been instituted between Belfast and London, for the telephone line

between these two capitals, apart from being some five or six hundred miles long, has to pass under the sea for about the same distance as the cables between England and France. Therefore whilst speech may be possible, some distortion of musical sounds may occur. But we live in an age of progress, so who knows?

CHAPTER XVIII

LONDON'S BABIES

LONG before British broadcasting was officially a year old it became evident that the original plan of eight stations to cover Great Britain was inadequate if the movement was to assume the democratic character so much desired. The first populous area to demand equal facilities with the cities already mentioned was that of which Sheffield is the centre, and the reasonable character of the appeal was immediately recognised. A small-power station of 100 watts, more recently raised to 200 watts, was constructed on the banks of the Don, with the object of receiving the Manchester programmes and relaying them on six days a week, the seventh being left open for a local programme by Sheffield artistes and speakers. But the best-laid plans of mice and men are sometimes disturbed by unforeseen circumstances. The telephone line from Manchester to Sheffield, which passes over the Pennines in the neighbourhood of the Peak, proved erratic, and an effort was made to establish a wireless relay, but here again, though excellent results were obtained at times, various reasons arose why this practice should not be continued. The line from Birmingham was next tried, and the Birmingham programmes were relaid. This time the experiments were much more successful, but in order to cut out any local feeling which might arise through the relaying of the bulk of the music

from another provincial city, it was finally decided that Sheffield, for the major portion of the week, should listen to the programmes of the London studio. The same policy has been applied to all our relay stations, with the result that the London studio has quite a family of baby stations waiting to be fed on six nights in the week. To Sheffield have since been added Plymouth, Edinburgh, Liverpool, Leeds, Bradford and Hull, Nottingham and Stoke-on-Trent. Plans are definitely in hand for two more relay stations, at Dundee and Swansea.

Children are always apt to steal a march upon their parents, and therefore it ought not to have come as a surprise to the London station one morning about midsummer in this year to learn that the Friday afternoon talks to children in schools, given at the London studio, but denied to other stations through an inability to obtain the trunk lines before 5 p.m., had actually been received by wireless at Sheffield, and relaid by this fractious child to schools in the locality.

Mr. H. C. Head Jenner, station director, has made a most successful feature of the children's hour. As "Uncle Herbert" he has had the assistance of Mr. A. Birch (Uncle Jim), Miss Hilda Francis (Dream Lady), and Miss Win Anson (Auntie Win). The station is collecting toys for the crippled children of the city. On one occasion the children's corner actually enjoyed the relaying by wireless of a programme from the Eiffel Tower.

The second child in the family of relay stations was Plymouth, which commenced so auspiciously on March 28 by a programme at the Guildhall, which realised £100 for local hospitals. Mr. Clarence Goode



Photo: Elwin Neame.

1



Photo: Blackwell, Parkstone.

