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THE POWER
BEHIND THE MICROPHONE

THE
POWER BEHIND
THE
MICROPHONE

by

P. P. ECKERSLEY



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A habit of public speaking inclines me to write sentences too fat to be active and generalizations too trite to be true. If these faults are not obvious it will be due to

DOROTHY CARRINGTON

who not only encouraged me to write the book but helped me to do so. To her therefore it is gratefully dedicated

P R E F A C E

THE paraphernalia of prefaces, introductions, glossaries and appendices are tolerable in 'great works' and therefore out of place here. I feel it so necessary, however, to be clear on one point that I have used the emphasis of a preface to explain it.

A book about British broadcasting is inevitably concerned with the B.B.C. I have criticized the B.B.C. I am so afraid that these criticisms will be taken to constitute a personal attack upon those whom in fact I respect and admire. The B.B.C. has done a grand job of work: those who serve it are men and women of sincerity and ability. My criticisms are not directed at the people who have ably carried out a policy but at the policy itself. I do not agree with the B.B.C.'s policy, but I nevertheless admire the determination with which it has been pursued.

- Some of those who have left the B.B.C. have published books which are critical of the B.B.C. and of Lord Reith. I hope my book will not be read as a personal criticism of Lord Reith, to whom I am deeply grateful for much that he has done for me.

Similarly I have criticized the Post Office. I have criticized it as an institution and have not intended the criticisms to apply to those who serve it. Those responsible for the hold-up of ideas have now been superannuated and their successors seem more anxious to allow things to happen. I believe I have friends in the Post Office. I hope I may be allowed to continue to think so if any of them should read this book.

I believe it is possible to be critical of ideas without subtracting in the least from an admiration of the character of those who hold them. If this point is clear this preface is justified.

January 1941

THE POWER
BEHIND THE MICROPHONE

INTRODUCTION

BENVENUTO CELLINI said that 'all men, whatever their condition, who have done anything of merit or which has semblance of merit, if so be they are men of truth and good repute, should write the tale of their life with their own hand'.

I have never been too sure about either my condition or reputation, but at least I have done something in connection with broadcasting which has 'semblance of merit'.

I have been fortunate enough to have been associated with broadcasting from its very beginning in pre-B.B.C. days up to the present time. During these twenty years I have seen what was at first no more than a development of communication technique grow into an incalculable force to influence the mass mind and so even the course of history. I have always hoped that this influence might be valuable. My hopes have been disappointed. Many of my technical ideas are used in modern broadcasting but the aim of those ideas, to make broadcasting more interesting and entertaining, is still unrealized.

Coincidence made me a wireless technician, chance made me the Chief Engineer of the B.B.C. I thought that my appointment was the greatest good luck; not only was I excited about what broadcasting could do, but I was also interested in its mechanism. Broadcasting, so it seemed to me, would allow amusing and interesting people to get into touch with an amused and interested audience. Music, which seldom got the hearing it deserved, would be spread far and wide. More than that, I felt that the loudspeaker might become that 'guide, philosopher and friend' which so many would appreciate. My job was to arrange that everyone could hear the programmes clearly and at small expense; my hope was that the programmes would be worth hearing.

Doubtless broadcasting, as we hear it in Britain to-day, is a comfort to the sick and lonely, interesting to those who can face the grim

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business of being interested, and a useful servant to the great majority who must know the latest at the earliest. But it is such a feeble thing compared with what it might be. It is a great bore, dull and hackneyed and pompously self-conscious. Its effect is more a drug than a stimulant. Choppy programmes break off a concert to tell us, on all wavelengths, the price of a fat cow; a prayer ends to give, at dictation speed, some news for little ships. Self-satisfaction oozes between salacious jokes, hardly tolerable in a music-hall, while views are given in prosy essays read in the high-pitched whine of emasculated liberalism. Issues are dodged which even a commercial press has no fear to expose. The B.B.C. stands, either remote and dictatorial or pawky and condescending, oblivious of opportunity, hopeless in its timidity.

And yet it does not require much imagination to see that broadcasting could be exciting and interesting, forthright and gay. Why then has it got itself into such a rut here in Britain? How can it be prodded into the open to do something more than just look noble? My book tries to explain.

'I always feel that's a miracle,' said a friend waving towards a chattering box in the corner. I agreed. Broadcasting is a miracle. But like most miracles it has a mechanism. The mechanism of broadcasting has the unique power to focus world-wide attention on a single event the moment that event is taking place. Only a very few technicians are needed to work the mechanism. In theory anyone, 'any body, group, or company', with sufficient money, could hire the services of these skilled people and tell them what to do. This group, which had the power to order the technicians what to do, would become 'the broadcasting authority'. Thus a single authority can select what events the broadcasting listener shall hear, and still more important perhaps, what he shall not. The robber barons of medieval times, perched in their castles above the river gorges, had the power to control water-borne commerce or even prevent it. In the same way the 'broadcasting authority' stands over the narrows of programme flow and can pass or refuse or select for broadcasting whatever its policy dictates.

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Who are these dictators, these modern barons of broadcasting? In Britain, there is the one undisputed overlord, the Baron B.B.C., an organization which the Government has appointed to do all broadcasting. In America there are several barons, a number of privately owned companies broadcasting for profit, but licensed to do so by the Government.

An innocent person might well ask 'Why does Government come into the picture so much? Surely broadcasting is only an entertainment, why must it be controlled or nationalized? It is obvious that it exercises a considerable political and sociological influence, but so do the films and the newspapers which the government more or less leaves alone. What is the particular thing about broadcasting that makes it come under official control?' The often heard answer to these questions, that 'the B.B.C. represents a measure of profound sociological planning', does not explain why a like profundity was not applied to newspaper publishing and the film industry.

Actually the B.B.C. was not the outcome of sociological planning. Broadcasting was made a monopoly in Britain as a solution to a technical and bureaucratic problem. The same problem faced American broadcasting; it was solved in America by limiting the number of broadcasting organizations, but not so drastically as in Britain.

The special problem, which distinguishes broadcasting from the films or the newspapers, is that it can only offer a limited number of programmes to the public at the same time. There is no limit, technically speaking, to the number of books or newspapers or films which can exist simultaneously, but there is a limit to the number of broadcasting programmes. Every wireless broadcasting station sends out its programme by electric waves. Unless each wave, used by each station, has a substantially different length from that used by other stations, its programme will be all mashed up by interference. So the unique problem of broadcasting is that there are not enough waves of different length, or in other words not enough wavelengths, to make it possible for more than a certain number, and a very limited number, of stations to work simultaneously. In fact, there are only about two hundred wavelengths available for broadcasting

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in all Europe, Western Russia, the Near East and Northern Africa. Two hundred stations for two hundred million people! One station per million! Broadcasting may be a miracle but unless the mechanism is very nicely adjusted it squeaks; it is a very limited miracle if one wants to put it into universal use.

Because wavelengths are so few they become a valuable and hotly disputed national property. The Postmasters-General, or as they are called abroad, the Ministers of Posts and Telegraphs, of every nation have to agree together how to allocate these precious wavelengths. When agreement is reached the responsible Ministers have to organize national wireless services, broadcasting among them, to make the best use of the limited number of wavelengths they have secured out of the pool.

When British broadcasting started the Postmaster thought that the best way to use the limited technical facilities available for broadcasting was to appoint a single agent to do all broadcasting in Britain. The result was that he created our all-powerful and all-boring B.B.C. In America there were at first no limitations and in consequence chaos. The inevitable wavelength scarcity has now imposed limitations; a number of firms do broadcasting but the number is restricted.

It costs a great deal of money to run a broadcasting system. The public, unlike the modern woman, always pays. In the British monopoly system, in any monopoly system for that matter, the public pays the State to run the service for it. In the other commercial system, as used in America, the programmes are apparently free and arrive 'by the courtesy' of commerce. The public pays just the same in both cases. Under commercial broadcasting it pays indirectly by buying more goods because of the air advertisements; under monopoly broadcasting it pays by buying a yearly licence to listen.

Both systems have their virtues and their vices. The *laissez-faire* methods of America can be supported by the same arguments which justify a 'free', that is to say a commercial, press — what one organization refuses to publish another will. The monopoly principle frees broadcasting from the dictatorship of the profit motive, but it brings it more under the direct domination of government. I maintain that

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if both systems work together they tend to cancel each other's vices and add to their virtues. But I always was an optimist.

Although I shall have a lot to say about the commercial system this book is bound to concentrate more on questions of British than American broadcasting. I shall try to show what the B.B.C. has done with its monopoly; how, in other words, it has interpreted its duties as a government agent standing over 'the narrows of programme flow'. I maintain that the B.B.C. should have concentrated upon a cultural interpretation of its duties instead, as it has done, upon a policy which is subservient to the spirit of bureaucratic compromise which fathered it. Culture is defined in the *Oxford Dictionary* as 'refinement of mind, taste and manners'. B.B.C. policy has been 'refeened' rather than refined; its mind has been occupied in minding its p's and q's, its taste is negligible and its manners genteel. My definition of a cultural policy is one which would make broadcasting 'in politics the rostrum of contending political theory, in sociology a means to show the community to the community, and in art the patron of the artist'. In contrast to this ideal the B.B.C. has become the careful mouthpiece of conformity ('there is so much to be said on both sides' that the B.B.C. lets neither side say anything), and far from being a patron of the arts it has been merely patronizing towards the artists.

Nevertheless I maintain that the principle upon which the B.B.C. is founded is sound. If we had an organization that was as independent in spirit as it is financially, it might do incalculable good. I see a truly cultivated and independent broadcasting authority not only becoming the wealthy patron of artistic activities, not only revealing all the bright facets of controversy, but also developing into 'a sort of national university which anyone interested in art, sociology, or politics would respect and consult'.

This does not neglect the obvious fact that the public treats broadcasting as an amusement. But the public is not one thing, it is built up of a mass of minority preferences. The word university is therefore used in the sense of universality.

Although this book is largely 'the tale of my working life', it also sets out certain suggestions as to how broadcasting might be reformed

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to make it more vital, more amusing and therefore more an expression of community life. This is in contrast to its present propaganda for the official point of view with its accent on acceptance and complacency. My ideas have a threefold basis: firstly, while preserving the B.B.C. and its monopoly, to give it a different kind of directorate, more cultured, less administrative; secondly, to institute a commercial broadcasting service to run in parallel with the B.B.C. service, and thirdly, to introduce a new technical method for distributing programmes. The object of the latter reform is to give the listener more programmes of contrasted type than he gets to-day.

My scheme for a reconstructed B.B.C. could be applied independently of my other two suggestions. The plan is based on the appointment of a new kind of directorate. Given this the rest would more probably follow. The B.B.C. governors have, up till now, been appointed by the highest governmental authorities; these gods have made governors in their own image. I would suggest men whose background was in the arts instead of 'public service', however worthy. This would ensure the appointment of an executive staff likely to have originality and enthusiasm rather than an ability to 'fit in' to a large organization. My plan further envisages breaking up the B.B.C. into six or seven Regional B.B.C.s, each largely independent of, although federated to, a B.B.C. headquarters. If, according to this suggestion, the focus of broadcasting were diffused by setting up several independent programme-making units based on various 'Regions' of the country then each would be on its mettle to do something because there would be less incentive just to be something. Moreover the institution of several independent organizations would be more likely to provide employment for artists; it would encourage local performance and release a great deal of talent now dormant for lack of opportunity.

The proposal to set up officially recognized commercial broadcasting services is essentially to provide some check on a too complacent or too dictatorial monopoly. It would furthermore give the public good light entertainment. Even under an intelligent directorate, the B.B.C. might be afraid of certain aspects of controversy. The commercial system is free from government control and, so long as it does not

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allow anything to be said which might 'endanger the safety of the state' it is free, like the 'free' press, to say anything. Besides which it is a true alternative to B.B.C. broadcasting because it is inspired by quite different motives. Of course a commercial stimulus to broadcasting has a tendency to play down rather than up to public taste. But its primary aim may be taken as a good example; it does, it must, amuse its public. Broadcasting is only an amusement, but amusement takes many forms. The public 'is not such a fool as some fools think'; it can enjoy both the more obvious programmes provided by commercial motives as well as those which choose the more difficult, but more enduring ways which I must call 'cultural'. The tendency to play down to public taste is more obvious in the example of British advertisement services, which have been piratically introduced from foreign stations, than in the established American system. The Americans realize that it is good business not to be too businesslike; what I shall have to say about their programmes may make them blush to find their stealthy idealisms famous. The British services have had little chance to emulate the American because the whole force of our Civil Service, from Foreign Office to Post Office, has been used against them. Perhaps these actions have been taken more out of loyalty to a sister in bureaucracy than because a principle was in peril, but taken they have been, and as vigorously as possible. I think this official opposition should be removed so that commercial broadcasting, which is essentially an innocent amusement to millions and potentially a check to complacency in the B.B.C., can be recognized. Commercial broadcasting cannot, for many years to come, become a part of our national service because there are no wavelengths for it, but eventually, when the wavelength problem is solved, it could be an equal part of national broadcasting. Meanwhile the foreign station service should continue without official blocking.

Even supposing a new B.B.C. were formed approximating in its policy, organization, and constitution to my ideal, it would find its policy thwarted by the wavelength limitations. It would find, in other words, that all the diverse material it wanted to send out would have to be sent through only two channels.

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The problem of making broadcast programmes, which have any pretence of representing all phases of amusement and culture, is like that which would confront someone who was commanded to read all literature to an audience of mixed appreciations and unequal intelligence. The problem of single channel broadcasting, where the lack of wavelengths means that one station must be used to send out all material, is as if there were only one heterogeneous audience, only one reader and only one auditorium. There would be two ways of setting about the task of giving the audience everything; one, the 'hotch potch' method, in which the reader would take a page of Homer, a quarter of an hour of Jane Austen, and, not to over-excite the audience (Government instructions), a paragraph of Edgar Wallace. The other method, a method of greater continuity, would have a Homer day, an Austen week, and a Wallace hour.

The highest ambition would be to please most of the people most of the time; the only way to achieve it would be by concentrating on readings appealing to an average taste. This would result in boring some of the people all of the time and others of the people most of the time. Given many rooms and many readers, which is equivalent in broadcasting to having a multitude of wavelengths or programme diffusing channels, each minority might always be satisfied and the broadcasting service could please all of the people all of the time.

People say that a broadcasting receiver can get a large choice of programmes by picking up any one among the many foreign stations. The ability of a receiver to 'pick up' far away stations is certainly miraculous, but what is picked up is seldom worthy of the miracle. Nor are foreign stations classified by the type of programmes they offer, one searches feverishly for jazz or symphony to find it, at last, spoiled by noises or, if clear, faded out for an interval signal or a talk in some outlandish tongue. Experience of air fishing dulls the first thrill because the catch is seldom fit for human consumption. A gramophone record printed with the bangs and whistles accompanying most 'distant' wireless reception would never be sold. So the listener often ends by settling down to the clearer home or local

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station and putting himself at the mercy of the 'mind, taste, and manners' of a local programme director. Even if the programme director were a paragon he could not do more than occasionally satisfy a minority. The listener of discrimination may well come to feel that his taste is only gratified by rare chance and usually offended by poltergeistic malice.

As an inventor of mechanisms to serve ideas I think I have seen a way to change all this. I want to have broadcasting programmes distributed not by wireless waves, which are so limited in number, but through wires which provide a multitude of channels. By using wires listeners could be given not only a clear reproduction of programmes, because wire broadcasting overcomes interference noises, but also a large number of clearly heard programmes of different types to choose from. Under this scheme a taste or a mood could be instantly and completely satisfied. To-day all of us have to wait a long time before getting something we really want to hear or else we can choose among a variety of foreign stations the noises which are least offensive. In tomorrow's broadcasting 'pressing button J', as it were, will ensure jazz and nothing but jazz, C will mean classical music, which is not faded out for a talk, V will mean various variety, but all variety, not something sandwiched in. None of these programmes would stop just as one was beginning to enjoy them. The listener could settle down to an evening of Mozart, or could hear the *Ring* all through, or hear all sides of a debate and both sides of jazz records. The breathless hurry of present day broadcasting would be abolished, interval signals would be a thing of the past.

These are direct benefits to the listener. But if only more channels were available it would give programme makers a better chance to make better programmes because different specialists could concentrate on different types of programme. To-day, the programme makers who have to use only the one channel, are puzzled how to make a pleasing design out of the clash of unmatching material.

Broadcasting through wires, apart altogether from its technical merit in giving more programmes and no interference, is part of a conception that broadcasting, as well as amusing passive listeners, would give

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greater opportunities for would-be active performers. The present B.B.C. centralization and London control may seem logical in that the best talent gives the best single performance, but it fails to encourage more talent to draw upon. Many people are at present discouraged from taking up instrumental playing, singing, or acting as a career for lack of opportunity. Broadcasting, with a multi-channel facility, decentralization, and the patron attitude, might awaken the musical and artistic talent that has been too long dormant in this country. We were once famous for our music; broadcasting, properly conceived, might make us famous again.

But these ideas are opposed on all sides. The B.B.C. does not want to take on cultural attitudes; it has got into the habit of being purely administrative. The very lack of wavelengths which brought it into being is its excuse to go on being careful and cautious. It can always say, when asked to do something original, 'we would if we could but we can't'. The B.B.C. has never taken to this idea of serving the public through its minorities, it wants the majority to be proud of its size rather than the minorities to be aware of their existence. I designed the Regional scheme so that British listeners could have at least two programmes to choose between. The B.B.C. seems to think that the public should have at least one and so sends out the same sort of material on two wavelengths. The Regional scheme is treated by the B.B.C. as a double outlet for material which accumulates, so to speak, in Head Office stores department. My idea was that the alternative programmes should be of contrasted types. I maintain that if the broadcasting authority were alive and intelligent it would demand more facilities to demonstrate its qualities. The B.B.C., provedly, does not agree, it uses two wavelengths to demonstrate that it is dead and stupid. My proposals for instituting a multi-programme system of broadcasting will therefore get little sympathy from the present authority. It is easy to stand over narrow narrows of programme flow, quite a nasty strain if they are widened.

The proposal to recognize and institute a commercial programme service is looked upon by the B.B.C. as rank heresy. It could be done by using some of the wire broadcasting channels; this is perhaps why

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there is such an opposition to wire broadcasting. Commercial broadcasting is looked upon by the B.B.C. as 'competition'.

The B.B.C. faced with any sort of competition is like one of those boarding house girls of certain age who takes offence at the very existence of others more attractive.

'Really, really; how anyone *can* admire such vulgarity. They may not take much notice of me but, thank goodness, I *was* brought up as a lady.'

Except that the B.B.C. thinks it was brought up as a gentleman there is not much wrong with the simile. Instead of expecting to be admired because it was nurtured under such 'naive' auspices the B.B.C. might have made itself admirable by an exhibition of its talents. But the organization has been so busy getting to know the right people it has quite forgotten that its real purpose is to be interesting and attractive. Faced by competition this purpose begins to look like a fearful reality. The B.B.C. bitterly opposes commercial broadcasting. It might welcome it in order the better to demonstrate the value of a principle it defends. This defence is made by words, attempted suppressions, but never by programmes.