2



3

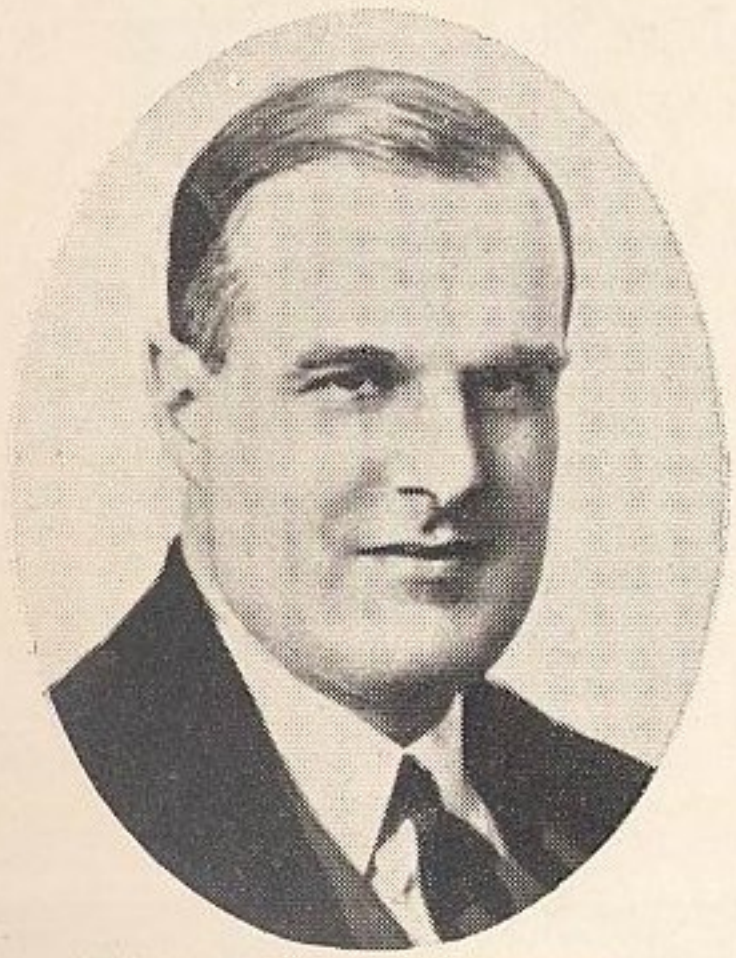


Photo: Yates & Henderson.

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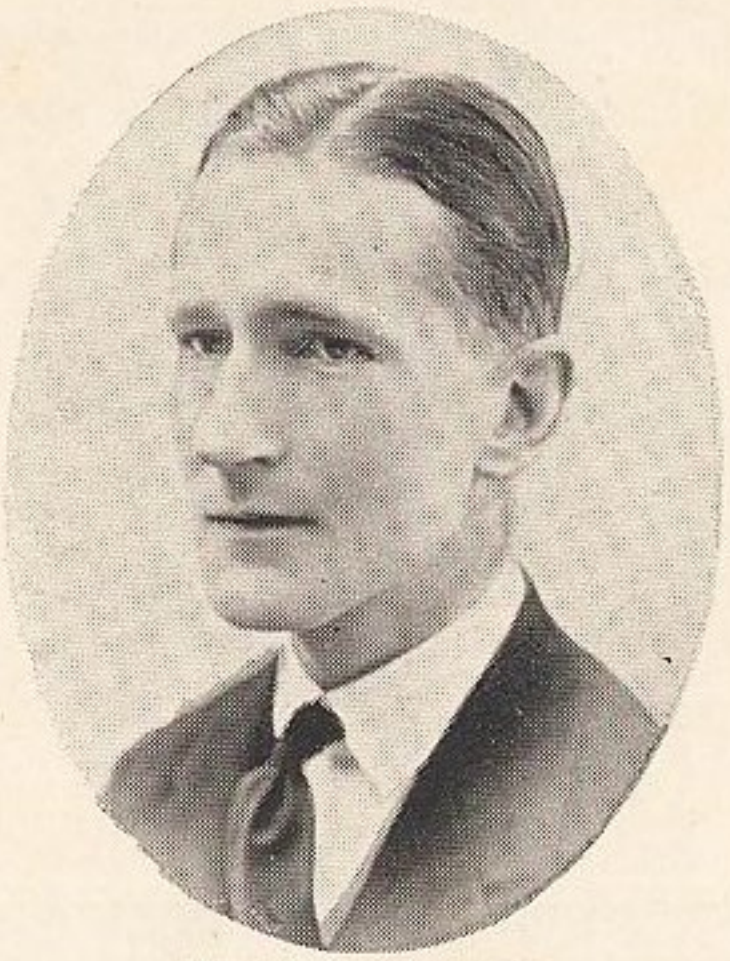


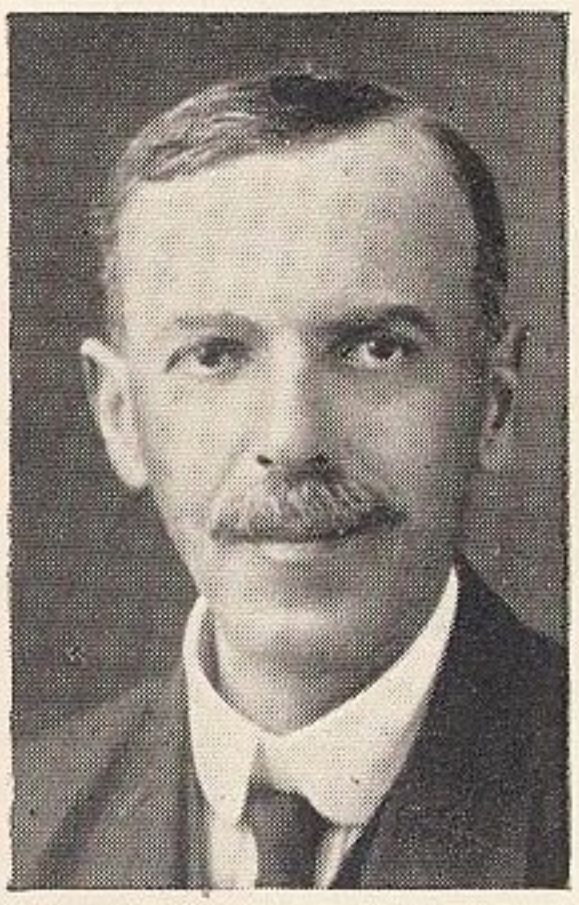
Photo: Dobson, Ltd.

5



Photo: Vandyk.

6



7



8

1. **C. S. Goode,** Director, Plymouth Relay Station.
2. **Leslie B. Page,** Director, Hull Relay Station.
3. **G. P. Fox,** Director, Leeds and Bradford Relay Station.
4. **H. C. Head Jenner,** Director, Sheffield Relay Station.
5. **H. C. Pearson,** Director, Liverpool Relay Station.
6. **E. Liveing, B.A.,** Director, Nottingham Relay Station.
7. **E. Godfrey Brown,** Musical Director, Belfast Station.
8. **E. Marshall, M.A.,** Director, Edinburgh Relay Station.

(Uncle Clarence), the station director, is determined that London shall hear a very great deal of at least one of its children before long. His staff is by no means confined to mere mortals, such as Uncle Henry (Mr. Harry W. Hudson), Aunt Jean (Miss Jean Tye), Auntie Elsie (Mrs. Delsie Elgar), but includes a mysterious "Pat," the radio dog, and "Tweetie," the prize canary.

The Plymouth station having nominally a crystal range of five miles and a one-valve range of ten miles, snapped its fingers in the face of the chief engineer on the first night of its existence by making itself heard on a single valve in Sunderland and other places equidistant. This misbehaviour was followed a few weeks later by Liverpool, which had the audacity to trespass on the territory of Manchester, and actually usurped the position of Manchester in Blackpool.

London's third baby was Edinburgh, which, unlike ourselves, had a good deal to say in the choice of parent. The simple folk in London thought Edinburgh would like Scottish programmes from Glasgow, but Edinburgh said "No," and there it was. The Edinburgh studio is at 79 George Street, and the staff, or, at any rate, that portion of it whose voices reach the public ear, consist at the moment of writing of Mr. G. L. Marshall, a graduate of Edinburgh and Oxford Universities (another Uncle Leslie), and Miss Nancy Shaw (Auntie Molly). Edinburgh's children's hour, which is already becoming a strong feature, is always rich in music—good music—with plenty of excellent material. Early in its career Edinburgh created a record by broadcasting a turn-out of the Edinburgh Fire

Brigade, which is the oldest in the British Empire. Three engines and a fire escape raced out from the Edinburgh station in so realistic a manner that a vast crowd assembled, imagining a real fire to be in progress. Thousands of supers were obtained for this broadcast comedy free of charge—a truly Scottish beginning.

Fourth in the relay family was Liverpool. This station has established a record which no other can hope to approach in this generation or probably for many generations. On July 19 Liverpool was able to give to the whole of Great Britain the Consecration ceremony of Liverpool Cathedral, a ceremony not performed in England since the year 1225. It took the lead also amongst provincial stations in the broadcasting of His Majesty's voice.