There was no attempt to make the title of this book a *double entendre*; the power does, however, lurk behind the microphone and proposals to make it come out into the open will be opposed by the B.B.C.

Others besides the B.B.C. will not look kindly upon the ideas I have tried to justify. The idea of having wire instead of wireless broadcasting technique is opposed by the vested interests of the wireless trade which profits by selling wireless receivers. The Post Office wants wire broadcasting instituted, but only to increase the earning power of its telephone in rediffusing existing programmes. The newspapers are bitterly opposed to commercial wireless programmes because the newspapers themselves make all their profits out of advertising. The entertainment industry is apprehensive of any increase in the entertainment value of broadcasting, which keeps people at home. Broadcasting gives one air performance a 'house' of millions and is therefore a menace to the box office. The Government, consciously or unconsciously, wants

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a tame broadcasting system to be a tacit propaganda for conformity. It opposes wire broadcasting as 'a dangerous new principle' because, I suppose, under it, broadcasting might no longer be a perquisite of ruling power.

Broadcasting indeed has become so fat and big that no one dares to let it move for fear of upsetting the delicate ornaments which decorate contemporary existence.

CHAPTER I

WIRELESS BEFORE BROADCASTING

'I KNOW the man who invented wireless.'

A schoolboy is asserting himself against my fourteen-year-old cocksureness.

'And who might that be?' I asked.

'Marconi.'

'Neither Marconi nor anyone else invented wireless,' I said. 'Michael Faraday found out all about electricity. And then James Clark Maxwell worked out Faraday by maths. Afterwards Hertz in Germany read Maxwell's maths paper and so was able to send electric waves — what you call wireless, you know — across his laboratory. Marconi *and* Lodge — don't forget Professor Lodge — repeated Hertz's experiments on a large scale and sent messages over long distances.'

The schoolboy friend had nothing to say.

'Science never invents,' I added sententiously.

I was not far wrong. 'Gradualism' is unknown in technology. The progress of discovery and invention is made in a series of leaps, and each leap is associated with some one person. A theory of the evolution of species says that new types are produced abruptly rather than evolved through infinitesimal changes. Accordingly one day, quite a long while ago, a typical ape gave birth to a strange baby. It had far less hair than its parents, it held itself more upright, it had a strange look behind more inquiring eyes. Behold! *Homo Sapiens*, the originator of war, wages, worry . . . and wireless. But through countless ages man was being prepared and formed by the environment and habit of his forebears the apes.

No one invented wireless, nor did it come like Eric, little by little. Its sudden birth as a practical means of communication was the result of many new conceptions which were not noticed by the man in the street because they seemed the normal result of the labours of research.

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The abrupt step from a laboratory experiment to a practical application called 'Wireless Telegraphy' was dramatic and, to all but a few, extraordinary. The public associates the birth of Electric Wave Communication with one name — Marconi.

In the year 1906, when I first took a schoolboy interest in wireless, Marconi was already famous. His experiments had aroused world-wide interest. Marconi was neither a leading physicist like Sir Oliver Lodge, nor a great technologist, like Edison. Typical technicians were therefore already busy detracting from his reputation. He had done 'nothing much' they said except use and adapt the discoveries of Hertz, Branly and Lodge.

Indeed, Marconi was one who had the ability to collect bits from the scrap-heap of unrelated discovery and use them to build up a working system. He did not so much invent as adapt the work of others to a specific purpose. He would have deserved his fame if he had done nothing more than to lay down, as he did, from time to time, certain broad principles. His idea of using vertical aerials and large power made wireless telegraphy over long distances practicable. His realization, in about 1920, that the recently invented thermionic valve made it possible to use all the hitherto denied advantages of short wave signalling, when the rest of the technical world was still struggling with longer and longer waves, was typical of real original thinking. A good chef does not invent the ingredients of his 'creations'; he knows how to choose the right ingredients and to mix them in proper proportions. Marconi did not invent the details of wireless, he used the mosaic pieces of invention to make a coherent pattern.

I remember, as a boy of about ten years old, reading how Marconi had signalled, without the use of interconnecting wires, across the English Channel. I was chiefly impressed by the fact that the signals persisted in spite of a thick fog. This seemed incredible. I then forgot about wireless until my elder brother, T. L. Eckersley, now a Fellow of the Royal Society, set up some experiments on high frequency currents. Returning home from school, I found our playroom filled with lovely and exciting instruments. There were Induction Coils to make fat sparks, Leyden jars, long black rods of ebonite wound with

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green silk-covered wire, X-ray tubes and galvanometers. The things, their touch and shape, gave me a sensual pleasure and made me want to understand what they were for. Though I understood practically nothing about wireless I became passionately devoted to Science. Books about Science absorbed the time that was not taken up arranging apparatus on shelves, turning on switches, and 'helping'. Returning to school I tried to impress my friends with my new enthusiasms. I would hold forth to the sceptical or the admiring about theories of aether and electricity, I was judgmental on the relative merits of Newton's corpuscular theory of light and Young's postulate that light was a wave motion. I set about the construction of a Fleming Cymometer (what we now call a wavemeter), and became the 'juvenile lead' of the Scientific Society.

Bedales, where I was educated, was the 'advanced' school of those days. It was remarkable, chiefly, for the fact that its rules and regulations were inspired by a reasonable outlook. Boys and girls were educated together; we used a reasonable dress — looking unreasonably ugly on the girls; we were given plenty of free time — if we occupied it sensibly; the mixed staff took infinite pains to see that no reasonable request on our part was refused. After healthy exercise (no fetish about games), we had tub baths; there were regular 'callovers' to ensure our attendance at the earth closets; we slept between blankets, took a cold bath every morning and were constantly within sight and feel of sensible oak beams and benches. The food was wholesome and there were no 'tuck boxes'. So reasonable an upbringing produced adolescents who were completely unaware of the world's unreason and who, in consequence, lived for many years after leaving school in a dream of beautiful unreality. Typical old Bedalians built cottages of honest oak and brick, and sold, with what profits one sometimes wondered, the products of the surrounding orchards. They wore tweed knickerbockers, grew untrimmed beards and encouraged Morris dancing. Bedales founded the modern school which has since developed the sadistic practice of allowing children to run their own lives into a state of lonely hysteria. There was, however, much to praise about Bedales; enthusiasms were left undimmed, idealisms were unchecked;

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we may have been turned out self-conscious prigs, but I think it is better to start in innocence and idealism than to know, at the outset, too much of 'what's what'.

It was typical of the best of Bedales that I was allowed a great deal of 'free time' to do my own experiments in wireless. My partner in this enterprise was Robert Best, who, although he has long since ceased to take a technical interest in wireless, has remained a life-long friend. Best, an acquaintance of Sir Oliver Lodge, was a proponent of the Lodge-Muirhead system, while I supported Marconi. These rivalries were typical of Oxford-versus-Cambridge schoolboy partisanship. I doubt if there was much difference between the two wireless systems. In order to determine if there were, we set up, near the school, a considerable-sized chicken house, with room inside for benches and apparatus, and called it 'Wavy Lodge'. Wavy Lodge was my first laboratory. We draped aerials round it and set out to test the relative merits of the counterpoise (Lodge) or grounded (Marconi) aerial. This was about 1906. Wavy Lodge nurtured an enthusiasm for wireless which has never died. Our aerials collected the few Morse code signals then audible, remarkably the grunting Eiffel Tower transmissions. Our little portable transmitter was taken afield and once signalled back the scores in an 'away' cricket match. Ambitious winter evenings saw us experimenting on such things as the measurement of frequency, the resistance of a loose contact and the relative merits of crystals. Best eventually had to break the partnership to take up another career while my examinations gave me less time for my obsessing hobby.

My simple dream on leaving Bedales in 1911 was to figure as a leading man of science, a great wireless inventor, a successful man of business and a dominant figure in politics. Wireless, however, was always the core of my ambitions. My impatient outlook made me want to start at once as a professional wireless engineer. It is a thousand pities that everyone, keen, as I was, on becoming a wireless technician, cannot have the benefit of the advice given to me by the genial Mr. Andrew Gray, so many years Chief Engineer and later Director of Marconi's Wireless Telegraphy Company. When Mr. Gray interviewed me, he asked questions about wireless (such as the time period

of an electrical oscillating circuit, its analogy with the pendulum, the meaning of damping), to all of which he got intelligent and correct answers. He then switched to questions on electrical engineering; motors, dynamos, switchgear, impedance and reactance in alternating current practice, and so on. It soon became clear that I knew little or nothing about electrical engineering. Mr. Gray delivered a little lecture, the gist of which was: 'Wireless is only a branch of electrical engineering and electrical engineering is founded upon the principles of electricity and magnetism. First learn about electricity and magnetism, so that you will readily understand electrical engineering, and then take up wireless, when you can rise, if you have ability, to the top of the profession. Otherwise you will be bound to stick somewhere short.'

It was good advice. Mr. Gray said I could neglect it and, there and then, get a job at about £200 a year. This seemed sheer riches to one who had never earned a penny, but he pointed out that it was not much to consider as a maximum for all time. Mr. Gray said that if I could go to a university or a technical college, I might earn not hundreds, but, one day, thousands a year. My stepfather, who was the arbiter in these matters, said he thought it was better for me first to go into a works to see how things were made, and then take up theoretical work. So from the isolation of Bedales I was sent to the realities of a Manchester factory.

The sunshine dream of reasonable Bedales soon faded out in the darkness of industrialism. I had, it is true, lived for many years near the centres of the Lancashire cotton spinning industry, but I never thought of them in any way save as places where cotton was spun. I had lived, as it were, in the front rooms, now I was to see what went on 'belowstairs'. Yellow trams, swimming in the canyons of lamplit streets, took me in the dark early mornings to my work. It was comforting to know that daylight, however feeble, must come, that the shops would open, that men and women would crowd the now deserted pavements, greasy in the persistent rain. In the factory, pulling on cold spanners, listening to the squalid imagery of popular swearing, it was difficult to believe that one had ever been

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so ignorant of how things which made money were themselves made. There have been, since that time, great changes; works are cleaner and conditions have greatly improved, but that 'Equality of Opportunity', which should be the foundation of the 'Liberty' we talk so much about, was certainly non-existent then, as, maybe, it still is to-day.

In about 1913 I left the factory and went to the Manchester Municipal School of Technology. It was a tremendous stimulus to take up mental work again. As time went on I lifted my head a little from the calculations and the books and looked about me to see what life was about. I did not discover much, except a lot of northern country, fell and mountain, and some rather naive urban excitements.

When the 1914 war came, it left me, at first, untouched. I had crooked a knee in my late 'teens and, in the first days of the war, applicants for service were so many and positions so few, that they sent you away for the slightest disability. High authorities said, moreover, that 'this is a technical war and needs qualified men; you'd better go on with your training'. The white feather distributors of Manchester mainly passed me by, and the remorseless eyes of Kitchener, telling me that my King and Country needed me, could be outstared by a civilian in training for a technical war. My friends were being killed, one by one, the news was as bad as it could be, but I just went on obstinately learning. When at last, in 1915, I passed my examinations and offered my trained self no one seemed particularly anxious to engage me.

After a while, having heard nothing about a wireless job, I applied to be a pilot in the Royal Flying Corps. I satisfied my examiner about family connections, whether I had hunted the fox, and the games I played, and waited another three months. Then at last I was summoned. I was just leaving the rooms with my papers, sending me to be trained as a pilot, when the officer behind the desk looked up and said:

'Oh! by the way, do you know anything about wireless?'

'Well . . . er . . . well yes.' I said. 'Oh yes.'

So I became a Wireless Equipment Officer instead of a pilot.

WIRELESS BEFORE BROADCASTING

As a Wireless Equipment Officer I wandered over most of the Near East, never seeing any war, until I came, in the summer of 1916, to Salonika. There I got malaria, came back to England, spent four months doing nothing, went to France, was invalided back just before the Somme retreat and then, after the lapse of three futile years, was set to do research, the kind of work I was trained to do in the beginning.

But war, however casually it treats individuals, combines so many talents in a common effort that things may get done. The progress of wireless, so vital for war purposes, was given a tremendous impetus by the development of the thermionic valve which had been produced in its first crude form about 1912. The importance of the valve can hardly be overestimated. Before the scientific age man's greatest discoveries were fire, the lever and the wheel. He has lately added the internal combustion engine and the valve. When a convenient and permanent source of everlasting energy has been found and applied to man's needs he will be the virtual master of matter. This will not make him any less foolish.

The valve has the power to shrink the world to the compass of a living-room. Electric communication does not as yet link up the world, but much has already been done. Doubtless in time wire and wireless communication links will be built and combined so that anyone will be in seeing and speaking distance of everywhere.

This will all be made possible by a prosaic tube of glass which, when all is said and done, is no more than an amplifier of electric forces. But the remarkable feature of the thermionic valve is that it can amplify electric forces however rapidly they change the direction in which they act; in other words, whatever the frequency of their alternation. Electric communication depends upon alternating electric currents which flow first this way and then that. Their rate of alternation is often tremendous. When, for example, waves sent out by the London transmitting station pass over a receiving aerial they set up currents in such an aerial which flow up and down in it a million or more times a second. These aerial picked up currents are very feeble. The valves in a receiver make them stronger, they amplify

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them in fact, until they are strong enough to work a loudspeaker. Just as telescopes and field glasses pick out the details of distant objects by amplifying or magnifying their size, so valve receivers make feeble signals audible.

The valve is the foundation of all modern electric communication technique. It is basic to the wireless telephone and therefore to broadcasting. The ordinary telephone can now talk across the world, but only because of the use of valve amplifiers. The miracle of television develops out of the valve. Many other miracles are to come. In less dramatic ways the valve helps industrial processes to become surer and speedier.

When wireless was invented, long before the valve, people thought it would supersede all other methods of communication. The great undersea cables, it was thought, would be left to rot. But these prophecies did not materialize, wireless in its first crude form could not compete, in either speed or reliability, with cable and wire communication. It was only after the valve came to the rescue that wireless was in any way competitive with cable telegraphy. Financial amalgamations then put it on a level with its more largely capitalized rivals. The real use of wireless in pre-1914 war, which were pre-valve days, was to communicate to and from and between ships at sea. Even this value of wireless was not fully appreciated until a thousand or more lives were lost in the *Titanic* disaster in 1912.

The valve was immediately put into use for war purposes. It was responsible for the battle of Jutland. Receiving stations, which can tell the direction from which waves are coming, were set up at different places along the east coast of Britain. They were always taking bearings on the wireless signals coming from the German battle fleet. One day the bearings showed a small but definite change. The German warships were presumed to be moving out. Our fleet consequently put to sea and met the Germans off Jutland. But for the valve the German fleet wireless would never have been audible.

Direction finding wireless receiving stations were also used during the last war in the Near East. The *Goeben* and the *Breslau*, German battleships, slipped through the Dardanelles and were loose in the

Mediterranean. Where? The direction finding stations were put on the alert. At last they picked up the transmissions. Results were quickly correlated and interpreted. There was no doubt about it, the enemy ships, according to the direction finders, were in the middle of Bulgaria moving at about 200 miles an hour! The reason for these false readings was found out later on. These Mediterranean readings had been taken at night, the German fleet readings during the day. It was eventually discovered that layers of electrification form at night in the upper atmosphere and the wireless waves, hitting these layers, are reflected downwards at an angle. There was no inherent fault in the direction finder, but it only works correctly when the waves come at it straight over the earth's surface. The incident stimulated research, pioneered by my brother, T. L. Eckersley, on the constitution of the upper atmosphere. The research is still going on.

I saw a valve for the first time in 1915, when I was sent to the training school at Brooklands as an R.F.C. wireless equipment officer. As a technician I was fascinated. C. E. Prince gave us lectures on how the valve worked. They were brilliant. Under Prince's witty explanations the valve became a friendly thing functioning for one's special pleasure. But in practice the valves of those days were not always well behaved. Indeed they were often wholly vicious and troublesome. It is strange to think that this profound development of technology once needed to be teased into life by warming its 'pip' by lighted matches. In early examples of the valve this pip, the little piece of glass where the bulb is sealed off, contained some asbestos which, if warmed, released gas into the interior of the valve. The gas, if present in correct amounts, made the valve work much better. Signals were thus made stronger by delicately stroking the valve pip with a match flame. Conscientious operators lost all sense of pain in fingers which got to look like well done sausages.

We must have been using the right kind of matches on the day I stood beside Prince and heard him say into a microphone:

'Hullo, Ferdy. If you can hear me now it will be the first time speech has ever been communicated to an aeroplane in flight. Dip if you are hearing me.'

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The aeroplane, lumbering along at fifty miles an hour, gave an obedient lurch.

It has never been decided who invented the valve. Two people claim to have done so but their claims were never recognized by the grant of a master patent. Sir Ambrose Fleming, an Englishman, is one; and Lee de Forest of America is the other. Neither really explained 'the process of manufacture' which could give 'a workman skilled in the art' any very clear idea of how to make or use a multi-electrode valve. Fleming took out an English patent for his diode, and Lee de Forest an American patent for his triode. Neither took out patents in each other's country. When Lee de Forest claimed to have invented the valve the American courts said that Fleming held the master patent. But it only applied to Britain. When Fleming, thus encouraged, claimed a master patent in Britain the British courts said that Lee de Forest had a master patent on the real kind of valve. But Lee de Forest did not possess a British patent. 'And so the poor dogs had none.' It was Langmuir who explained the valve completely, but then he had no patent at all. To Edison, Fleming, Lee de Forest and Langmuir belongs the joint honour of finally producing the stable valve. Doubtless these eminent people felt that they deserved more reward than just honour. Any one person who could make a real claim to have invented the valve would have become a multi-millionaire.

I did not have much to do with valves while on active service, but in the last part of the war I worked in laboratories which were busy developing this new and fascinating invention for all sorts of war purposes.

When the war ended at last I found myself, in common with many other ex-officers, undecided what to do. Opportunity seemed infinite, it was the 'dawn of a new cra', our land was being made 'fit for heroes to live in'. It was clear to me, however, that I was not a hero and, pending the dawn, I had better set about getting a job. An offer was made which, if accepted, meant going on with my existing research work for the Air Force, but that hardly seemed in tune with the age of opportunity; war, I was told on all sides, was finished for all time.

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There was another and more tempting offer, made by C. E. Prince, my original training lecturer, and now my immediate boss at the R.A.F. Wireless Experimental Establishment. Prince wanted me to join with him in an Aircraft Section of the Marconi Company, which he and H. B. T. Childs hoped to be allowed to form. I joined the Marconi Company.

A few months later it was decided to move the technical section of the Aircraft Department from London to somewhere near the works at Chelmsford. Prince decided that he disliked a clay soil, so I was put in charge of the technical development. Our laboratory in Essex consisted of an army hut in a field, near the village of Writtle, a mile or so from Chelmsford. Here I set to work, with a small staff, to design wireless equipment for aircraft, notably the Croydon Airport transmitter and the transmitters and receivers for the aeroplanes.