Liverpool has as its station director Mr. Pearson, a young ex-naval officer, who previously had several months' training for the work in Birmingham.

Of the work done at the local relay stations at Leeds, Bradford, Hull and Nottingham, one cannot yet write, but Leeds and Bradford, under the joint local direction of Mr. Fox, a son of the Town Clerk of Leeds, had a fine send-off on July 8, in a visit by the Grenadier Guards and two already famous Yorkshire artistes, Miss Elsie Suddaby and Mr. George Parker. The Leeds studio is at Cabinet Chambers, Basinghall Street, the transmitting station in Claypit Lane, and the Bradford transmitting station in Simes Street, Bradford.

The Hull station (at 26-27 Bishop's Lane), with Mr. Leslie Page as station director, and Nottingham station (4 Bridlesmith Gate), with Mr. Edward

Liveing as station director, have been opened whilst this book was in the press.

How far it may be necessary to add further to this group of London "children" depends upon the success during the present summer of the experiments made with a high-power station. If 100 miles or more crystal range can be obtained, then many towns with big populations, at present denied the opportunity of listening on cheap sets, should be in a position to join the ranks without more ado. Should the high-power scheme fail, through any unforeseen reason, then further relay stations will undoubtedly be necessary.

CHAPTER XIX

AT THE END OF TWO YEARS

LOOKING back over the few months during which broadcasting has had a part in national life one can but feel that, however crude may have been these early efforts in relation to future developments, we have already on record several events which may reasonably be spoken of with pride.

Millions will be able to tell their children how they followed at a distance the King's speech and ceremonial at the opening of the great exhibition of 1924, and how at a later date they were privileged to hear and follow in the Consecration of Liverpool Cathedral, a religious rite of great importance and solemnity, such as had not been experienced in these islands for seven centuries.

Hundreds of thousands, too, in the summer of 1923 were given their only opportunity for hearing a reading of the heartrending "blinding" scene from *King John* by Miss Ellen Terry, the veteran and most widely loved British actress. Since Miss Terry celebrated the jubilee of her professional career in 1906 a new generation had grown up, to whom hers is but an honoured name. We are told by some who listened at a distance, and knew Miss Terry in the days of her stage glory, that her voice, as it rang across the æther, still revealed its old-time charm and ability to express, to an exceptional degree, the whole range of human emotion.

When His Majesty opened Wembley Exhibition

a gramophone record was taken of the Royal speech as transmitted by wireless. This record is now in the British Museum. One can only hope that our national home of historic treasures will also receive in time the metal die from which the record was struck, so that in the event of the fabric of the record decaying new ones may be cast, and young Britain of 1,000 years hence be given the opportunity of listening, through the wireless medium, to a monarch who would bear about the same relation to them, from point of view of time, as King Alfred the Great to ourselves.

Is it not a question for really serious consideration whether similar records should not also be made of other current events of historical importance, so that the future as well as the present may benefit thereby? It is not enough to be able to point to literary record. Much more can be conveyed by the voice than by the pen or printing press.

How different might British history appear to us to-day if we had before us actual verbal records dating from the signing of the Magna Charta!

To many, I imagine, the broadcasting of the song of the nightingale in its natural haunt was an interesting "stunt." The song itself may have been disappointing to those who have taken poets literally and were looking forward to a performance of surpassing beauty. In this respect, perhaps, we were wrong in selecting for a first effort a subject which relies for its full effect not only on sound but natural surroundings and the hour of happening. Be this as it may, the actual act of conveying the voice of a free bird into the homes of our crowded cities was in itself sufficient justification. Syncopated dance music may convey the impression of town life to the

rural areas; the voice of song-birds, the whistling of the farmer's boy, the hum of the threshing machine, with the attendant sounds of a carefree life, may easily reverse the process and give to the town-dweller a desire to know more of the countryside—much more than is to be learned by racing at high speed through clouds of dust.

On Australia Day, January 26, 1923, wireless telephony gave to its listeners its first lesson in Imperial affairs. Through the active co-operation of the High Commissioner for Australia an entire evening programme was provided, ranging from Australian children's stories, read by Australian story-tellers—and a special story written by Dame Melba herself—to the provision of a musical programme by prominent artistes and instrumentalists, all of Australian birth. What a revelation of our dependence on the Commonwealth it must have been to regular concert-goers to find on our programme for that evening such names as Nellie Melba, Ada Crossley, Clara Serena, Stella Power, Daisy Kennedy, Rosa Alba, Gertrude Johnson, Peter Dawson, Lauri Kennedy, Albert Whelan, Malcolm McEachern, Alfred O'Shea, and Horace Stevens.

Here, again, we opened the doors of a store-house from which many an instructive evening may be drawn.

The policy of the B.B.C. from its earliest days has been to ensure that each broadcast programme contains material which is something more than merely interesting. Every talk has been chosen with the dual object of entertaining and enlarging the knowledge of at least a section of listeners. Now that broadcasting is well established little difficulty is experienced in obtaining talks of the order we have

always had in mind, but at the outset the task was less simple. It might, indeed, have been difficult but for the sympathetic and very practical assistance given by such eminent persons as Sir Frederick G. Kenyon, K.C.B., Director of the British Museum, Sir Charles J. Holmes, M.A., Director of the National Gallery, Sir Sydney F. Harmer, K.B.E., F.R.S., Director of the Natural History Museum, Colonel H. G. Lyons, D.Sc., F.Z.S., Director of the Science Museum, South Kensington, and Sir Cecil Harcourt Smith, C.V.O., LL.D., Director of the Victoria and Albert Museum, each of whom placed us in touch with expert speakers on a variety of subjects, and in most instances personally inaugurated the series. Sir Frank Dyson, the Astronomer Royal, not only pointed the way to a number of most fascinating series of talks upon the heavenly bodies, but unofficially secured for our broadcast programmes the co-operation of a small committee of Fellows of the Royal Astronomical Society. Later in the year the British Science Guild also gave us valuable assistance. The League of Nations, too, has been ever ready to enlighten British listeners on the problems at present confronting nations in their work of reconstruction.

In the matter of religious addresses there was, from the outset, a ready and most gratifying response from the several religious denominations, so much so that little difficulty was found in bringing representatives of the Church of England, Roman Catholic Church and United Free Churches together on national and local advisory committees; and in Scotland, leaders of the Church of Scotland, United Free Church of Scotland, Episcopal Church, Congregational, Baptist and Wesleyan Churches.

Hundreds of letters representing all classes of persons, equally from the infirm and physically fit, testify to the help and comfort which the Sunday evening talks invariably give. These addresses and the hymns and anthems broadcast at the same time are being received in many unexpected places, including wayside inns, where they are spoken of in terms of high respect.

Confirmed by these early results in his conviction that broadcasting has a great future as a popular educator, Mr. Reith, our managing director, lost no time in evolving a scheme for the development of the informative side of the British programmes along systematic lines based on the experience of our highest authorities. The Treasury has shown practical sympathy by creating a precedent and sending from the Board of Education one of its senior officials, Mr. J. C. Stobart, a Cambridge graduate with high credentials. Mr. Stobart, as is indicated in an earlier chapter of this book, will concentrate more particularly on the problems of informative talks to schools in school hours, and for adolescents at other convenient times. Those who anticipate some boring quarters of an hour as the outcome of this new development are doomed, I am certain, to disappointment. It was with a view of obtaining data for the school hour transmissions that the experimental broadcasts, referred to in another chapter, were made during the present summer. These experiments brought to light striking illustrations of the enthusiasm which broadcasting has aroused in areas not over-blessed with wealth and worldly comforts. The children of St. Saviour's, Southwark, for instance, reassemble at school to hear the evening programme when that programme is suitably attrac-

tive; the children of another none too opulent area—Rolls Road, Bermondsey—have purchased a wireless set out of the proceeds of a violin class. In many other places the school receiver represents personal sacrifice on the part of little ones, to whom a few pence mean a great deal.

The results—well, these can best be gauged by our post-bag, which has been rich in letters after each school-hour transmission.