It was at Writtle, engaged on development work for the Aircraft Department and, later, the Designs Department of Marconi's, that broadcasting crept upon me. Before I knew where I was I had become its devoted slave. I still am.

CHAPTER II

BROADCASTING BEFORE THE B. B. C.

THE period immediately following the peace of 1919 was one of hope: the code word was 'Reconstruction'. The word had a particular significance for communication engineers; they had the valve to help them revolutionize their technique. Communication means all sorts of communication by wireless or by wire.

It was not only in wireless that the valve was so valuable; it also gave the ordinary wire telephone, of domestic and blasphemous use, a vastly increased utility. The ordinary telephone uses a loop of wire to join the points between which communication takes place. The larger the loop, that is to say, the greater the distance of communication, the feebler the sounds 'at the other end', because the currents get tired going so far. Before the valve was available it was not possible to telephone comfortably over distances much greater than two hundred miles. In order to communicate over even this distance one had to shout pretty loudly and the wires sending the shouts had to be thick and carried on poles overhead. If a buried cable were used it was not possible to telephone farther than about fifty miles. It is much better to give the ugly telephone wires a decent burial; it also protects them from damage. It is, nevertheless, not much good using even overhead wires if they cannot carry messages beyond about two hundred miles. After the valve was perfected, however, the less fragile buried cable could be broken up into fifty-mile sections and an amplifier inserted in the break to boost the power of the waning currents. This could be done as often as was necessary, putting no limit to the *overland* distance which could be bridged by the telephone. I stress the word 'overland' because it is evidently impossible to break up an undersea cable and maintain valve amplifiers in working order on the ocean bed. It is, however, not impossible to jump over the ocean with wireless waves. Thus the missing link for joining conti-

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mental wire telephone systems together can be formed by the wireless telephone. By combining wire and wireless the range of the ordinary telephone can be, and has been, increased to world distances.

This potential of the wireless telephone to bridge the oceans and connect land wire systems together was realized almost as soon as the valve was invented. Experiments were therefore made to see what practical difficulties might stand in the way of establishing and maintaining a transoceanic wireless link. Broadcasting grew naturally out of these experiments.

During the 1914-18 war the Americans succeeded in transmitting speech from Washington to Paris by wireless. Directly after the war the Marconi Company set up a rather low power transmitter in Ireland which succeeded in maintaining speech communication, up to distances of about two thousand miles, with a ship carrying delegates to Canada for a world press conference. Very soon after this Captain Round, then head of the Research Department of the Marconi Company, assisted by a pioneer in wireless telephony practice, W. T. Ditcham, designed and set up a fifteen-kilowatt telephone transmitter at Chelmsford.

Round wanted to know how far the signals could be heard and asked for reports from anyone who heard them. A great many people were and are interested in wireless as a hobby. These people, who have no professional interest in wireless, call themselves 'wireless amateurs'. The amateur movement is strongly supported. It crystallized in this country into the Radio Society of Great Britain. The amateurs are still going strong. You can (or could before the present war started), hear them talking to one another on short waves; you will recognize their transmissions because they always call each other 'old man'. They are usually very young men. They have the greatest fun and increase knowledge by giving mass observation. Reports on the Chelmsford transmissions came from amateurs all over Britain and the continent. These gave Round a very fair idea of how far, given a certain transmission power, he could expect to communicate. It was only natural, once the job was working, to transmit music as well as speech. The gramophone is a handy device for making music to

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transmit. The Chelmsford station therefore broadcast gramophone records. Famous artists also came and sang into the microphone: Dame Nellie Melba and Melchior both gave concerts which were widely commented upon in the newspapers.

These transmissions added to the miraculous excitement of hearing by wireless the pleasures of listening to music. More and more people took an interest in wireless telephony and the reports which Round wanted multiplied.

Towards the end of 1919 public interest was increasing; the wonders of the wireless telephone were always good for a press story. Journalists in Rome took down a speech made in Italian by Senator Marconi who was speaking in London; more and more people became interested in the possession of an apparatus which, fantastically, picked music out of the air. The idea of broadcasting was thus generated as the result of an experiment designed for quite another purpose. The idea was, however, still very dim; no one was making those speeches about 'this great invention which bids fair' which unfortunately followed later. They might have followed sooner if the Post Office had not written to the Marconi Company and said that the experimental broadcasting transmissions must stop because they were interfering with important communications — the kind of communications made by the Post Office presumably. The Post Office is supreme in these matters; upon its sufferance depends the continuing activity of any experimental or permanent communication. So broadcast silence fell upon Britain.

In America no one told Mr. Conrad, of the Westinghouse Company, who was doing just what Round was doing, that he was interfering with anything, and so American broadcasting started just at the time ours was stopped. This is so terribly typical. It is the same red flag which was carried before the embryonic motor car to warn us of the dangers of progress. Disgruntled wireless amateurs got some compensation from the Dutch (Hague) transmissions in which the *Daily Mail* took a sporadic interest.

We at Writtle were not particularly sorry when the Chelmsford transmissions stopped. They were so powerful, because so close, and

interfered with reception tests. The Writtle staff had by that time been augmented and the functions of the section expanded. The Designs Department had been formed, bringing together the Aircraft Department and the Field Station Department under one head. I was appointed head of the experimental section of the Designs Department. My staff now comprised, among others, Ashbridge, Kirke, Wynn and MacLarty, all of whom followed me to the B.B.C. They are still there. Ashbridge, now Sir Noel Ashbridge, is Chief Engineer, Kirke is head of the Research Department and Wynn and MacLarty hold important positions. The Writtle staff was indeed, with a few notable exceptions, the nucleus of the 'brain trust' of the technical side of British broadcasting. The atmosphere of Writtle was both constructive and gay. We all taught one another, we cursed Head Office and screamed good-natured abuse at the Works for not following our specifications. We were extremely loyal to our own section and we found a lot of time to laugh.

After Chelmsford had closed down the amateurs felt, very understandably, that if some transmission centre were set up with a declared power, exact wavelength, and the best technique, it would be valuable as a standard by which they could compare their own results. They petitioned the then Postmaster-General for such a station. They were refused. Undaunted, they petitioned again, and, under the influence of persistent pleading, authority said, about 1921, that a wireless telephone station might be established under certain specified conditions. The station power was to be, I think, 400 watts (a typical modern broadcasting station has a power of 50,000 to 100,000 watts), the transmissions were to take place once a week and to last for half an hour. The station had to 'shut down' at stated intervals during the half-hour so as to be ready to receive instructions to stop altogether in case it was interfering with 'more important services'.

We received a letter from head office saying that the amateurs, in the form of the Radio Society of Great Britain, wanted the Marconi Company to design, install and maintain this station on their behalf and that we had better do the job at Writtle. Naturally we were not to interrupt our normal work and, in any case, because the amateurs

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also had 'normal work' it was no good transmitting before they got back to their homes. It was decided therefore to broadcast from eight to eight-thirty in the evening once a week. We received a little extra pay to do a little extra work and set about, rather lightheartedly, putting together some valves, condensers and chokes 'on a board' to produce the required low power transmitter. This was to be the first broadcasting station in Great Britain to do regular and advertised transmissions. But we only thought of it as another job of work for which we would be blamed if it went wrong and hardly noticed if it went right. But our critics, the wireless amateurs, were numerous and informed. They were liable to be rude if we were not efficient.

I wish I could remember the date when we started. Late in nineteen twenty-one I should think. It is to me, at any rate, an historic date; it was the first time that I was to be a 'power behind the microphone', albeit a very frivolous power and a very crude microphone.

There was a somewhat feverish preparation. A quarter of an hour before zero hour a horrid crackling, followed by a complete cessation of signals, heralded trouble. Kirke located a broken-down condenser and substituted another. Signals came on again.

The next day found Writtle rather gloomy. It 'hadn't been quite so good'. Reports were fair, but far from enthusiastic; we too were dissatisfied. After two or three transmissions complaints became numerous and pungent. W. T. Ditcham, of the Research Department, came to see what was wrong and waved a neon tube under the aerial while we said 'ah' into the microphone. The tube flickered; we were at least modulating.

I was startled, a few days later, by a howl from Kirke.

'Look,' he cried. 'Look.'

We saw only a condenser, the condenser substituted for the one which had broken down before the opening transmission.

'But look! The value!' Kirke shouted.

We peered at the rather blurred markings and saw that the capacity of the condenser was a hundred times greater than it should have been. In the hurry and with blurred markings Kirke was not only fully excused for his mistake, he was congratulated for spotting the reason

for our bad transmissions. We never said a word about it and the complaints died down; indeed, in a little while the Writtle transmissions were voted 'O.K., old man' by a growing audience of amateur enthusiasts.

Our programmes were, at first, very formal. They were made up entirely of gramophone records. A mechanical gramophone played the music into the air and one of the staff held an ordinary microphone, such as one talks into when telephoning, in front of the trumpet. In those days there were no concealed loudspeakers in beautiful shiny cabinets and no 'pick ups' connected directly to the electrical circuits of the transmitter.

The operator, before transmitting a record, went through a long rigmarole, based on the technique of commercial station operating, repeating for a minute or so:

'Hullo, C.Q. Hullo, C.Q. This is two emma tock, Writtle calling.' (C.Q. are the code letters meaning 'all those hearing me' and 'emma tock' is operatorsese for M.T., the call sign which, if said in a normal way, might be confused with, for example, N.C. or N.E.)

And then:

'We will now play a gramophone record entitled' (why are gramophone records always entitled?), so and so, 'played by' such and such an artist and 'recorded by' this or that company.

Then the gramophone was put on and the microphone was pushed up against the noisy air. When the record stopped, the operator, transferring the microphone from the gramophone trumpet to his lips, said, once more:

'Hullo, C.Q. Hullo, C.Q. This is two emma tock, Writtle calling', etc. 'You have just heard a gramophone record entitled . . . played by . . . made by . . . We are now closing down for three minutes.' At the end of three minutes the process started all over again.

When the routine was established I was in the habit of leaving the others to get on with the transmissions and going home to listen at my house in Witham, eight miles away. But one evening I decided to stop and see the transmissions through. After a meal at 'the local' I thought that not only would I stop but I would do the operating as

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well. A certain ebullience, which often overcomes me when I have an audience, prompted a less formal attitude towards the microphone than was customary. The look of horror on Ashbridge's face, seen across the field where he stood in the receiver hut, tethered by ear-phones to his painful duty, Kirke's broad grin and Wynn's chuckling, made me more exuberantly informal than I had perhaps intended. I failed to play all the records, even though we never shut down for the regulation three minutes, and I went on talking and talking, convincing myself that I was being very funny. The staff held a post-mortem. I did not say much, except:

'Did I say that? Really? Good Lord!'

It did seem rather awful hearing it repeated in cold blood.

I faced the resulting post, swollen to horrid proportions, with some misgivings. There was, to my relief, only one protest and that could hardly be counted against me because it came from Head Office and was signed by Arthur Burrows, head of the Publicity Department, who had been shocked by my frivolity. Fifty or more postcards from ordinary listeners testified that 'a good time was had by all'. The theme of the fan mail was 'Do it again, we like it'.

So began the Writtle programmes, remarkable for their gaiety and irresponsibility, programmes which would to-day be dismissed as altogether too frivolous, but which were obviously designed to amuse their audience. We always maintained afterwards that we were pioneers because we started the idea, if not the form, of many features which are now part of a broadcasting day. Our Children's 'Hour' lasted five minutes and was designed, not so much for the 'teenies' and the 'weenies', but for the childish technicians who appreciated nursery rhymes such as:

Hey diddle dodrode,
Two grids in one quadrode,
The outer one forming the plate.
The electrons got muddled
With so many grids,
But the final m value was eight.

Or:

Four and twenty B valves, standing on a shelf,
 Ash. couldn't find one so I had to go myself.
 When the circuit opened the phones began to sing,
 Don't you think that I was right to smash the beastly thing?

We signed off with a theme song. I sang it in a high tenor voice to the tune of Tosti's 'Goodbye' with an accompaniment vamped on a piano.

Dearest, the concert's ended, sad wails the heterodyne.
 You must soon switch off your valves, I must soon switch off mine.
 Write back and say you heard me, your 'hook up' and where and
 how,
 Quick! for the engine's failing, good-bye, you old low-brow!

We did a wireless play. We chose the balcony scene from *Cyrano*: it is played, on the stage, in semi-darkness with virtually stationary players and so it seemed very suitable for broadcasting. 'Uggy' Travers, a young actress, and her brother came to help. We sat round a kitchen table in the middle of the wooden hut, with its shelves and benches packed with prosaic apparatus, and said our passionate lines into the lip of our separate microphones.

Letters of appreciation multiplied. McLachlan, of the Research Department, came and played the piano and was *very* informal. A rather earnest artist came and sang very seriously. This latter performance produced my largest fan mail saying it was the best imitation I had ever done! Melchior caused a 'technical hitch' imagining, without having consulted us, that the louder he sang the farther his voice would be carried. He particularly wanted to be heard in Denmark. In consequence his opening note shattered the microphone, pulled out the breakers, and shut down the generator.

It was all rather fun. Doubtless at times I was horribly facetious, but I did try to be friendly and talk with, rather than at, my listeners. They seemed to like it all very much. We failed to take ourselves seriously, and broadcasting, as we saw it, was nothing more nor less than an entertainment, for us as much as the listeners.

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I have often been asked if a popular broadcaster receives the flapper adulation given to the matinée idol or film star. I believe the B.B.C. announcers, 'uncles' and such, do get written to by 'lonely' women. I had one such correspondent at Writtle who showed a gratifying enthusiasm for the image she had formed behind my voice. Wynn and I composed some really touching replies to her letters.

Once, much later on, while I was in full cry over the B.B.C. air, I was rung up, after I had given a 'nine-fifteen talk', and told, by a deep contralto, that I had a lovely voice, a sense of humour and an attractive personality. I came to the conclusion, from the depth of the voice rather than the sentiments, that someone was 'leg pulling'. I replied with exaggerated fervour and asked that we should meet there and then, late though it was. No! That would be impossible, but could I lunch the next day? A car would be sent for me. I said I was particular about cars, both as to their make and colour, but I would be satisfied with a Rolls Royce and preferred the colour to be either puce or maroon. I forgot all about the incident until I was rung up by the commissionaire next morning, half an hour before lunch time, and told that a car had been sent for me. It was red and it was a Rolls. The chauffeur acted like a deaf mute but he was made to understand that the invited regrets he's 'unable to lunch to-day'. I was so astonished that I forgot to take the number of the car.

The B.B.C. started operations while we were still sending programmes from Writtle. Before the B.B.C. was formed, in November 1922, the Marconi Company had been sending programmes from a station on the roof of Marconi House. This station was afterwards taken over by the B.B.C. and became its first London station, the famous 2LO. The Writtle spirit of farce and foolishness, with its accent upon a community of technical listeners who formed part of a pioneering effort, was in striking contrast with the careful pomposity of those in London who made it their policy to 'say nothing which might offend'. 2LO was allowed to transmit every day, so we had plenty of time to listen for things which would give us material for our lampoons and skits. We were not disappointed. It must have been galling for the great 2LO to receive requests that they should shut

down on Tuesday from 8 to 8.30 in order that Writtle should be more clearly heard laughing at them.

It must have been because of this anomalous position that I was taken, in December of 1922, to Magnet House, Kingsway, to see a Mr. Reith, who had been appointed General Manager of the British Broadcasting Company. I found the B.B.C.'s chief executive installed in what was little more than a cupboard opening off an office in which the rest of the staff, about fifteen people, were feverishly working. I was impressed by the way I was handled and, before I quite realized it, I had promised to shut down Writtle, even though I had really no right to do so. I thought vaguely that I should rather like to work for Mr. Reith, but this seemed impossible. Ashbridge and I had already been disappointed to hear that a Chief Engineer to the B.B.C. had been chosen from Head Office.

'Always Head Office,' we said.

When broadcasting began the methods of announcing and the studio routine were derived from, if not identical with, a code of formal procedure laid down for operators using 'Wireless Telephone Communication'. The constant 'hullo's, the repetitions of the station call sign and the obvious itemization of programmes were designed, so it seemed, more to illustrate 'the Wonders of Wireless' than to do broadcasting justice. It made the listener think more about the technical means by which he heard the programmes than the programmes themselves.

My attitude towards broadcasting completely changed when I first heard the B.B.C. transmit an opera, Humperdincke's *Hansel and Gretel* from Covent Garden. Special microphones, developed in America for high fidelity, had been placed along the stage footlights and connected to the 2LO transmitter. The result was staggeringly different from anything I had heard before. I sat for three solid hours while the performance lasted, rigidly clamped by head telephones, completely absorbed, oblivious of discomfort. There were no interrupting announcements, no 'dead' studio feeling: I had been to the opera without going to the opera. Broadcasting, I realized, would let me join in events without my having to drag my body all over the place.

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This idea may seem rather *jejune* in the light of modern experience, but for one who had come to broadcasting through the evolution of the wireless telephone it seemed like a revelation. A real invention had been made, much more profound in its implications than the invention of the wireless telephone.

We said goodbye to the Writtle listeners, drinking their health in a glass of water, promoted to champagne by the sound of a pop-gun, and settled down to normal routine. We had to design a broadcasting receiver which Marconi's were going to sell to the public for listening to the B.B.C. Owing to considerable indecision in head office we got our first knowledge of the requirements of performance of the receiver from a full front page advertisement in the *Daily Mail*.

Early in 1923, in January to be precise, I was just going into Marconi House when I remembered that I had forgotten to buy tobacco. I turned on my tracks and ran into Major Basil Binyon, Managing Director of the Radio Communication Company. He greeted me as if I were something he needed very badly.

'Heavens!' he said. 'Of course, you're just the man. I don't say you'll get it, but you certainly should apply, and do it at once.'

I had not the vaguest idea what he meant until he explained that the man who had been offered the position of Chief Engineer of the B.B.C. had turned the offer down and no one had, as yet, been appointed. His idea was that I was 'just the man they needed' and I should therefore apply immediately. Perhaps if I had not smoked a pipe . . .

A few days later I was sitting on a window sill of an office in Marconi House, swinging my legs, waiting anxiously for a call from Mr. Reith to tell me whether or not my application had been successful. I was very excited; I wanted that job. The bell rang: 'Yes! When could I start? Monday?' 'Yes, I could start on Monday.' Mr. Isaacs, when I saw him to say good-bye, said grimly that it was all very irregular, that my agreement called for a month's notice on either side.

'But go and see the cashier at once and get a month's pay', he added. 'Get to Magnet House as quickly as you can, there's a great deal to do.'

How right he was and how kind. Naturally, as Managing Director

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of the Marconi Company, he was as anxious as anyone for the success of the B.B.C. Ten thousand pounds of the Marconi Company's money was invested in the venture. Mr. Isaacs had been kind enough to take an interest in me since I joined the company, just after the war, and I think he felt that I was as wise to take up the new appointment as he was to let me go without formalities.