Here is one from a school at Twyford, in Berkshire, dated June 24, 1924, which followed an hour of stories by that past-master, Mr. Arthur Burrell.

"DEAR ——,—The stories were very good last Friday. The best story was 'The Wonderful Bed.' *I was right at the back of the class sitting by Bill Munday*, but I heard it quite well. I hope the gentleman will tell some more.—Yours faithfully,

"ERNEST H——."

Somehow I should like to meet Bill Munday.

I often wonder how many surprises broadcasting, even as we know it to-day, has in store for those who listen. What do you imagine would have been the reply of George Frideric Handel if in 1739 he had been told that the principal items of his opera *Jupiter in Argos* would be given to the world *for the first time* in 1925, and would be heard simultaneously by millions of persons sitting in their own homes!

Yet such is to be the case. At the moment of writing an expert in musical transcription is copying from the only score, in the possession of Mr. Newman Flower, this opera, the character and whereabouts of which has been for long years the subject of much

speculation in musical circles, and with Mr. Flower's courteous permission it will be broadcast.

May it not happen that the playing by wireless of *Jupiter in Argos*—this submission to a national tribunal of a composition of unknown merit—may herald a new era in musical art. What has real music to fear from the voice of the people?

No one amongst us considers broadcasting as a mere medium of public entertainment. Here, it is true, is a great field of usefulness, for in these days of intensive industry, of monotonous routine amidst machinery, some healthy form of recreation, free from forced excitement, is very necessary. Broadcasting is one such form of entertainment.

Carefully handled, however, it can be much more than this, and we hope we are exercising that care. I believe broadcasting will prove an ever-rising fount of inspiration, from which young and old alike may quench their thirst for knowledge.

All sections of the community should benefit in some degree from its development, but it is in the country districts that the value of broadcasting will be most quickly felt. It is not surprising, therefore, that amongst the Government Departments which first gave serious attention to our activities was the Board of Agriculture and Fisheries. This Board originally sought our aid in a campaign which it was waging against the rats of the United Kingdom in the autumn of 1923, and having obtained a place in our programmes prepared an amusing and most unofficial type of article, opening with an extract from "The Pied Piper of Hamelin," and concluding with an appeal to all to join in the rout of the destructive rodents, reported to cost each individual in the British Isles at least £1 per annum.

The Board of Agriculture has since arranged a twelve months' series of fortnightly talks, including addresses on such serious subjects as the harvesting of crops, the care of livestock, etc. This Ministry, however, is satisfied that its talks will have a much wider audience than that of the British countryside, for its syllabus will contain much useful information upon poultry keeping, the growth and preservation of fruit, and the handling of milk. It may also reasonably be expected to anticipate from time to time gluts of various forms of foodstuff, particularly fruit and fish. Information will be given to households as to the best ways of securing the advantages from these gluts, and it will probably be found that, despite beliefs to the contrary, this timely instruction of grower and consumer may result in their mutual benefit.

On the value of the wireless weather report there is no need to expand. True it is that those who live in the country possess a keener weather sense than those living in large towns, but in these sea-girt islands many changes may occur in a few hours, and the luckiest weather prophet cannot reckon with that oft-mentioned lady—some near relation to the Clerk of the Weather—Anti-Cyclone. I think it reasonable to anticipate that with the introduction of means for giving crystal reception in rural areas and a closer alliance between broadcasting and the Government Departments most intimately connected with the development of the land and the provision of the nation's foodstuffs, more numerous weather forecasts will be available than at present.

Another Government Department, which by co-operation with the broadcasting services can give useful help to the dwellers in city and country alike,

is the Ministry of Health. A recent address by Sir George Newman showed that by the employment of hygienic methods and by sympathetic prevention and treatment of disease, every child born into this country to-day has a prospect of twelve years longer life than his grandfather had at birth. Yet it is quite safe to say that the majority of people are ignorant of the influences bringing about so remarkable a result. Is it unreasonable, therefore, to suggest that broadcasting may be responsible in some degree for a still further increase in the life prospects of each man and woman?

CHAPTER XX

WHAT OF THE FUTURE?

What lies ahead in that uncharted sea, the future? Broadcasting to-day, despite its appeal to public imagination, is really only in the position of the prehistoric fisherman who put out a few hundred yards from shore in his frail coracle or dug-out. He could see the greater ocean, but its extent was hidden by a horizon set by the fisherman's limited knowledge of materials and their uses. There is nothing new under the sun. All the essentials for the hull of a ship, turbine engines, and even wireless transmitters existed in prehistoric times. The only things lacking were knowledge and experience. We marvel to-day that in so relatively short a space of time we should have acquired so much information upon the æther medium, which belongs to a world outside the limitations of our senses.

We may be certain, therefore, that the work of the past few years, fascinating as it has been to those directly engaged upon it, and mystifying to those who have followed it at a distance, is but shallow-water fishing in relation to ocean navigation. We are told that wireless transmission of sound will be followed at no distant date by television—wireless television.

It has been shown that by the use of rapid vibrations it is possible to gear up the most complex sounds to a point where they become inaudible, and that these inaudible forms of audible things can be

thrown across space, even through solid matter, and be re-translated by the use of comparatively simple apparatus into their original character. May we not reasonably anticipate that by some further development of wireless transmission a *reverse* process may be successfully accomplished, and we may have brought within the limitation of human hearing and vision sounds and sights at present denied to us, and thus be given new points of contact with other realms of creation.

What surprises may be in store on the other side of silence? How far will our present knowledge of music prepare us for an appreciation of nature's eternal harmonies—the seasonal cadences of the rising and falling sap, the music of the growing grass and the love-songs of butterflies?

What, too, lies before us that is at present beyond our sense of vision? Many forms, so familiar to us, melt out of existence when "viewed" through the medium of the X-ray with its intensely rapid vibrations. May not we be influenced one day, through the discovery of some process of reversal, by other forms, which have existed since the beginning of time, but which have remained hidden from sight through our visual limitations.

These speculations, and others which I hesitate to commit to paper, have been prompted in some degree by what is perhaps a unique experience. In the writing of this book it has been my great privilege to have the assistance of one—a Miss Mabel Green—who has been blind from infancy. Nearly every word here set down in print was dictated to Miss Green at normal dictation speed. The shorthand notes were made by a machine having seven keys only, one for each of the six dots upon which the Braille system is

built, and one for spacing. The phonetic signs were embossed on a paper tape similar to that used for recording telegraphic messages. The transcriptions from this tape, made by means of an ordinary typewriter, have been astonishingly accurate, and would do credit to one in full possession of his powers of vision. This book is, I believe, the first to have been prepared under such conditions.

In taking this opportunity for drawing attention to the little-realised skill of trained sightless persons we arrive back at the line of thought which I have been endeavouring to stimulate.

Miss Green and others are able not only to translate from speech to printed characters through the medium of the sense of touch, but can actually read an ordinary printed book, containing no characters in relief, through the medium of sound. Through the ingenuity of an English professor, Dr. Fournier d'Albe, blind persons can read pages of cold print, recognising the inked form of the letters by the varying *musical chords* conveyed to her ears by an instrument termed the optophone. Here, in the training of the blind to read by sound effects, we have perhaps a novel and unexpected use for broadcasting.

I would ask you, however, to leave for the moment the technical side of the future and to pass to a consideration of the bearing of broadcasting upon domestic, national and international affairs. The novelty of wireless telephony still exists for many, and until this has passed it will be difficult to estimate the actual effect that broadcasting will have upon the home life. Some argue, and we like to think rightly, that the provision of varied entertainment within the four walls of the home will do much to restore the old-time domestic circle, for which

virtue has been claimed. This being so, then wireless is bound to exert an influence on the work of the builder, for surely it is largely the inadequacy of the average cottage and small house to meet the requirements of comfort that has led the younger generation to seek entertainment elsewhere. It is too much, of course, to expect an instant change in ideas on housing, but if families remain at their present average, and if broadcasting continues to make an appeal, the design and arrangement of an ordinary home will undergo an alteration.