This was not everyone's view; the Writtle staff were, I think, sorry on personal grounds that our association was to be broken. Many a wise careerist thought me foolish to give up the safety of an established company for the chances of so unpredictable an adventure. I did feel a little worried about it all; I had not then become so convinced as now that life is only interesting if one learns how to say 'yes' properly. But it is a word which implies a lot of trouble as well as adventure.

CHAPTER III

THE FOUNDATIONS OF THE B.B.C.

'PUBLICISTS', those who explain everything to the public by simple inaccuracies, often say that the creation of the B.B.C. was 'a far-sighted measure of sociological planning'. In fact, it was nothing of the sort; the B.B.C. was formed as the expedient solution of a technical problem; it owes its existence solely to the scarcity of wavelengths. This wavelength shortage is the fundamental disadvantage of wireless. A short explanation of this is essential.

Intelligence is broadcast by electric waves radiated into space by a transmitter. These waves are picked up by a receiver. The distinguishing characteristic of a wave is its length. Hence the term wavelength. A great many transmissions take place simultaneously. The different stations which radiate the different transmissions prevent mutual interference by using waves of different lengths.

We speak of 'tuning in' a receiver. Tuning means making a receiver vastly more responsive to waves close to one length than to those of other lengths. Thus if it is desired to hear one programme to the exclusion of others the receiver is tuned, i.e. made responsive to, the wavelength of the station sending that programme. This is perfectly satisfactory provided every programme is sent on a separate wavelength. But if two or more stations should use the same, or nearly the same, wavelength a receiver tuned to that wavelength obviously gets all the programmes at once. Which is too bad. So therefore, in principle, every wireless programme, and for that matter every wireless message, must be sent on a different wavelength. If this is not done a receiver will pick up a lot of messages at once and be unable to sort out any particular one clearly.

Of course if the waves sent out by one station are much stronger at the point of reception than the interfering waves, even if they are of the same length, then the interference to the stronger transmission is

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negligible. For example, Europe can use the same medium wavelengths for broadcasting as America without causing interference between European and American stations in either continent.

The vital question is of course 'how many wavelengths are there?' The depressing answer is 'too few'. This scarcity exists firstly because other communication services (ships, aeroplanes, the fighting services, etc.), want to use the air, and secondly because each wavelength used by each station must be, not a little, but *substantially* different from wavelengths used by other stations.

When a transmitter sends out a programme it uses up not one but a group of waves all close to one another in length. This group is symmetrically centred upon a principal or carrier wave. Those who have rubbed brasses in churches may remember how the tomb of a crusader is sometimes engraved with a drawing of the armoured man in the middle and descending rows of his children on either side. The picture of the wavelengths is like the crusader and his children. The principal or carrier wave is in the middle and the children are side-band waves on either side. The whole group is broad; it occupies in wireless not one but several wavelengths. For instance, a station using a carrier wave of three hundred metres requires the use of all waves lying between the wavelengths of two hundred and ninety-seven and three hundred and three metres. The station thus occupies a channel the width of which is measured in wavelengths. In the example I have given the channel was six metres wide. No channel must overlap the next or there will be interference to the receiver tuned to one or the other central or carrier wave. So the given band of wavelengths allocated to the broadcasting service must be divided up into channels. This 'broadcasting band' is limited because other bands are wanted for other services. It must therefore be obvious that the number of channels available for broadcasting stations is very limited. Actually, as I shall show later, the whole area of Europe, Northern Africa, the Near East and Western Russia has to be covered by only about two hundred stations and many of these, to the detriment of their service, share the same channel.

Just after the last war only those few who were interested in wireless

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as a profession or a hobby knew anything about broadcasting. Any demand to set up a broadcasting service was not therefore 'a widespread public demand'. Nor at that time did publicists and politicians know that it was possible for their voices to invade the houses of the multitude. The demand for a service was not therefore generated in 'influential circles'. The real stimulus which caused broadcasting to start was commercial and specialized; it came from those who wanted to create a market for the sale of wireless receivers. Manufacturing firms specializing in wireless thought that if a broadcasting service were started the general public would buy listening apparatus. This would establish a market for the sale of receivers. It was the wireless trade which wanted to start broadcasting.

Stimulated by what was going on in America, the people in the wireless business were perfectly prepared to spend a lot of money setting up broadcasting transmitters so that they could make more money by selling wireless receivers. They planned moreover to make money out of transmission as well as reception. This was being done in America, so why not in Britain? The idea was to set up transmitters and then sell 'time on the air' to anyone who wanted publicity. Manufacturers of, for instance, soap, motor cars, toothpaste, cigarettes, patent foods (and their antidotes patent medicines), are dependent for sales upon advertisement. One way of advertising is for the manufacturer of a proprietary article to give a wireless programme to the public making it quite clear that the programme is coming to the listener 'by the courtesy' of the firm which wants publicity.

This is a grand scheme for the wireless manufacturer. Profits are made firstly by selling time on the air, secondly by selling receivers to the public, and thirdly by getting someone else to provide the expensive programmes. Commercial broadcasting would undoubtedly have been instituted in Britain had it not been for the wavelength shortage.

America, where this type of broadcasting started, is a free country. It was so free that the Federal Government had no constitutional rights to refuse to allocate a broadcasting channel to anyone who might demand it. All that the authorities could do was to say that

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such and such a station should use such and such a carrier wavelength. The demand was so great that the supply of wavelengths ran out. Stations therefore had to share the same or nearly the same channels. The programmes in consequence got jumbled up together and destroyed each other's value. It was all sorted out in time but at the beginning there was chaos.

Britain is also a free country, but freedom is doled out in limited quantities. This prevents greedy people getting an overdose of liberty. Our authorities, unlike the American authorities, had the constitutional right to refuse permissions to set up stations. When, in 1921, the Government was bombarded by requests from wireless manufacturers to set up broadcasting stations it refused them all. It did so because there were more demands for stations than there were wavelengths available. But, as the demands were vociferous and persistent, something had to be done. Before anything could be done it was necessary to find a principle under which the limited facilities should be fairly distributed. What principle? First come first served? Too anarchic. Most expert, most favoured? Too contentious. Most money, most claim? Too archaic. Obviously nationalization was the only solution.

The Post Office, as the technical department of State which controls all national communication, was concerned in all these questions. The wireless trade had asked the Post Office for permission to start broadcasting, it was the Post Office which refused their requests. It would seem therefore that once nationalization appeared essential the Post Office would properly have conducted the broadcasting service itself. In those days however no one was very sure if the public would be interested in broadcasting. Many thought that broadcasting would be no more than a technical hobby, an amusement for schoolboys. Cautious and dignified people such as rule the Post Office were both loath to spend the money in establishing sending stations and reluctant to put themselves into the posture for entertaining the public (or schoolboys). They therefore decided it would be a better idea to appoint an agent to do broadcasting for them. The B.B.C. was in consequence made their agent. The wireless trade, which demanded

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a broadcasting service, was prepared to risk the capital necessary to establish the B.B.C. But it was obviously going to require more money, after the capital was provided, to run the stations and supply the programmes. In other words the B.B.C. required a revenue. There were two possible ways of collecting this revenue. Either the B.B.C. could hire its facilities to advertisers and profit by the transaction, or the public might pay for its entertainment directly. It was decided to make the public pay; the B.B.C. revenue was to be obtained by taxing those who listened.

So in effect the Post Office said to the wireless trade 'Form a company. Call it the British Broadcasting Company. Give it capital to establish the stations. Staff it with people capable of making programmes and looking after the technical side. If you will form such a company we will give it a monopoly over all transmission of broadcasting in Great Britain and Northern Ireland. We, the Post Office, must have the absolute right to decide the number, the power, the location and the wavelengths of the transmitting stations. We shall thus supervise the technical side of broadcasting through our agent the B.B.C. Nor is this all. Since we are ultimately responsible to the public, through the Government, the B.B.C. must do broadcasting "to the satisfaction of the Postmaster-General". We will give the company a revenue. This revenue will be derived from taxing the listener. We will rule that every member of the public who possesses an apparatus in his house "capable of receiving wireless messages" must buy from his local Post Office, once a year, and for so long as he possesses the apparatus, a licence costing ten shillings. This will establish a wireless licence fund. We shall collect it. Out of this fund the Post Office will pay the British Broadcasting Company what the Post Office considers an adequate amount to run the service. Obviously the increase of licences will be a measure of the Company's success; if justifiable demands for more money are submitted they will be sympathetically considered. But it must be clear that the amounts of money handed over will be determined by us absolutely. The B.B.C. furthermore will not be allowed to make any profits. We will, provided the funds are sufficient, let the Company

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pay its shareholders seven and a half per cent on the capital subscribed. No more. No one save bona fide British manufacturers of wireless apparatus can take up shares in the B.B.C.'s capital. The "non-profit making" seven and a half per cent yielding shares are for the wireless trade alone. We see no reason why companies, manufacturers, newspapers, or any commercial organizations wanting publicity should not be allowed to put on programmes to advertise themselves, but the B.B.C. must not accept money for allowing such programmes to be broadcast. Thus the B.B.C. must not hire out time on the air but it can give it away.'

The wireless trade accepted these conditions. The capital was subscribed and 'the Company' formed. The B.B.C. directors were appointed from those wireless manufacturing concerns which had made the biggest subscriptions to the capital. Under this business directorate the B.B.C. engaged its staff, set up the stations and made the programmes.

The B.B.C. was thus born of a lack of technical facility and nurtured by business firms intent upon making profit (no blame to them). But the B.B.C. was obviously not a 'wise measure of sociological planning'. The only evidence that its sociological influence was appreciated was the decision to get a revenue from the public rather than from advertisers. But this ruling was only made to save trouble. If the demand for air time had been small, the Post Office agent, almost a civil servant, would have been forced to go to undignified lengths to sell it, if large it would have had to have taken up a dictatorial attitude to refuse it. Advertisement broadcasting was not ruled out. The B.B.C. was only forbidden to accept money in return for advertising facilities. If the number of listeners had been small, and the funds to run the service therefore inadequate, the company would no doubt have forgotten the sociological issue and saved itself a lot of money by getting advertisers to put on programmes. As a matter of fact the B.B.C. was never unduly pressed for money; perhaps that is why it is so haughty about commerce.

Thus the B.B.C. was a company ruled by business men and acting as agent for a technical department of the State. It existed so that

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the wireless trade could profit by selling receivers. In the final issue it was a company which was nobody's child and everybody's whipping boy. It was run as a business and supervised as a bureaucratic organization. I have often thought that if there had been a world shortage of celluloid, as there is a shortage of wireless channels, we might even now be suffering the soporific of a nationalized cinema, and pompous people would be justifying boredom by pointing out the values of a clean screen.

Thus at the beginning of broadcasting a company, run by business men, was given an absolute monopoly over what has proved to be the most powerful propaganda medium yet devised. It had, at the outset, no traditions and no comparative standards. What would be made of it? The only stated duty was that the broadcasting authority should satisfy the Postmaster-General, but there was no way of telling what satisfies Postmasters.

Every company says it has a policy; 'the Policy of This House', says the advertisements, is this or that. No householders are honest enough to lean out of their windows and shout to everyone that the policy of a commercial house is to make money. The B.B.C. did not have to make money. Provided a reasonable proportion of the public listened and continued to listen the Company's revenue was assured. The unique position of the B.B.C. was that it had to be efficient enough to make listening popular and yet it could 'take a line' regardless of the 'trammels of trade'. But what line? The B.B.C. of those early days is to be congratulated because it took a line which its directors considered was in the best interests of the public and not necessarily commercially beneficial to the wireless trade. The company undoubtedly saw itself as a cultural force, by which it meant something uniquely constituted to avoid the postures of vulgarity. The unfortunate thing, to my mind, was that its idea of becoming a cultural force was so uncultured.

It seems to me that people can be classified as predominantly political or predominantly artistic. The political mind judges a work of art by its subject matter. Does the subject matter reinforce certain political standards? Is its effect 'uplifting' or 'subversive'? The

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political point of view is interested in the influence art has upon the public mind. The artist, on the other hand, judges a work of art by its purely aesthetic values. Its use, if use comes into the question, is in just being beautiful. The artist only asks, is it good art or bad art?

Here is an unconventional looking picture.

'Decadent art,' exclaims the politician, 'it corrupts men's minds.'

'Good art,' says the artist if it happens to be beautiful.

The attitude of the B.B.C. has always been wholly political. If it is conscious of the artistic point of view it abhors it. There is, it is true, an attempt, not always successful, to avoid the more obvious forms of vulgarity, but this has little value when there is so little appreciation of the difference between good and bad taste. The members of the staff are judged by their character rather than by their talents. The typically English idea that all artists are immoral is fostered; art is thought to be basically 'bestial' because derived 'from the senses'. The ideology of the B.B.C. might be said to be directly derived from nineteenth century materialism. The B.B.C. has always aimed at making its broadcasts a public example of dignified behaviour, respect for authority and religious belief.

The form, content, and influence of the broadcasting service as we know it to-day is the product of one dominant mind: it represents one man's conception of the role of broadcasting in a modern democracy. No one who is serving or who has served the B.B.C. has had an influence in any way comparable with that exercised by its first chief executive, then Mr. now Sir John Reith.¹ He was the only man who made up his mind about policy, who knew what he wanted and who had the power and will to carry his ideas into practice.

One of his chief tasks in making the B.B.C. into the type of instrument he desired was to eliminate from his staff everyone who would not understand or sympathize with his point of view. What a heterogeneous collection they were at the beginning and what a lot of weeding was necessary: Arthur Burrows, an ex-publicity chief of the Marconi Company and formerly a journalist, was, at the outset, appointed Joint Director of Programmes. Dear Burrows: 'the man

¹ Lately made a Baron.

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with the golden voice', his journalistic training dramatizing the least incident. Memory shows me his earnest concern over a letter from a parson in Norfolk who thought he heard someone say damn into the microphone. It might have been Cecil Lewis who said it and who would not have cared a damn if he had. Lewis would have appreciated the mistake and got on with the work. He had a warm sympathy with the aesthetic side of life and, with Burrows, completed a strangely assorted pair. Rex Palmer, who ran the London station, had a beautiful voice. He sang 'Abide with me' on Sunday nights with extreme unction. He was so nice too. Rice the secretary showed a healthy contempt for the highbrows. He lived somewhere on the east coast and seemed to bring with him some of the lively tang of that ungentle air. 'The music', about three instrumentalists who plugged bravely on from morning to night, was looked after by Stanton Jeffreys, L.R.C.M. 'Jeff' was always cheerful and bump-tiously reliable. 'Aunt Sophy', demure and intact, smilingly filled any interval with a precise piano.

These were among the first. Some were there even before I joined, Admiral Carpendale¹ came later. Mr. Reith appointed him as second in command. My early memories of the B.B.C. picture the Admiral wrinkling his forehead in puzzlement at the strange sort of people and the strange sort of problem he had to deal with. They were not at all like those he was accustomed to meet during his brilliant career in the Navy. Mr. Reith, I know, found the Admiral's detached and experienced worldly outlook extremely helpful. Later the brilliant and bon-homous Gladstone Murray impinged upon us. I had not seen him since he used to fly me around England during the war. Fleet Street speaks of him now as 'the only human being who was ever in the B.B.C.' But perhaps by human being they meant that he knew how to treat journalists. I managed to detect signs of humanity in others: Stobart, for instance, finishing a long career in the service of education by being sympathetically astonished by the gambols of his B.B.C. colleagues. I found again that Val Goldsmith was a very human being. He had a real respect for artistic standards and a sympathy with the personal

¹ Now Admiral Sir Charles Carpendale.

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problems of the staff. Goldsmith combined business ability with aesthetic appreciation in a very balanced way. He is now running the business side of B.B.C. publications.

There were many more people, remarkable in one way or another, but I should overburden this chapter if I mentioned them all. I must not however forget the late Filson Young who was distinguished in my mind as being the only one of us who could truly be described as having the cultural outlook. He was not, I fear, very popular with the administrative people. Of my own staff, who joined me soon after I took up my job, and particularly of Bishop, Assistant Chief Engineer and pioneer of 'Maintenance', I could write much. It would all be in thanks and praise.

Our directors gave me a warm sense of confidence. They were so obviously competent on the business side and yet they never missed an opportunity to encourage efforts and praise work well done. This, and our sense of pioneering a fascinating new development, gave the Company an enthusiasm which must somehow have escaped through the microphone. Those who took up listening in the twenty-threes and fours still speak of the 'early days' with reminiscent regret and deplore the smug stolidity which has now overtaken broadcasting.

But ebullience was kept in sufficient check and our efforts canalized by the ever present feeling of our Chief, watching with the eye of conscience for any backsliding, any disloyalty, or any slacking. It would be irrelevant to draw more or more detailed pictures of the staff, because there was only one who had real influence on policy and performance. Mr. Reith was in every sense a leader; he had the ability to make decisions, the firmness to stick to them. He was not only able to dominate his diversely talented subordinates, but he inspired a loyalty to himself which he returned in full measure to those who gave it. He was undoubtedly feared. He had perfected the technique of picking upon a weak spot in another's character or performance and pressing on it until he was sure of obedience. There was no unkindness in this, it was all a part of duty, the duty to make a compact loyal and disciplined staff which could cope with excessive work and complex problems. The great feature of Mr. Reith's leadership was that you

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knew where you stood. If one of us should say anything derogatory to him about another he would be made to repeat it in front of the accused. This stopped a lot of tittle-tattle.

That Mr. Reith ever purposely sowed discord among us to prevent our combining against him I do not believe. He spoke about this as a part of the technique of administration, but he never to my knowledge exercised it. He had no need to. He chose to surround himself with those whose obedience was unquestioned because their outlook was unquestioning. He promoted my brother Roger from a junior position on my staff to assistant head of the programme department in one year. Roger's charm would melt a heart of stone. Gentleman Roger! never expressing an opinion, seeing both sides of every question and, with these safe supports, floating upwards to a resting place near, but never too near, the top.

As always happens in large institutions, the 'prefects' of the organization, the heads of the departments and sections, would gather together and discuss scandals and the latest news about the 'Head'. Often one of us might say 'after all I made the B.B.C.' It was tempting to believe it. Our publicity was flattering. We all thought we had played a pretty prominent role at one time or another. But it was not any one of us who had made the B.B.C., it was the B.B.C. that had made every one of us. Sir John Reith made the B.B.C., so we all owed him a great deal.

I would sum up the character of the Company as it crystallized during those early years, by saying that it was ideally fitted to be a careerist in the medium of bureaucracy, but therefore inflexible and unsympathetic to artistic standards. It proved itself worthy to be trusted by the Government and was legitimately given place and patronage. This ability to appear properly dressed and nicely spoken in the offices and corridors of Whitehall disappointed those who expected the Company to show more respect for culture and initiative and less desire for official approbation. The very success of the B.B.C.'s career, so essential to its security, subtracted from its power to use that success to challenge any accepted institution or promote any very exciting artistic enterprise.