Secondly, I do not think there can be any doubt but that the nation which makes the freest and most systematic use of broadcasting will be the one to take the foremost place intellectually and industrially. Inasmuch as a holiday at the seaside has an educative value, through the change of environment, the exploration of new country, and the meeting with folk in other stations of life, so I believe it will be possible, without departing from the field of recreative entertainment, to provide occasionally such new and useful knowledge over the æther, that inquisitiveness and the desire to travel will be stimulated, and the public will obtain first-hand information on the lives of those who, though not reared in our country, are fellow-inhabitants of the same old world.

At this point we pass from the national to the international aspect. Experiments have been in progress for some time with a high-power station, by means of which it is hoped to bring within crystal range every British home, urban or rural, within the radius of at least 100 miles. Engineers are, by tradition, conservative beings, and when they talk of a radius of 100 miles they are probably thinking of a radius over which perfect crystal reception may be ob-

tained under the most adverse circumstances. For this reason I imagine that in practice we shall find that for the greater part of the year, certainly in those winter months, with their long, dark evenings, for which broadcasting is eminently suited, the proposed high-power station will be heard on the cheapest form of apparatus over a much greater distance than has been estimated officially. If this station is placed within a few miles of London, then it should be possible for not only the English cottage to enjoy the British broadcast programmes, but also for thousands of thrifty, intelligent persons in the western provinces of France, Belgium and Holland, and even perhaps as far afield as the western shores of Denmark.

We have spoken so far of the cheap crystal receiver. With the increasing demand for valves and their auxiliaries there is certain to be a cheapening of output and a simplification of apparatus. This will give to a really high-power station an international importance which cannot be ignored; and I imagine that within two or three years there will be the keenest rivalry between nations to display to their neighbours, by wireless telephony, the high standard of musical and dramatic art within their respective countries.

When raising this point in the *Radio Times* early in the present summer, I repeated the suggestion that broadcasting may possibly hasten the ideal of an international language. Within a week I received from Denmark, from the editor of a local newspaper, a reply giving strong support to the argument, and also emphasising his belief that English would be that international language. The writer said:

"I—and many here with me—are looking forward to the high-power station as the ideal thing, and you

may have it from me that many hundreds of thousands, not only in Denmark, but in all Scandinavia, in France, Belgium, Holland and in Germany, will listen to British broadcasting besides that of their own country. Most people here in Denmark have a little English, but now *all* will learn English. I know, personally, many elderly people who are studying English with great energy in order to understand the broadcast talks and speeches."

We all know the disservice performed for the League of Nations by those misguided persons who led unthinking people to assume that with the foundation of the League there would be an immediate end to war and warlike actions, and how to-day the League authorities have to spend part of their valuable time and energy, which should all be concentrated on their stupendous task, in correcting the false impression of these misled enthusiasts. With this object-lesson before us we are not going to be so foolish as to suggest that broadcasting is the agent of the millennium. Carefully handled, however, it may become a most powerful influence in creating a better understanding between nations, and of giving greater happiness to individuals. In those days, not so far distant, perhaps, two prophetic thoughts of Shakespeare's master-mind will be realised. The first one, spoken by Caliban, in *The Tempest*.

Be not afear'd, the isle is full of noises,
Sounds and sweet airs that give delight, and hurt not:
Sometimes a thousand twanging instruments
Will hum about my ears, and sometimes noises.'

And the other from *Henry IV*.

And those musicians that shall play to you,'
Hang in the air, a thousand leagues from hence.
And straight they shall be here. Sit and attend.

POSTSCRIPT.

In a letter written by Edward Pease, the "Father of Railways," in 1857 (a year before his death), there is the following:

"I only did what every well-wisher to his friends and his country ought to do. It seems to me that Divine Providence has condescended largely to bless our designs and efforts for the good of the world, and we have great cause to thank Him for the benefit He has enabled us to confer upon humanity."

"I should like to emulate this humility in connection with broadcasting," was the recent comment of Edward Pease's great-grandson, Lord Gainford.

What finer ideal could be placed before those who are privileged at this moment to be serving the nation on the staff of the B.B.C.?

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