Although, at the outset, the B.B.C. was not bound by many rules,

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it was nevertheless in a difficult position. Because it was so free its liberty was in fact restricted. No one, least of all the B.B.C. officials, knew if the public wanted a broadcasting service; there were no standards or experience even to indicate how a government-established company should behave. It was therefore understandable that, out of many possible policies, it adopted one which made the organization itself secure rather than any which might involve questionable experiments. After all there was that phrase in the Charter which said that the Company must do broadcasting to the satisfaction of the Postmaster-General. The Postmaster was unlikely by appointment and temperament to welcome any great originality. Moreover the business board, intent upon establishing a market for receivers, was liable to be cautious.

While appreciating all these points I feel that the B.B.C. over concentrated upon securing its foundations. This prevented any clear conception of what was to be built upon them. Indeed this concentration has been so great and so prolonged that the B.B.C. might be said to have disappeared underground; it has dug itself a deep shelter so as to be safe against any attack. Those who have dug for security have come to be as solid as the structure they have made. Unless something drastic is done nothing of recognizable form and usefulness may ever appear above ground. British broadcasting none the less owes a great deal to Sir John Reith, no one could have made a better job in establishing it. It is rare to find a combination of administrative ability combined with a sympathy for artistic values. Now that these vast and firm foundations are so securely made and have been ready for so long, it is time for an architect to build something striking upon them.

The B.B.C., considered as an organization, is obviously very powerful. It is highly respected both by the Government and the public. Its career in bureaucratic terms has been safely brilliant. Its careful and unchallenging policies have drugged listeners into a belief in its infallibility. The public is reassured by complacency in high places and government is pleased to rule a complacent public. The very constitution of the B.B.C., freeing it from any commercial controls, seems, to a nation engaged in commerce, an absolute guarantee

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of purity. The B.B.C. thus appears as that most respected product of modern society, the gentleman bureaucrat. This character is reinforced by the B.B.C.'s uncanny skill in avoiding issues. The British—or should I say the English?—adore compromise and justify their escapism by claiming intuitive judgment. Perhaps we ought to call the English Channel 'Intuitive Judgment'. Doubtless the English attitude is inspired by the nice desire to be nice, but it is no good these days being even 'naice', like the B.B.C., to vital issues. But being nice does ensure respect and trust whatever else it effects. In consequence the B.B.C. is trusted.

This worthy character which the B.B.C. has acquired is reflected not only in its political but also in its cultural behaviour. It is impossible to imagine that an organization nurtured in a business and bureaucratic environment would be likely to have much sympathy with artistic standards. When moreover the main concentration has been and omistration, there is little chance that 'refinement of mind, taste and manners' will seem very important. Broadcasting has therefore shown the same escapism from artistic initiative as from the realities of controversy. It might be said that the B.B.C. typifies the Victorian paterfamilias, a pillar of the church, a stickler for decent behaviour and a warm man of business. This practically guarantees a deep mistrust of art and the artist. It ensures on the contrary a wholesome respect for the pedant who deals with facts rather than feelings and rounds off the sharp edges of controversy by careful reservations. The B.B.C. is essentially official and pedantic.

I have criticized B.B.C. programmes in detail in a later chapter, called 'Leaving the B.B.C.'; this discussion of its foundations only attempts to explain why the programmes have taken on their particular cautious and inartistic character. Is there, one must ask, some reason for this careful and conformist attitude which shies away from any more outlooking and cultivated policy? Some excuse maybe? The Americans, supporting their own free commercial system, say that it is inevitable that a government-appointed broadcasting service will always uphold conformity and will never take any bolder line than the majority approves. In spite of the B.B.C.'s apparent proof of the

justice of the American argument I do not agree with it. A later chapter on 'A Possible Future' outlines a scheme which, in my opinion, uses the principle of broadcasting monopoly intelligently. If I am wrong, if the B.B.C. is never to be anything more than a Vicar of Bray, moulding policy to suit a career, then we may just as well resign ourselves to a dictatorship of the air or institute 'free' commercial broadcasting to challenge it.

Critics of the monopoly principle argue that because the B.B.C. must do broadcasting to the satisfaction of the Postmaster-General, and because the Postmaster-General must do his Postmastering to the satisfaction of the Government, and because the Government must do its governing to the satisfaction of the governed, therefore broadcasting legitimately becomes the 'Voice of the People'. It is I believe a sign of madness when people talk to themselves, a better way is to listen a good deal to others talking. Monopoly broadcasting, according to my conception, should be an outlet for people's voices, not the average bleat of the voice of the people. I do not mean by this that the loud-speaker should stir sectional revolts against authority or be used to corrupt morals by subversive suggestiveness. It is however axiomatic that the minority of to-day becomes the majority of to-morrow and so minority views should obviously be heard.

There is nothing in the foundations of the B.B.C. which forbids it to open the microphone to all the currents of human thought and feeling. Indeed the monopoly which it possesses seems to me only to exist for this purpose. No vested interests stand in the way of an idealistic policy. Too great a concentration on its establishment and an over-emphasis on security in the bureaucratic world has held the B.B.C. too long in an inlooking habit and has blinded it to its opportunities. Like too many individuals its first and, in the end, its only aim has been to keep its job. My hope and belief is that it is no longer necessary for our broadcasting authority to continue such a pusillanimous career. It is time to show critics, here and abroad, that broadcasting under monopoly can become 'the rostrum of democracy and the patron of the arts'.

CHAPTER IV

SPREADING THE SERVICE

WHEN I joined the B.B.C., in February 1923, I was obviously the chief because the only engineer. When I left six and a half years later three or four hundred technicians were working for British broadcasting. We worked pretty hard during those pioneering years and I think we made something rather grand. But at first I had no staff of my own, the few stations then working were being superintended by engineers temporarily seconded from those wireless firms which had made the largest contributions to B.B.C. capital. Before I was appointed, the B.B.C. had been running for three months without a chief or any engineer of its own.

On the morning I joined I was summoned to see Mr. Reith, then general manager of the B.B.C. He outlined my immediate problems. I must recruit a new technical staff. 2LO, the London transmitter, installed on the roof of Marconi House, was interfering with the Air Ministry receivers over the way and must be moved to a new position. I had better be satisfied that the new stations, to be erected at Glasgow, Cardiff, Bournemouth and Belfast, were being properly installed. New office premises had to be found. I might have to do something to convince the amateurs, now working on wavelengths around four hundred metres, that they must move off to make room for our new transmissions. Several of the technical publications were asking for articles on our future plans: publicity was essential. He suggested I should see the new press man, Smith, who was coming down from Glasgow. Was it necessary for me to live in Essex? Hadn't I better get a house in London at once? And perhaps a better suit of clothes might help. And . . .

'There's a lot of bother at Marconi House because the noise of the band disturbs people working in the offices below'.

Was it true that the Western Electric Microphones were better than the ones we were using at the 2LO studio?

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'Please see Mr. Pease, the managing director of the Western Electric Company, about this. He's round at the Aldwych; here's the address. Good-bye . . . and why not dine with my wife and myself to-night when we can talk things over more fully? I want you to get on quickly.'

I came out of the cupboard-like office, where Mr. Reith managed to get some degree of isolation, feeling slightly dazed. The outside office was crowded with typists, executives, office boys and visitors. I found a desk labelled 'Chief Engineer' and piled high with unanswered letters; I wondered if I ought not to go back to Writtle at once. But school had taught me that new boys become old boys: I thought I would go over to Marconi House and talk to someone I knew.

I decided to start work by finding a new site for the London transmitter. In those days, in order to avoid the expense of masts, we generally used factory chimneys to hold up the transmitting acrials. I went on to the roof of Marconi House and looked over London for anything tall. In the north-west I saw what looked like a suitable structure. A map, a compass and the principle of the range-finder located Marylebone. I took a bus up Baker Street and wandered around until my tower, looking smaller from the ground, was seen to be the chimney of an electricity generating station. I tried to see someone in authority.

'Who may I announce?' I was asked at the entrance.

'I am the Chief Engineer of the B.B.C.' I replied, savouring my new title.

'Of the what, sir?' asked the commissionaire.

But even if my position seemed unimportant to others because broadcasting was hardly known at that time, it was important enough to me. I had to think out a technical policy. I decided, for a start, that its main basis should be that everyone should be able to hear one programme clearly on a cheap set. This may seem so very obvious that it may be wondered why I troubled to set it down. But this is a story. At the time of which I am writing wireless was considered much more as a technical hobby than a way to broadcast amusement

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and information. The wireless trade was quite naturally exploiting this technical and hobby interest. Even some of the B.B.C. directors said quite frankly that if the public were able to listen on cheap sets the profits of the wireless trade would vanish. The 'amateur' interest, it was said, could only be sustained by making the programmes reasonably difficult to pick up; the amateurs bought expensive components and showed off their sets to admiring friends who also got bitten by the craze. If anyone could pick up wireless with any old set the magic would cease and then where would the trade be? Peddling profitless crystal sets and never selling a valve (with its thousand per cent profit) at all!

I am proud that, even in those days, and even though I was a technical expert, I wanted to use my skill to enable the listener to forget about the technique of the service. I felt then, as strongly as I feel now, that the programme is the only thing about broadcasting which permanently interests the public. And if this fundamental interest is worth anything it ought to be satisfied by providing a programme that is clear of accompanying noises and a faithful copy of the original sounds which make it. What is more distracting than the bangs and crackles which are too often the accompaniment of wireless listening? What value is a talk if the words are masked by portentous booming? How can music be really appreciated if it is a snarling parody of the original? And added to clear hearing, broadcasting, I thought, and still think, should supply not one, but a large number of clearly heard and faithfully reproduced programmes. Only thus can all the public be satisfied at once, because the public is a mass of minorities having different tastes and preferences. But to give the clear hearing of only one programme was difficult enough at first.

Thus there were three main technical problems to be solved: (1) to ensure that one programme could be heard anywhere in Great Britain without interruption from extraneous noise (Elimination of Interference); (2) to arrange that the sounds heard were a faithful copy of the original (Production of Good Quality); and eventually (3) that we should try to give the listener the widest range of choice

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between different, clearly heard and faithfully reproduced programmes (Removal of Channel Scarcity). The latter problem is solved, so far as technicalities are concerned, by using wires instead of wireless to distribute programmes, but, so far, the scheme has not been allowed to be put into practice. This chapter deals with the first problem and tells how we spread the service over Britain until everyone could be sure of hearing at least one programme in good conditions of reception.

One of the main difficulties in broadcasting is to get rid of extraneous noises (bangs, crackles, hums, whistles, etc.) which are apt to accompany the reception of programmes. Broadcast intelligence is diffused by modulated waves created by a transmitter; the waves form the link between a unique programme source and the scattered listeners. Wireless waves are unfortunately also created and radiated by electrical machinery, such as trams, refrigerators, flashing neon signs, electric motors and so on. These waves, since they cause interference and are not wanted, are called parasitical waves. The audible signals, I mean the nasty noises, created by parasitical waves made by electrical machinery are referred to as 'man-made static'. Parasitical waves are also caused by lightning flashes. These make crunching noises. They are called 'atmospherics' and in America 'static'. Atmospheric wireless waves are very powerful, they can make noises in sensitive receivers located in England, even though the thunderstorms which create them are taking place in Central Africa. The tropical east and the Gulf of Mexico are also centres of atmospherics.

Thus a receiver picks up 'wanted' waves carrying intelligence, and, at the same time, 'unwanted waves' causing interference. Interference is caused by waves of every length and so cannot be eliminated by 'tuning'. The longer the waves the worse the interference. That is why short waves are so useful. The only way¹ to get rid of interference is by what engineers would describe as 'brute force and bloody ignorance', in this case by making the wanted signal much stronger

¹ Howard Armstrong of America claims a frequency modulation system which gets rid of interference. It uses up more wavelengths however than the ordinary system and performs uses short waves.

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than the unwanted interference. We as it were shout down interference. There is a misconception that a sensitive or, as some say, a 'powerful' receiver will get a clearer reception than one that is cheap and simple. The sensitive set will, of course, pick up more stations than the simple set because it picks up weak as well as strong signals. But a weak signal cannot shout down interference and is, therefore, bound to be accompanied by noise. It is useless to amplify a weak and noisy signal and expect better reception; the noises will be amplified equally with the interference. No receiver can make a signal louder than the interference.

There is no other way of covering a large area with clear reception except by increasing the power or multiplying the number of transmitting stations or both.

I am afraid of analogies because people often find them more difficult to understand than the phenomena they attempt to explain. But I think, in this case, that if a source of light is supposed to represent the source of wireless waves and deeper shadow worse interference then the meaning of 'service area' may be clearer. On a dark night an area is formed round, say, a street lamp within which the shadow is dominated by the light and wherein it is possible to see clearly. Outside the boundaries of the lighted area darkness dominates. Equivalently an area exists, centring upon a wireless station, within which the signals are strong enough to overcome the interference and outside which interference is likely to be unpleasant. I christened this area, wherein reception is satisfactory, as the 'service area' of a station. Americans refer to it as the station's 'coverage'.

The problem that confronted me when I joined the B.B.C. was to locate stations of suitable power so that the inhabitants of England, Wales, Scotland and Northern Ireland could all have signals strong enough to dominate interference. This meant establishing overlapping service areas throughout the whole territory.

Obviously the more powerful the transmitting station the bigger its service area; analogously the brighter the source of light the more area of ground it illuminates. There are two contrasted methods of 'illuminating' a country, that is to say covering it with strong signals.

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In one method an enormously powerful station would be located in the centre of the area, in the other method a number of low power stations would be scattered about the country, each, as it were, illuminating a patch. These patches, joined together, would give complete 'coverage'. It is better to light up a big room with diffused lighting coming from a lot of different points than to have one powerful central lamp. The single powerful light gives a bad glare near to and a not too good light far away. In the same way it is better to have a great number of small-power broadcasting stations placed so as to spread the signals evenly over the area to be served than one super-power station in the middle. The single super-power station 'glares', that is to say, the near-by signals are so powerful as to make it impossible to receive any other signals. If a lot of low power stations are used, signals are rarely either too strong or too weak.

For these reasons my first plan was based upon the use of as many stations as possible so that their service areas overlapped. Then anyone, anywhere, could get an interference-free programme from a 'Local Station'. But as there was (and is) a scarcity of wavelengths the number of separate stations had to be limited.

Wherever the signal is strong the receiver reproducing it can be simple and cheap. A weak signal requires amplification, amplification requires valves, valves and associated components cost money, and so a weak signal, besides being spoiled by interference, requires a more expensive set to make it audible at all. When broadcasting started valve sets were expensive and the great majority of listeners used crystals sets which demanded a very strong signal to make them work. This was another good reason for my policy of producing plenty of signals everywhere.

This policy was unpopular among my old friends the amateurs. The amateurs resented the domination of the air by the increasing power and number of B.B.C. stations: they had sensitive receivers and they could 'get' all sorts of stations. They asked why the public should be pampered by what they considered unnecessarily strong signals. I argued that the ability to 'get' something, regardless of the clarity of what was 'got', was by no means the aim of broadcasting.

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The point was whether an ordinary set could get a clear and uninterrupted reproduction of the programmes. The amateur enthusiast was quite satisfied if, out of the noisy air, he fished the faint resemblance of music and called the station 'Zlonk, somewhere in the Balkans'. Foreseeing that air-fishing would be the craze for a small number I insisted that the aim of broadcasting transmission was to make it possible for listeners to get a clear reception of many contrasted types of programmes with cheap receivers. We could only supply one programme at first but later on there should be more. My job was rather to provide poorer people with entertainment than to pander to the better-off who had a hobby. The amateurs and the B.B.C. remained friends because the more responsible leaders of the movement saw that the general public just wanted cheap listening facilities. But for many years I was to argue with the knob twiddlers.

The first plan, made before I joined the B.B.C., was to erect nine stations of fifteen hundred watts power at London, Manchester, Birmingham, Newcastle, Glasgow, Cardiff, Aberdeen, Bournemouth and Belfast. These were afterwards called 'main stations'. Experience soon proved that these stations had a service area no greater than ten to twenty miles in radius. They could not therefore, by themselves, cover the whole of Great Britain.

The inadequacy of our main station service was brought home to me by a Mr. Lloyd who burst into my office to say that reception in Sheffield, where he came from, sounded like an 'insurrection in hell'. After visiting Sheffield I applauded the analogy. The signals from the Manchester main station, thirty or forty miles away, did not penetrate the deep Pennine valley and so local interference got the better of them. The bad reception conditions in Sheffield were repeated in many other places such as Hull, Edinburgh, Plymouth, Leeds, Stoke: anywhere in fact outside the range of the main stations. Calculations showed that if main stations had their power increased, signals close to the transmitter would be overwhelmingly strong and yet the gain in the interference-invaded towns would be negligible. We decided therefore to set up more low power transmitters rather than increase the power of the existing main stations.

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But what programmes should be radiated from these local stations? A multitude of stations centred on different localities might seem to demand a multitude of different local programmes. But such a policy, even if desirable for its own sake, would have been in those days uneconomic. We were spending our money very rapidly and the Post Office was not being very generous. Consider that only £50 were available for an hour's programme. If there were twenty stations the available money per programme per station would be £2.10.0; a fifty-shilling suit may be a good bargain but a fifty-shilling programme is a horror. Put this economic issue another way. A star artist is engaged for a fee of one hundred pounds. Is the artist to sing in London and not be heard anywhere else or is he or she to cost twenty times a hundred pounds for a tour round twenty stations? Neither alternative is any good.

The solution of these difficulties was, and is, to use telephone wires to interconnect the stations so that the output from one microphone would operate many stations simultaneously. For example, to-day the announcer in London reads the news into a microphone which is connected, through telephone wires, not only to the near-by London station, but to all the other stations scattered up and down the country. The system permits any number of permutations and combinations. By using the trunk telephone wires a programme can be picked up anywhere and sent to some or all stations, there to be broadcast to the listeners near-by.

When we made our first experiments we said that we would connect the local Sheffield station to the Manchester studio by a telephone wire so that the Manchester programme would be repeated or 'replayed' by the Sheffield transmitter. Thus the Manchester programme would be represented by a good strong signal in Sheffield; we extended the service area of the Manchester programme by giving it a new focus in Sheffield.

No sooner was the scheme put into operation, as an experiment, than it was bitterly criticized by the belligerent civic authorities of Sheffield.

'Why should we listen to Manchester programmes?' they asked. 'If we have local station we should have local programme.'

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I replied that a short while ago they were complaining that they could not hear Manchester; now they were complaining because they could.

'We don't want anyone else's programmes,' they said. 'We must have our own.'

I explained the economic difficulties.

'Very well,' they said. 'But we don't want Manchester programmes, we want London programmes.'

This meant a longer telephone wire but a shorter argument, so the Sheffield relay station was arranged to relay the London programmes.

Immediately it became known that Sheffield was 'favoured by the possession of a relay station', a great clamour went up from a multitude of cities, towns and even villages, demanding local transmitters. It has already been explained that wavelengths are scarce and so, even had it been within our means to do so, we could not have granted even a small proportion of the requests. It was decided, after taking into account the number of wavelengths available and the population and geographical position of the localities demanding a better service, to set up eleven relay stations to supplement the nine main stations. The requests from the cities and towns served by relay stations to have their own local programmes were so vociferous that they were allowed about an hour a day to do this. For the rest of the time they 'took London'. Thus at the completion of the relay stations there were nine main stations mostly doing their own programmes and eleven relay stations mostly sending out the London programmes.

It was apparent to us, even before we started the relay stations, that the use of the trunk telephone system to inter-connect the existing broadcasting transmitters would be a great convenience. If, for example, one announcer could read the news in London so that it was simultaneously radiated from every station it would be much better than communicating it by telephone to every station as we had had to before we made the new arrangement, and broadcasting it separately. There were many other advantages which must, in the light of modern experience, be obvious.

In 1924 the telephone system was not so well developed as it is

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to-day. The war had held up progress, and while it was clear that the valve amplifier or 'repeater' was going to be of enormous help in extending the trunk telephone system there had not been time to reorganize the system to take full advantage of the new facilities. The B.B.C. therefore had to co-operate with the Post Office to see what special problems might be introduced in linking our broadcasting stations together. The Western Electric Company kindly helped us and, with Mr. Erikson, formed a liaison between B.B.C. and Post Office engineers. Our first scheme was to make London the wire centre and see if we could send programmes through the 'Trunks' to our provincial stations. We therefore got the Post Office to give us eight or so telephone lines to join a room in Marconi House with our provincial station control rooms. It was our job to send speech and music into the London ends of these lines and the Post Office's job to see that what we put in arrived safely at the provincial station control rooms.

It was far from easy getting this system going. The Post Office engineers were magnificent. They had to do a lot of overtime work because they could only get at their trunk lines when the public traffic was small, that is to say after business hours and late into the night.

At last, one Sunday afternoon in 1924, Mr. Erikson, of the Western Electric Company, who was helping with the job, telephoned to me to say that he thought everything was tidied up and would I come down to inspect and take over? In those days Mr. Reith forbade broadcasting on Sunday afternoon, so we could go on the air without disturbing any routine. Confirmatory telephone conversation with each main station engineer proved that we were hooked up to all our transmitters. Mr. Erikson bowed me towards the microphone saying:

'You can now broadcast from all stations simultaneously.'

'Hullo, everybody,' I said. 'These are all the B.B.C. stations testing. I am now speaking from London through all stations simultaneously. The stations are connected to London by telephone lines. I should be very grateful for reports on reception conditions in various areas. I will go on speaking for ten minutes to enable you to tune in your receivers. One, two, three, four, five, six, seven, eight, nine, ten. Mary had a

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little lamb. Sister Susie's sewing shirts for soldiers. A, B, C, D, E, F, G,' and so on, intoning the jargon of 'testing'. It all seemed to work and 'S.B.', as we called this 'Simultaneous Broadcasting', became a feature of our system and a great help in spreading the service.

The first two years were punctuated by ceremonies surrounding the opening of new stations in provincial towns and cities. The routine became standardized. A date was fixed, a senior official of the B.B.C., usually Mr. Reith, was booked to do the honours. He would bring with him some well-known figure to 'declare the station open'. The Mayor, the Corporation, and local notables were asked to the party, some to make speeches, some just to 'support the Mayor'. Harold Bishop, assistant chief engineer of the B.B.C., would go in advance to make all the preparations. He had to hustle the contractors, supervise the installation of our gear, see that the hired palms were standing to proper attention, make arrangements for the junketing, test the quality of the transmission, ensure the proper functioning of the local telephone lines and rehearse the engineers to carry out the complicated routine of the ceremony. Bishop and I got to call all these preparations 'casements'. I do not know why, but the name was somehow funny.

Most of the openings went without a hitch. We played our technical tricks: Big Ben rang out in Town Halls from loud speakers garlanded with flowers, congratulatory telegrams poured into the Mayor's parlour the moment his speech was finished. Special editions of the local papers carried our photographs, looking haughtily over our white ties, and gave verbatim reports of the speeches. I can hear them yet, those full and rounded periods. . . .

'This great invention which bids fair to transform the lives of all of us, which brings good music to the fireside, comforts the shepherd in his lonely hut upon the wolds as much as the statesman relaxed in his study; which offers encouragement and hope to the sick; here in our great city, it finds a new outlet, a new beginning. We may be proud . . .'

When it was all over I would find my way to the relaxation of the control room carrying a left-over bottle to revive an overstrained staff. Next morning the Head Office officials caught an early train and

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went back to London, the ceremony forgotten. In three or four years the majority of stations, so pompously opened, were to be shut down to make way for the new Regional scheme.

Once completed, the main and relay stations had made it possible for the majority of townspeople to hear broadcasting clearly on simple sets and without interruption. In consequence the number of listeners vastly increased. The number of licences, however, did not increase in like degree. Many people, some innocent of the law, others determined to evade it, failed to pay their dues. In my tours round the stations I would broadcast, asking:

'Is it fair? Is it British? Do you want others to pay for your service?' ('Yes,' someone once whispered behind me.)

The appeals helped: the morning after my speeches would see long queues outside the post offices; these were the listeners being fair and being British. We calculated nevertheless that in the years 1925-26, and in spite of the appeals, twenty-five per cent of the listeners had not paid for a licence.

What a craze wireless became in those days! First of all it was a crystal set craze. Ingenious people made wonderful helixes and sliders and vaunted the merits of some particular 'ite' they used for the crystal. The crystal was a delicate thing. It had to be tickled with a fine wire called a cat's whisker. There was a nice spot on the crystal which made the signals really satisfactory. Someone slammed the door, the cat's whisker jumped, and 2LO was calling vainly. So one had to start prodding about with the whisker all over again. This was very irritating. It was also uncomfortable being tethered to the set by the earphone leads which got tangled up with others reserved for little George to hear Auntie So and So. So there was a temptation to scrap the crystal set and buy a valve set which worked a loudspeaker.

The valve set craze began. Small boys were heard talking about rectification, reaction, reflex circuits, and tuned anodes; passwords hitherto only used by the esoteric. Technical papers with huge circulations came out with the latest circuits; blueprints, and detailed instructions on how to make 'our latest most staggering innovation,

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“the Nuoduoohypertropodyne”’. The ingenuity in adapting well-known principles, *pour épater le bourgeois*, had no limits.

I suppose the man in the street was so enthralled because wireless was a hobby for making things, which in spite of being made at home, really worked on a full scale. The home-made steam engine is fascinating to make, but when all is done only puffs uselessly. The fun is mostly in the making of it. The home-made wireless set not only worked but it worked to some purpose. There was as much fun in using it as in making it. And it could always be altered or added to.

But everything has a catch somewhere. The catch about these home-made sets was that they oscillated. To make them sensitive and yet use as few valves as possible they had what was called ‘reaction’; what pompous people said ought to be called ‘retroaction’. The degree of reaction was controlled by a wicked little handle which, turned in the direction labelled ‘increase’, made signals louder and louder. If the handle were turned too far, a howling noise drowned the reception. Moving the tuning knob altered the pitch of the howl. ‘A preferred method’ of tuning in was to set the ‘reaction knob’ too far, hear the howl, rotate the condenser knob until the pitch of the howl note was lowered to inaudibility when, by slacking off reaction, the programme could be reproduced, if gruntingly, at least audibly. The adjustments were at times so delicate that it was fatal to move hand or body or the intelligible sounds would disappear to give way to piercing howls. Distant listening therefore involved long periods of virtual rigor mortis waiting for a distant station to give its identification signal. Once ‘got’, another station was ‘logged’ and another lie started. All this would have been very well had not the howl, audible by the set which made it, been also audible to every other set in the neighbourhood. One oscillating set caused interference to be heard in other receivers over an area of the order of thirty square miles. ‘Tuning in’ to a popular programme was to imagine oneself in a circle of Dante’s Hell: the wailing and the grunting, the shrieking and the crying, made listening a torture. Naturally this was a kind of interference which could only be shouted down with great difficulty and so it contracted service areas to very small dimensions. It was

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not necessary, but it was very tempting, to 'oscillate'; it was, in any case, very anti-social.

Oscillation became another of my 'causes'.

'Was *this* fair? Was *this* British? Don't oscillate, *please* don't oscillate. Don't do it,' I said over the air again and again. I was called 'Don't-do-it-Eckersley'. The sole effect of my appeals, backed by a widespread distribution of pamphlets, was to make the listener feel guilty when he made his set oscillate, but to leave him just as determined to go on doing it.

If persuasion fails, compulsion is necessary. It is against the law to oscillate. When a receiver causes this kind of interference it does so because it turns itself into a feeble transmitter. No one is allowed to use a transmitter without a special transmitting licence. The listener's licence was a receiving, not a transmitting, licence.

It was suggested that the Post Office, which had a duty to enforce the law and which benefited from the licence payments, should equip a motor van with apparatus which could detect offending oscillating receivers. The idea was that the van would tour a district where oscillation was severe and pitch upon and make an example of an offender. This was done first as an experiment, later as an institution. I doubt whether the Post Office van could, except in rare instances, track down an oscillator. I am sure it could not determine the presence of a set having an indoor aerial, the owner of which might be evading paying for a licence. I know nevertheless that the moral effect of an official vehicle slowly touring a street, swinging an impressive frame aerial this way and that, staffed by stern official looking men, was tremendous. After the van had passed through the district, many listeners hurried out to the local Post Office with ten guilty shillings in their pockets. Others perhaps made good resolutions to be careful in future about a too generous use of the reaction knob. Certainly statistics showed both a remarkable increase in the number of licences and a considerable diminution of oscillation in the districts which were visited. To-day the number of licences is nearly equal to the number of householders and the Post Office records are sufficient to trace anyone who has forgotten to pay his licence. Receivers are

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moreover designed so that they are sufficiently sensitive not to need the help of 'reaction' which causes oscillation. I feel, in these circumstances, that I am not telling tales out of school in revealing the 'secret of the Post Office detector van', namely that it has none.

As the facilities for reception were improved, more and more people became listeners. The most optimistic of us were astonished at the extent of the increase. What fantastic profits would have been made had the service been run by private enterprise! A relay station cost no more than a few thousand pounds: its transmitter was of very low power, 100-200 watts maybe, and its aerial was hung from a factory chimney. The rental of premises amounted to a few hundred pounds a year and the staff were neither numerous nor highly paid. For a capital of two thousand pounds and an expenditure of about fifteen hundred pounds per annum it was possible, in some districts, to secure twenty thousand new licences in the first year, mounting to fifty thousand in the next, representing an increased licence revenue, after saturation-point had been reached, of twenty-five thousand pounds per annum. It is true that the B.B.C. by no means received all of this revenue, but if the amount handed over were even half the total available, the enterprise was highly profitable.

It was however more profitable in some districts than in others. A one-kilowatt station, costing a few thousands of pounds, located in the heart of London, gave an adequate service to two million households and produced a tremendous return on the money spent; a similar station placed on, say, Tayside in the centre of Scotland, might serve but two thousand families with the same efficiency and would cost more to run than the revenue it produced. A private broadcasting enterprise, intent upon profit, would have tended to skim the cream of the licence revenue by concentrating on the big towns. This is what actually happened in America under a commercial system of broadcasting.

As a public service company, the obvious duty of the B.B.C. was to serve the rural as well as the urban areas of Britain. Those who deplored the depopulation of agricultural districts said that, while the low wages paid to land workers was the chief cause of their con-

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stant exodus, the lack of facilities for their amusement was almost as great. Broadcasting, it was said, would help to bring the amusements of the town to the isolation of the village. My observation that B.B.C. programmes might well whet the appetite of eager rural adolescence for megalopolitan joys was thought to be cynical and misplaced. But I still think it has point. Cynicism was no part of my duty and, in proselytizing a rural broadcasting service, I drew fine word pictures of the lonely shepherd on the dark hillside, wrapt in the spell of music's charms, the long hours passing swiftly till the chimes of Big Ben ushered in his bucolic sleep. The fact that the shepherd normally went to bed at eight, but was up half the night in the spring lambing, that he was too tired to listen to anything but the varying notes of his flock's complaints was neither here nor there. If we really want agriculture to flourish, we should see that it is profitable in itself. But while broadcasting is not going to save the land, it is obviously right to try to amuse and interest those who, in the face of discouragement, are trying to save it themselves. Nor must it be forgotten that 'important' business men take their week-end rest in the country and want to hear the news.

The problem of filling up all the country areas not served by main and relay stations with good service broadcasting was by no means easily solved. We knew, when the question confronted us, that a thousand-watt station, using wavelengths of the order of three hundred metres, had a range of ten or twenty miles. Increasing the power of main stations where they existed was undesirable; they would have overpowered so many receivers.

I solved our problems by the use of long waves. I thought that these long waves would travel farther under the 'push off' of the same power than the medium length waves we had been using hitherto. Experiments proved that my hunch was right; the gains in using long rather than medium, waves were proved to be enormous. But there were relatively few long wave channels; far fewer than those in the medium wave band. This made me decide to base rural broadcasting on the use of a single high power long wave station to be located somewhere in the geographical centre of England and Wales. I

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realized that we had to move quickly before other nations made claims for long wave channels.

Long wave broadcasting was an innovation. It was opposed and even ridiculed by some experts and I had to fight hard to get my way. It was said by the receiver manufacturers that the necessary fitting of an extra switch to adapt sets to receive long waves would so complicate their operation and increase their cost as to make the scheme impracticable. To-day sets are adapted with a wave switch to enable them to receive long, medium, short and ultra-short waves. It was argued that interference would be the greater the longer the wave, that it was impossible to modulate long waves and get good quality, and that long waves would be jammed by certain wireless telegraph stations. I wonder sometimes why I persisted. It was a good thing for the wireless trade that I did. Once long wave broadcasting started no one would buy a set unless it had the necessary wave-range switch. American sets, adapted for American conditions, where no long wave service existed, had no such switch and therefore little sale in this country. This single factor protected our own trade against American imports better than any tariff that could have been devised by the most protectionist of governments. Indeed, if I had received, as a reward for the introduction of long wave broadcasting, one-tenth of the extra revenue which accrued to the wireless trade I should, maybe, long ago have gone to America and invested my gains making receivers suitable for the English market.

Before we could start up this new service we had to get permission from the Post Office to use a long wave. To the eternal credit of the authorities permission was given. Frantic efforts were made later to withdraw the permission because a lot of European nations copied our example and also used long waves so that all the 'long wave band' of wavelengths got filled up with broadcasting. The Post Office and the fighting services wanted to use these other long waves for their own purposes and so wanted the foreign long wave broadcasting stations shut down. But, once given, the permission could not be withdrawn; the public would never have allowed the Daventry long wave service to stop; too many listeners had come to rely on it.

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A site for the rural service station was chosen on a hill overlooking the town of Daventry in the very centre of England. Those who go northward along the London-Birmingham road must have seen, to the right as they pass the seventy-first milestone, the five-hundred-foot masts which held up the aerials of the Daventry sender for so long. The long wave station was recently moved to Droitwich. The site of the old Daventry station is now used for sending short wave broadcasting transmissions to the world.

Thus by about 1925, two years after I joined the B.B.C., the combination of main, relay and long wave stations gave eighty per cent of the population the chance to hear one programme clearly and without interruption on simple and cheap sets. The remaining twenty per cent got a good service, but they had to use valve sets; their reception was liable to slight interference. The ubiquity and flexibility of the system was enormously increased by the use of trunk telephone wires joining all the stations together so that they would simultaneously radiate one programme injected into any part of the network. The relay stations were devices more to extend service area than to give any diversity of programmes: they were technical expedients, not means to give the listener a wider choice of entertainment. The main stations were, in theory, autonomous organizations, but on many occasions they merely relayed the London programmes.

It has been said that the monopoly given to the B.B.C. was not an unmixed advantage; that it created complacency within the organization and a certain inflexibility and inhumanity in the programmes. I do not think that the power which the engineering department was given to plan and execute a technical scheme was abused. Monopoly was indeed essential to a proper plan. Had there been no central authority to decide the claims for relay stations in relation to a national plan there would have been chaos. I did, and always shall support, the principle of having a single technical authority to plan schemes of national importance, but I recognize that even a technical national authority can become bigoted or inexpert. Perhaps this is merely saying that, in those early days, our enthusiasm was maintained by a competition with ourselves: we were on trial against

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the measure of our ambitions and so we never became complacent. Anyway, it was the grandest fun.

At the end of it all, when this first single programme scheme was completed, I was already planning another. This was designed to give listeners the clear hearing of alternative programmes. This new plan was, and is, called the Regional Scheme. I shall describe it later on.

CHAPTER V

A BROADCASTING LEAGUE OF NATIONS

IF travel broadens the mind I ought to be less intolerant. My job in the last war sent me wandering over the Near East; my jobs in the last peace took me to every European capital. The object of my peacetime travelling was to discuss the ever pressing problem of 'wavelengths', their scarcity and their distribution. These discussions concerned all those who were responsible for national broadcasting systems in the different countries of Europe. We met together under the auspices of an organization we formed and which came to be called L'Union Internationale de Radiodiffusion. Broadly speaking this means a broadcasting League of Nations. The title 'The Union' is good enough although it is not a very apt description of what went on at the meetings. Our international society was born in hope and gaiety in an era of peace, it died in the gloom of war. R.I.P.

The necessity for international co-operation about wavelengths became obvious about 1925. Some listeners wrote to me to complain of a whistling note, 'of variable pitch and uncomfortable intensity', which accompanied the night-time reception of one of our stations. Investigation proved that this interference with the reception of our station, at places only a few miles from it, was caused by a foreign broadcasting station, five hundred miles from England, which was using a wave of nearly the same length as that used by our station.

It was staggering! We had had no idea up till then that so feeble a transmission, so far away, could possibly interfere with reception from a near-by station. But it was clear from this isolated example of interference, that every station in Europe, and the parts of other continents bordering Europe, would have to have a separate wavelength channel. Otherwise there would be chaos. Stations very far apart geographically might share the same 'channel' but inevitably their areas of service would thereby be restricted. It was quite easy

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to calculate, knowing the upper and lower wavelengths limits necessary to form a channel for any one broadcasting station, and knowing the limits of the total band of wavelengths allocated to the broadcasting service, how many exclusive channels were available for the European stations. The depressing result of these simple calculations was at that time, and before the band allocated by agreement between world governments for broadcasting services had been expanded, that only sixty free channels could be used simultaneously. To-day, owing to all sorts of compromises (e.g. stations sharing channels and putting up with a restriction of their service areas, placing channels so close to one another that they overlap and give poor but just acceptable service), and because the broadcasting services have been given a larger total band of waves to work in, about two hundred stations can work simultaneously in Europe, Western Russia, the Near East, and Northern Africa. This works out at about one broadcasting station per million listeners. No wonder this miracle of broadcasting is so miraculously dull!

When I first met this problem 'they didn't believe me'. I hardly believed myself. The English part of me said:

'It'll be all right.'

But a still small voice added:

'If you do something about it.'

So I asked the B.B.C. to write to all the Ministers of Posts and Telegraphs in Europe suggesting a conference and asking them to send someone who could understand and discuss the problems involved. At the same time, in order to focus forthcoming discussion on to something concrete, I made a plan of wavelengths. This plan was no more than a list of the wavelengths that could be used by stations without causing mutual interference. Opposite each number, which gave the length of such waves, was the name of the station which was to use it. There were at that time only about sixty working stations in all Europe. As there were about sixty different available channels my plan looked very nice and complete. But it did not leave room for any more stations which might come on the air later. 'Sufficient for the day', I thought.

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I also thought that, even if the people I was going to meet did not accept my plan exactly as it stood, (the British stations did look a bit numerous and well placed), they would at least accept the general idea that some sort of a working plan was necessary. I was very ignorant and, as always, very optimistic. I had not then met the legal mind; I knew nothing about 'juridical bases'.

I met opposition in full verbal force as I sat in the Presidential chair at our first conference. The B.B.C. circular letter had encouraged a few countries to send delegates to see what it was all about. The League of Nations had been sufficiently interested in our meeting to offer us a conference room in their headquarters at Geneva. So here I was on a Monday morning in the spring of 1925 sitting at the head of a long table flanked by two rows of puzzled men. I tried to explain, in French, the first principles of wireless and the implications of our recent discoveries. Some of the delegates were good technicians but did not speak French, some spoke French but did not understand technicalities. Others, like myself, thought we knew both French and technicalities. I was perhaps too optimistic about my French, which was a little rusty.

'Qu'est-ce que ça veut dire "obvieuse"?' asked a bi-lingual Frenchman during the recess.

'Why that's obvious,' I replied.

'Ah oui, c'est evident,' he said.

It was also obvious that few had either understood or, if they had understood, had agreed with my proposals. The only gleam of satisfied unanimity was shown when someone proposed that we should adjourn for lunch and continue afterwards with the help of an interpreter.

The interpreter soon made it clear that certain of the delegates were brutally determined not to agree to anything. It was not so much a question, said these people, of accepting or even discussing any wave-length plan; the general issues must be faced first. The French were the chief proponents of this point of view. I soon came to realize that 'Je suis tout à fait d'accord mais' meant 'Je ne suis pas d'accord', 'mais' being the operative word. 'En principe' meant 'I understand what you mean but I do not agree'. Everything seemed to mean 'I do not agree'.

Disagreement was summed up by a Frenchman who said 'Every

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Nation, every Sovereign State has the ineluctable right to do what it chooses within the inviolable territory bounded by its national frontiers. No power on earth can alter such rights. This attempt to subject us to the necessity of making certain arbitrary technical arrangements at our broadcasting stations is bound to fail unless the root principles of international usage are recognized.' It sounds lovely in French. Agreements must, according to this view, be signed by 'les hautes parties contractantes'. I had a vision of Mr. Baldwin and the President of the French Republic putting their signatures to a document which agreed, as a basic political principle, that the Paris station should for ever work on the wavelength of 373.95 metres. The velocity of light would be agreed between the National Physical Laboratory and the equivalent French scientific body so that wavelengths should be expressed in five significant figures.

I replied to these speeches, using the authority of the chair to prevent anyone else butting in, by saying that I recognized the 'ineluctable rights' of anarchy, but their manifestation on the form of a wireless howl throughout Europe did not seem to be their best justification. Might I too pose a juridical principle, the principle of the sacred rights of property? Could not Britain bring an action for trespass against French waves when they strayed over our land with 'apparent intent to do harm'? But setting aside all this juridical tripe (Translator: 'Ces questions qui ne sont pas tout à fait à propos concernant les faits techniques'), what 'rights' was anyone giving up in consenting to make provisional arrangements? All I wanted was a gentleman's agreement. Interpreter completely stumped. All right, 'un plan provisoire', a 'titre d'expérience'. But no! 'Pas d'accord, pas d'accord.' I wanted to scream. I probably did. Poor interpreter.

The history of the Union was foreshadowed at that first meeting. It was a history of a struggle between realist technicians and those who had legal principles. What happened was a typical example of the impossibility of getting international conferences to agree to anything, however desirable for the common welfare. The blocking of the legal and nationalist mind is ever the same. The reader may find it amazing, the writer knows it is true.

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But a steady increase of interference forced the Union to do something, so its progress was marked by successive provisional plans until 'the officials' ratified a bad one which more or less stayed put. Thus the history finished with the triumph of the jurists the memorial to whose work is existing chaos.

The problem which faced us then at that first meeting, and has faced the Union ever since, is as easy to state as it is difficult to solve. A technician could solve it in a few hours. 'En principe, mais' has not been able to solve it yet. The problem is that there is a limited number of things called wavelengths and each nation wants more than it can have. It is useless to 'rob the pool' because any wavelength taken without consent risks being made useless by interference. Agreement on a plan for wavelength allocation is obviously essential.

The jurists, right from the start, stressed the necessity of getting out a formula which should express the just demands of any nation for a number of wavelengths. The technicians sympathized with this desire for order but they felt that a formula could not be devised until they knew more about the nature of the things the formula dealt with. We knew very little at that time about how far wireless waves travelled. We could not express more than a qualitative relationship between the length of a wave and its penetration. We did not know what effect the ground over which waves travel might have upon the rate at which they die away. We lacked experience to tell us the minimum safe wavelength difference between channels. Might not station neighbours in the plan, separated by large geographical distance, be able to work on closer wavelengths than stations nearer to one another? Claims might be made by countries which spoke two or more languages for more waves to speak on. Britain, I observed, spoke English, Scotch, Welsh, Irish and the Oxford dialect.

Then there was the question as to whether waves ought to be reserved for countries which at that time had no stations but might want to start a broadcasting service later. If this were done wave channels might be left blank for years. Were we to deny ourselves the use of precious wavelengths because they might be wanted in a year or ten years' time? Not — very — likely. So here was another reason for a

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provisional plan which could be rearranged to make room for newcomers. It would, we argued, be generally known that our Union exists and that wavelengths are scarce. This will prevent other nations starting transmissions without agreement as to which wavelengths they shall use. Plans will be evolutionary. As time goes on we shall have more experience and make better plans. This is a technical job to be done by technicians. The Union will be corporately the Chief Engineer of the United States of Europe Broadcasting system. At present any individual Chief Engineer can alter national wavelengths to meet changing conditions, therefore all the Chief Engineers in conference can agree to alter all or any of the European wavelengths. After some time has elapsed we shall have enough knowledge to get out a real fair plan based on the logic of technical quantities.

'Pas d'accord, pas d'accord, we must have logical bases before we make any plan', replied the jurists.

There were four distinct phases of the Union's evolution. Each phase faded into the next but their general character is marked. The first Geneva phase, from 1925 when the Union started to about 1926, consisted in meetings in which I tried, and failed, to get even a provisional plan accepted. The end of this phase produced a complete rupture between the two points of view, technical and juridical. The second Brussels phase began in about 1926 with a reconciliation and, thanks to Raymond Braillard, was characterized by the dominance of the technical committee. This was disputed by the jurists and came to an end between, I should say, 1928 and 1929. The third phase, which lasted until the Madrid world conference in 1932, was marked by the dominance of State officials rather than technicians directly responsible for the working of the broadcasting stations. After Madrid, in the fourth phase, the Union put on a peaked cap and ran errands for the Post Offices.

The last of the Geneva meetings of the first phase was held in a room dominated, I felt, by the spirit of Calvin. The meetings, like the room, were both long and gloomy. Yet another plan was illustrated on a blackboard tucked away in a recess. I was to make a last effort to get something accepted.

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'Sirs,' I began, in a French now greatly perfected, 'We have now come to a point in our deliberations where the success or failure of our efforts to reach a conclusion must be put to a test.' A dramatic pause. 'While I am aware that many of you must feel that your national needs are far from being satisfied by the tentative and provisional plan illustrated on the blackboard, it is incumbent upon us all, as has so often been explained, to make sacrifices. I want to ask you, if you will be so good, to consider this plan, not as it concerns your national aspirations, but rather as a whole, in its international sense, as a plan designed for the greatest good for the greatest number of European listeners rather than for listeners of any particular country. Let us then sink any national interest for the sake of international agreement. Now international agreement . . .'

My flow had stopped because I had seen a hand uplifted by a rather shy-looking man sitting half-way down the table.

'Pleeze Mister the President,' he said, 'may I talk pleeze in English?' and before I could say that I supposed that was what he was doing:

'Pleeze Mister the President, my country is a very *long* country with many many *beeg* mountains and our wavelenghts *pleeze* is a very very *short* wavelenghts. And pleeze . . .'

'Yes, yes!' I replied. 'I quite understand, but perhaps this rather particular national question could be settled or discussed later; I now want the plan to be considered in its international aspect. As I was saying . . .'

The little man sat back, looking very miserable. After another ten minutes of my oratory, up went the hand again.

'Pleeze, my country is a very *long* country,' he wailed.

'My country is a very long country,' became, in after years, the slogan to typify those delegates who never came to a conference without a desire 'to come out with more than in I went'. The usual method was to air particular grievances to the complete disregard of general interests and hold up all progress until satisfied. The 'long country' people were more successful than they should have been because patience is not inexhaustible.

The last Geneva Conference broke up without a decision: my

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eloquence had been unavailing. I muttered something about the B.B.C. having lots of money and that we would raise the power of our stations and shout down Europe. I was reprimanded by Admiral Carpendale, the head of the British Delegation.

'Pas d'accord, pas d'accord,' the train wheels sang as we rattled northwards. 'Pas d'accord, pas d'accord.' That parrot cry! What a sense of bewildered failure accompanied me over the channel and back to the office! Though there seemed little to be done by conference, obviously a new situation had to be faced. We must be careful to base future plans on the use of fewer wavelengths and defend our channels from invasion by the use of higher power. It was all very unsatisfactory. The Post Office said that it was no use making plans at all before the decisions of the World Wireless Conference to be held in 1927 in Washington were known. It was added that young men in a hurry usually found out their mistakes. Obviously, said the bureaucrats, no European agreement could possibly be come to now and not very likely in the future. We were wasting our time. But meanwhile reception was being ruined. The howls of some lonely station wandering about in the night with no place to go became ever more plaintive, more piercing. The Post Office might say it was a waste of time trying to make plans to fit in the stations comfortably together; I thought it was a waste of good air not to try.

In the autumn of 1925 I received a letter from M. Hubert, of Brussels, where he directed many international phases of wireless, asking me to go to Paris for 'just a friendly talk' with some of those who, while anxious to get something done, were nevertheless opposed to the British policy. Naturally I went. I met certain French broadcasting people in an office at the top of the Petit Parisian Building. M. Hubert had brought with him an engineer named Raymond Braillard.

'Braillard,' said M. Hubert, 'might be able to propose some solution, based as much upon his knowledge of conditions in France as upon his competence as an engineer.'

I took an instant liking to Braillard, a liking for his quick understanding of technical problems, his flair for the political implications

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underlying technical proposals, and above all for his ability to translate technical fact into the language of juridical compromise. I consider that the Union first became effective after this Paris meeting and that Raymond Braillard was largely responsible. Alas! even he could not, in the end, prevent it from becoming a debating society. The Paris meeting was successful not only because it was held in the capital of France but also because Braillard was able to 'understand' French and the French. It was suggested, as the outcome of the meeting, that he and I should find a 'logical basis' for a 'provisional plan' and submit this to a further conference.

We all had a lovely cordial lunch and Braillard and I caught the evening train to Brussels. I ate my dinner wedged in a swaying corner of the Wagon Restaurant and talked technics the whole of the journey. Braillard did not understand English and the strain for me, in those days, in understanding and talking a foreign language was considerable. It may have been the dinner, it may have been the strain, or the train, or all the lot together, but I shall always remember my first night in Brussels at the Palace Hotel as remarkable for the most violent *stomache-ache* I have ever had or, pray Heaven, am ever likely to have again.

I woke up full of optimism and little else. In a few days Braillard and I had made a provisional plan of European wavelength allocation 'inspired by logical bases'. These 'logical bases' were expressed in a formula. This formula contained three symbols: A, B, and C. A was the area, B the population, and C the 'commercial importance' of each country. The latter parameter, so valuable to England, was represented by the number of telephone calls made and telegrams sent during one year in the country concerned. The formula (when its component parts were given in the proper units), gave a figure for any country which, in relation to the figures got out by the formula for other countries, measured the claim of that country for a number of exclusive waves. Nothing in 'the logical bases' formula said anything about the quality of the waves it allocated. Actually the length of the wave was proved later to be the chief measure of its value; quality was just as, if not more important, than quantity. But none

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of these points were very relevant because, when we got out the plan, it had very little relation to the formula. Braillard winked at me.

'We use the formula just as a "guide",' he said. Everybody knows what a guide can do for one if one is nice to him. We were awfully nice to our guiding formula.

It was all rather comical. The plan we built on these 'logical' bases was very little different from that ordinary 'technical-compromise' plan which I tried to get accepted at Geneva. It departed wildly from the formula. Its great recommendation, to the administrative mind, was that, hovering in the background, were some juridical, logical principles which were not then, but might some day be applied. The jurists were thus satisfied by the mere existence of logical bases even if they were not used. Technicians were delighted because a plan could be accepted which prevented the worst interferences.

The plan was eventually accepted by the great majority of delegates. As it had been mostly discussed in Geneva it was called the 'Plan de Genève'. As time went on the plan was evolved and modified. Its modifications became so profound that eventually a new plan was necessary. It cannot therefore have been awfully logical. This new plan was made and also accepted. It was called the Plan de Bruxelles because it was worked out in Brussels. The same thing happened again and the Brussels plan was superseded by the Prague plan.

Between the Geneva and Prague plans, during what I call the second or Brussels phase, we did our best work. The modification of plans required co-operation between the responsible technicians of the different nations. Thus a committee of the Union was formed called the 'Technical Committee'. This committee administered the working and evolution of the plans. Braillard presided.

Braillard is one of the few truly remarkable men I have met in the course of my professional life. He is remarkable because he combines patience and intelligence. My trouble is that I am so impatient. When I get an idea I seem to antagonize everyone who does not share it. Braillard seduces his opponents; very round, very eloquent, he stays, immovably charming, persuading and cajoling. He is both a master of statistics and analogy. In rare crises he throws off his charm and

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puts on his indignant act which, being French, he does wonderfully.

Van der Pol from Holland, world famous as a mathematical physicist, added greatly to the consequence of our committee. Turning over old photographs I see him always in the front row of the groups where his fame entitled him to be. Lemoine of Sweden always spoke very, very slowly. Anticipation as to whether he agreed or not prolonged anxiety because, without it, we were obviously on the wrong track. Zweiger, from a then independent Austria, was very small and very idea'd. We got along famously. I christened Steinbach, the Czechoslovakian, 'Eric or little by little' for his habit of edging his stations up the ladder of the channels towards the coveted longer waves. Representation by France was sporadic. Gendron, representing one private station, was sometimes with us, but other French delegates made it quite clear that his agreement meant nothing because he did not represent France. Whenever the French State officials put in an appearance they made it clear that they came only as observers. What they observed never seemed to please them much. But they never spoke. It was just something about their expression. My assistant Hayes was the Datas of the Conferences. His ability to remember past plans and present railway timetables was a wonderful help. Everyone liked him, his kindness and patience were equally appreciated.

Above the technical committee was the 'Conseil', who were the business men, as it were, who had to ratify any proposals made by our committee. Admiral Carpendale, then controller of the B.B.C., took the chair at the Conseil meetings and was therefore President of the Union. The Admiral is, in Navy talk, one who is 'a martinet on the quarterdeck but a good fellow in the wardroom'. He seemed to feel that Europe was a wardroom and this made him a charming companion. He was greatly liked and respected by everyone. A dominant figure in the Conseil was Monsieur Tabouis, the husband of Madame. Tabouis was as famous in the Union for his speeches as Madame became later on in the larger world for her writings. He spoke beautifully. He had certain mannerisms, however, and I once won a bet that he would say 'à l'heure actuelle' more than fifty times

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in one speech. I won. I was somewhat indignant on his behalf when he was mentioned in a recent war newspaper article about his wife as 'her husband a Radio Dealer'. He is actually a director of the Compagnie Française Radioelectrique. The Chamberlain Lerche from Denmark put younger men to shame by the vigour of his dancing. He gave two fingers in a handshake with members of the Conseil and one to members of the Technical Committee. When it was *de rigueur* to put on our medals and decorations the Chamberlain wore a key on his hip. Travel does broaden the mind. 'Papa' Rambert from Switzerland was often credited as being the founder of the Union. Whether he was or not his charm and common sense made the Union's foundations the firmer.

Arthur Burrows was the secretary of the Union. Burrows was famous in England as a pioneer broadcaster but 'he folded his tents like the Arabs and silently faded away' to Geneva where he became secretary of the Union. Burrows was English to his very accent. He complained of the difficulty of finding facilities in Switzerland for his 'youngsters' to play cricket and substituted the effects of our island breezes by giving his family iodine chocolate. Divoire, a professor of the University of Brussels and secretary of the Technical Committee, laughed at the same things as I did, so I found him excellent company.

It was not until the Union had been functioning for a year or two that the Soviets sent anyone to represent them. It is strange to remember that Russia was in those days quite beyond the pale. No Russians were invited to the World Wireless Conference held in Washington as long after the war as 1927. In consequence, and to their great advantage, they took and used all the best waves. But they saw the point of the Union. We were not proud, we just wanted to avoid interference and so we welcomed Russian co-operation. Their first delegation was composed of two men — one technical and the other obviously more political. They were never apart. The personnel of the Russian delegations which followed were seldom the same from one meeting to another. Even the brilliant Hirschfeldt who dominated the Madrid conference was not seen again. The delegation to the last conference before the war was headed by a woman. She presented a

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rather original plan to the Conference and said it was her government's instructions that it should be accepted. She was only doing what most of the other delegations did. The days of the flexible technical committee were by that time long past.

It was the Union's most attractive procedure to meet in different foreign capitals. Each organization took it in turn to be host to the rest. We had a wonderful time. We were taken up high mountains and down imperial cellars. We saw the Rhine, the Danube and the Tiber through the rose glasses of hospitality. Gala nights at the operas saw us filling the boxes. Processions of charabancs took us to beauty spots, castles, and winter sports hotels. The conference was once taken to the birthplace of Cervantes where a statue commemorates Don Quixote. An Englishman asked Braillard what this statue was meant to represent. 'It is Don Quichote,' said Braillard, using the French pronunciation of the name. The Englishman believed for many years that the statue commemorated the tragedy of the shooting of a donkey. As Panza's mule was present, and because of the French pronunciation of the Don's name, the mistake was perhaps understandable. It was the same Englishman who asked the proprietor of a vineyard, 'Tell me, just how much water do you add to the wine?'

When hospitality was nearly as exhausted as ourselves we congregated in 'Cafés' and 'Dancings'. The plans were built in conference rooms but launched in cheap champagne.

The visits to the capitals were only made for the full Union meetings. The Technical Committee met once every three weeks or so in Brussels. Brussels was chosen because it had a certain vested interest in neutrality and because Braillard, although a Frenchman from the Juras, had made his home there. Braillard also established the Centre du Control in Brussels.

This Centre du Control was both interesting and important. It was obviously no use allocating certain wavelengths in the plans to certain stations if they did not stay strictly in their allotted channel. Any wandering meant collision with a neighbour in the wavelength plan. So we had to agree internationally on a standard of measurement of wavelength. Braillard therefore instituted a laboratory at Brussels

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where he measured the length of the wave of every European station. This laboratory was called the 'Centre du Control'. A sensitive receiver picks up the station to be measured and examines the physical properties of the signal with an instrument called a wavemetre. This wavemetre, as its name implies, measures the length of the wave picked up by the receiver. The laboratory started in an outhouse in Brailard's garden and grew to a large building on the outskirts of Brussels.

The Control Centre was a good example of what can be done by international scientific co-operation. As the Union became more important it raised considerable sums of money from its members. Part of this money was devoted to building and maintaining the international laboratory at Brussels. The necessity for its existence was to ensure a rigid adherence to the technical provisions of the wavelength plans, but, besides the routine work, a good deal of research was undertaken. Instruments were built which measured frequencies of electrical vibration to an accuracy of one part in ten million. Observations were made on the strength of signals coming from great distances which gave the technical world a lot of information about the physical characteristics of the upper atmosphere and wave propagation.

The last time I saw Brailard was in the summer of 1939. The new building was complete. I sat in Brailard's office facing a noble desk, my gaze wandering between diagrams and maps on the wall and the wide windows showing the Brussels forest stretching to the horizon. One technician at least, I thought, had realized his ambition. The last news I had of Brailard was of his flight into France with his family and his treasured apparatus, packed into a fleeing car. He was last heard of in Bordeaux.

But I must go back to the Union's history and describe the all-important Prague Conference held in 1928. This was remarkable because the meeting was composed not only of old friends but new enemies, men who had no interest in broadcasting except to regulate it. These were people from the Post Offices, people who had to consider all communication services as well as broadcasting.

The necessary international co-operation about all wireless com-

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munication, whether for broadcasting or shipping or telegraphy or flying services, is done at world conferences. The first of these was held in Washington in 1927. Before that agreement was informal. Washington founded what I think is now called the World Telecommunication Union or something grand like that. Telecommunication is the operative term anyhow. The object of the Telecommunication Union is not to allocate this or that wave to this or that station but to decide what bands of wavelengths shall be used by the different services. The conference agrees, for example, that ships must do their ordinary traffic on wavelengths lying within a band between six hundred and eight hundred metres, commercial flying services must only communicate on waves of length greater than nine hundred and less than a thousand metres long. Other wavebands have to be found for telegraph point to point services, police van communication, telephony to lightships, army, navy, and air force communication, and so forth. And broadcasting? Broadcasting was a gate-crasher. It came late too. But it was a loud voice demanding a place. It has managed to get a medium band between about two hundred and five hundred and fifty metres and some short wave bands. In Europe our pioneering work on long waves established and made good a claim for waves between a thousand and two thousand metres, much to the disgust of certain administrations.

The delegates at these world conferences are 'the highest authorities'. They are civil servants. National delegations represent their Post-masters-General or Ministers of Posts and Telegraphs. I shall follow the Union practice and call the people forming the government delegations with the generic title 'Administrations'. The word is the same in French or English spelling.

Clearly these conferences had little resemblance to the Union conferences. The Union spent its time niggling with the minutiae of allocating waves to particular stations, the world conference spent its time in a broad battle of principle, deciding what sort of facilities should be given to different types of wireless services.

The Union was composed of all sorts of different classifications of delegates. All that was necessary to be a member of the Union was

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to prove a direct association with a working European broadcasting system or even a single working station. Some of the Union's delegates were members of 'Administrations' because in some countries the Post Office ran the technical side of broadcasting. At the other end of the scale there were members of private commercial firms which ran private stations or had some direct interest in the public broadcasting service. Then there were people like myself, who were responsible for the policy and performance of the technical side of a national broadcasting system, but were not members of Post Offices.

This was all very unsatisfactory from a bureaucratic point of view. Its sole justification was that it worked. Indeed when we were left alone to do a technical job it worked very well. It was obviously such a good idea to have an expert and flexible association which had only the interests of broadcasting to consider. These interests had to be pressed however; the claims of broadcasting would never be properly heard unless there were people able and willing to press them. Broadcasting is a source of entertainment and information to millions upon millions of people. It deserves every consideration. How can a collection of technical bureaucrats properly appreciate the political and sociological importance of broadcasting? Ships were and are using wavelengths better suited to broadcasting; broadcasting, the late comer, is forced to use waves which would be perfectly satisfactory for shipping. Messages are being sent by wireless which could just as well be sent by wires; the facilities of wireless, so essential to broadcasting at that time, were being, as we thought, misused and squandered.

But if the Union were to be ruled by members of the Administrations how could these views be stressed to the point where action would be taken? If the ruling people in the Union were the ruling people in the world conferences they would never argue satisfactorily with themselves. Their sense of duty at the union conference would no doubt prompt them to give full backing to a resolution demanding better broadcasting facilities, but when they met their own resolution face to face at a world conference a wider sense of duty, the duty towards other claimants, might make them oppose their own recom-

mendations. If, in other words, the controlling personnel in the Union were the same as that in the overriding world conference it could only talk to itself — possibly in its sleep. So it seemed, to those who held these views, a bad idea to let the Union be dominated by the Administrations.

There was another great advantage of not having a too formal constitution. If the elimination of a howling noise in a million receivers demanded no more than giving X a bottle of champagne and an explanation of wave propagation and the heterodyne theory it was better than assembling a hundred careful officials to explain to one another why they could not agree about anything. Our way of keeping the plan going was to ring up a friend on the international telephone and say:

‘I say, shift your A— station a kilocycle up, will you? We’re getting a lot of sideband splash on our B— station.’

The jurists wanted us to send stilted letters through those ‘proper channels’ which lead along dreary corridors to an unknown burial in a dusty file.

The jurists really wanted that smug comfort which comes from the backing of office chair authority. They wanted plans which had what they considered was the solid basis of ratification by high contracting parties. Naturally our signatures did not have final juridical authority, but they seemed to me to be good enough because we could mostly be trusted to abide by our agreements and our Post Offices were mostly quite satisfied if we were.

The 1928 Prague Conference was the beginning of the end of the Union’s integrity and independence. It was summoned by the Union which ‘invited’ the Administrations to come and approve its deliberations. ‘Will you walk into my parlour?’ We walked, some eagerly, some reluctantly. What after all is the voice of common sense beside the loud bruha bruha of ‘authority’? Anyway, off we went to Prague to hand ourselves over to ‘les Administrations’.

The Prague Conference was certainly dramatic: dramatic in its incidents, dramatic in its results. Used as we were to tens and twenties of delegates turning up at our meetings, the collection of hundreds

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was itself unusual. The poor little Union sat at the back of the hall while our betters filled the front seats and the great ones faced us from the stage. Men who were both members of Post Offices and of the Union fluttered up and down between the front of the hall and the back, loyalty and pride competing.

It was soon apparent that one called Pellenc, a member of the French P.T.T., was going to be very tiresome. I liked M. Pellenc's attitude, a David defying the Goliath of the Conference, but we all got rather tired of his point of view. I had heard it before so often: 'Pas d'accord, pas d'accord.' Nothing could tame Pellenc, not even the chief of his delegation, the picturesque and charming General Ferrié, doyen of the Conference and a pioneer of wireless technology. For ten days we listened to the dear old cry, 'pas d'accord, pas d'accord'. For ten days we saw the snow falling. For ten days hope died and was resurrected. At last Braillard took a hand. He gave the defiant and fiery Frenchman a dinner and a talk, both no doubt chosen with taste and understanding. Then, after dinner, Braillard and Hayes and I escorted the more genial, but protesting, Frenchman through the snow to the now empty conference room. He was given a virgin page, a pencil, and asked to make a plan; his own plan. He found that making a plan was not so easy. Indeed it involved not only knowledge but experience. After trying to do in an hour what had taken us three years he flung down his pencil saying:

'All right, all right! Make your beastly plan. D'accord, d'accord.'

We swept him into a taxi, and in ten minutes burst into the 'Dancing' where, every night, the more lively delegates congregated, crying:

'Pellenc est d'accord, Pellenc est d'accord.'

Pandemonium broke out; it was six o'clock in the morning before we got to bed, very satisfied. Three hours later some of us were still smiling in the conference room. Pellenc was not there, he was still entirely 'd'accord'. Everyone remarked that it had stopped snowing: spring had really come.

In the end the Union, not the Administrations, made the plan. Indeed, as the plan took shape the government people came, almost

hat in hand, to the little room where Brailard and Hayes worked patiently on, pruning, adjusting, arguing, explaining.

'It's hard work,' said Brailard. 'Getting two litres into a pint pot.'

He knew about weights and measures. The plan, by champagne out of hard work — the sweet champagne of a thousand headaches and the work of accumulated knowledge — was, in the end, accepted, by twenty-eight delegates from twenty-eight nations, in spite of everyone having to make sacrifices.

The end of the conference was to be celebrated by a banquet and the delegates were to be the guests of the City of Prague. They were selling balloons in the streets that afternoon, hydrogen balloons which pulled upwards. The now popular Pellenc and I bought twenty or more. We cut out some cardboard in the form of the Greek capital L, the letter lambda, which is the mathematical sign for a wavelength and wrote on it 'Prague' and the date, and attached it with strings to the balloons. An hour or so before the ceremony was due to start the balloons were pushed under the table in front of my place in the banqueting hall. Hayes was to sit beside me.

They have a fascinating habit in Prague of giving you beer, as in France they give you mineral waters, to accompany the more serious drinking of the wines. The wines were excellent, and so was the food and so were the speeches and so was the sense of achievement.

'Vive l'Union! Vive les Longueurs d'Ondes! Vive les Administrations!'

The official speeches ended. I rose:

'Gentlemen,' I said. 'At this late hour I hardly dare to introduce a serious note or involve you in any more discussions about wavelengths and plans and the rest, MAIS — that frightful word — the plan is not complete, or should I say, an hour ago it was not. An hour ago we had lost a wavelength and, horror of horrors, it was one of M. Pellenc's wavelengths and he was "pas d'accord"'. Searches were made, the secret police were called in, but nowhere could it be found. But you all know that, when something goes wrong with the plan, appeal to Hayes! I did, and now — see! He has found it! And here it is!'

And with that the balloons, tethered to the string held in Hayes' hand

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and suspending lambda, the symbol of all our troubles, floated above a hundred upturned faces. Someone was inspired to make a ceremony of launching the wavelength. The stately liveried servants drew the great curtains and opened the tall french windows leading on to a first floor balcony. Everyone in their full regalia, medals, uniforms, orders, white ties, crowded importantly on to the balcony above the wide street below. The balloons tugged to be away. Someone made a little speech, glasses were raised, and, at a word, the lost wavelength went tearing down the street borne on the gusty wind. It caught a moment's illumination from the lamps and then zoomed into the darkness. The Plan de Prague was launched.

The Prague plan was the last plan in the making of which the Union played a useful role. The history of the Union after Prague is the history of any organization which, adding titles and fame to give it dignity, subtracts from its power to adapt itself to changing circumstances. Once all the paraphernalia of high contracting parties had been invoked, once the signatories were those of less expert and more juridically minded people, inevitably modification became more difficult, whereas the need for adaptation became more pressing.

As the years passed and European politics became more involved, broadcasting was used in every country as an adjunct to national and international propaganda. Wavelengths were looked upon as valuable properties, munitions almost. Each nation strove to secure and keep as many as possible. The old Union committees, ten to fifteen strong, found themselves composed of a hundred men, each charged with the mission to secure the maximum facility for their own country regardless of the interests of others. There was no trace of the old idea to co-operate and to use the limited facilities for the greatest benefit of the greatest number. It became possible to trace frontiers with maps showing only the positions of broadcasting stations. The Union, from being a flexible and friendly organization, expertly informed, was the miniature battle ground for international rivalries. These developments, I am thankful to say, became more acute after I had left the B.B.C. and when therefore I no longer took any official part in the Union meetings.

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The last meeting I went to as an accredited delegate took place in Barcelona in 1930. I made an effort to persuade the Union to abandon the old plan and make a new one which, now that we had had five years' working experience, would be based on technical facts, not vague juridical bases.

Brillard had pointed out, that given the hundred and fifty or so channels, the possible permutations and combinations were so numerous that a new plan could have been made every second since the birth of Christ without exhausting the possibilities. The question was, is, and always will be, which, out of this vast number of possible plans, is the right one. It is a question which cannot be answered with absolute certainty but its solution, as I saw it, was that the Union, in its corporate action, should treat Europe as, say, the B.B.C. would treat Britain. Here was a technical problem, there were the limited means to solve it. Here was Europe to be spread over with signals, there were the wavelengths and the stations. The B.B.C. did its best with its limited facilities to serve the British listeners; the Union should do its best with limited facilities to serve the European listeners. When we started we had only vague ideas how to use our facilities efficiently, now we knew a lot more. Now was the time to apply them properly. Five years ago in Brussels we had made a formula to justify a nation's claims for a number of wavelengths. But we had never adhered to it. In any case it was a poor formula because it counted one wave as good as another. Now we knew about the quality of wavelengths. We knew that a long wave was worth many medium waves. So surely it was now time to make a new formula and a better plan based on that formula.

The jurists went right back on their principles. I argued with the same arguments that they had used at the beginning. They now justified the preservation of the existing plan simply because high contracting parties had accepted it. According to the legal mind the logical bases of the existing plan were that the Post Offices had accepted it. There was therefore no question about its soundness. It must be right if the Post Offices had said so.

It was a very hot afternoon when I launched my attack on the

existing plan. Our lunchtime greed had been bigger than our appetites. We were in Spain and should have been having a siesta. I illustrated the foolishness of existing arrangements by particular instances. I pointed out that two small flat countries had long waves; Spain, a large mountainous country, had only a few medium waves. This may have come about because the Spanish delegates at previous conferences had been dominated by the siesta habit, but this was hardly a logical basis for a plan. My attack was of course general, but the glaring absurdities of certain examples drew the fire of those who profited by illogicality. A skirmish with a flat country delegate ended by my saying:

'Then, Mr. President, I assume that the learned savant, my friend opposite, says that he cannot serve his small flat and densely populated country with two medium waves.'

'That is so,' said my *vis-à-vis*, not waiting for the President to speak.

'Then, Mr. President,' I replied, 'I withdraw the description of my colleague and suggest eliminating the words "learned", "savant" and "friend".'

A bottle of ink, fortunately unspillable, whizzed past me. But it was quite unnecessary to throw things at the poor gentleman; he was only doing his best. Needless to say my suggestions were not adopted.

It is a very funny business when one sees it in perspective. First, in the Geneva phase, before we had any accurate technical knowledge or wide practical experience, the lawyers wanted us to make a plan based on 'logic'. What logic was there, we replied, save that of technical quantities involved? Lacking a knowledge of these quantities we had to make provisional plans so as to find out more, in order to make better plans. This general idea was accepted in the Brussels period because we said we had got some vague formula which was not used but 'guided' the plans. We did not use the formula, it was enough for the legal mind that it existed, hovering somewhere over our deliberations. In the midst of evolution, indeed only at its beginning, the administrations stepped in at the Prague conference, took a look at one of the illogical and evolutionary plans and said: 'We like that

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one, we ratify it.' Later, at Barcelona, when we had got enough knowledge to make a further plan, which is much better, because technically sounder than any of its predecessors, the legal people said: 'Oh no you don't! We have already ratified a plan, that is enough. It would be folly to change what is existing just for the sake of technical ideas'. It was my time to say 'pas d'accord'. But my repeating of this old cry was a mere valedictory echo. The whole business may sound silly but 'the pity is 'tis true'.

I underline my view by repeating that broadcasting would have been better served by a flexible and technical committee which, in its corporate action, solved its changing international problems much as a single executive dealt with his national problems. Such a body would be able to challenge accepted views at the World Conferences and would represent the technical facts and the needs springing therefrom expertly and enthusiastically. As it is, as it was, slowly but surely, independence and enthusiasm were lost.

The last sad scene is drawn from memories of 1938-9, when I went as an observer to the meetings, first at Ouchy and later at Brussels and Montreux. Whether the ceilings of the conference rooms were lighted by a summer sun beating off the lake of Geneva or from the chandeliers of out-of-season hotels, the spectacle was ever the same, many, many people of many different nationalities, black-coated and sad, talking, talking, talking — to make, in the end, a few minor changes of little benefit to anyone. Two hundred men, a hundred days, twenty thousand man-days, and no alteration of any magnitude! We once did it over the telephone. *Quel fin de siècle.*

Happy days, good-bye! And one day, we hope, good-bye to an insoluble problem.

CHAPTER VI

IMPROVING THE SOUND

I DOUBT if anything is more fascinating to a technician than working on sound reproduction. A lot of people with good ears, an interest in music, or just a feeling for hobbies have found the problems of the loudspeaker absorbing. So many interests are involved, music, acoustics, valves, acute hearing; even theories about art and distortion and what reproduction really means. The Patent Office is bombarded by specifications for the perfect reproducer of sound, but how few ideas, so hopefully launched, have come to anything. No wonder when the subject is so complex. This chapter is bound to be to some extent technical, but I hope there are many who will nevertheless read it and see why the subject is so interesting.

Sound is caused by vibrations. These are usually detected as a vibration of the air, but, as we know by putting the head under water, or hearing someone snoring in the next room, sound vibrations can pass through solids too. Sound as we normally hear it is caused by successive increases and decreases of the pressure of the air round and inside the ear. A note is distinguished by being a regular and rhythmic vibration of the air; a harsh sound is made up of a lot of pure notes of different rates of vibration. One quality of a note is defined by how many increases and decreases of air pressure take place in a second. Musicians call this the pitch of the note; technicians describe it as the 'note frequency', or, more usually, just 'frequency'. The higher the pitch the higher the frequency. The high note has, in other words, more puffs and sucks of the air during a given time than a lower note.

A note is said to be pure when the increases and decreases of pressure are regular and rhythmic and contain only one rate of vibration or frequency. An impure note is composed of a strong pure note called the fundamental and a lot of other pure notes called harmonics. It

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is the different numbers and different relative intensities of the harmonics which give notes their character so that we can distinguish the difference between 'the flute, violin and bassoon'.

Then there is another quality of a note, its intensity. This is measured by the ratio of the maximum and the minimum pressures of the air over a cycle of vibration. Sounds can have relative intensities ranging millions of times to one, and yet the ear still miraculously hears them and is neither offended by their loudness nor unable to hear their softness.

The average human ear can appreciate notes having frequencies between about thirty vibrations and fifteen thousand vibrations a second. Any frequency lying between these limits is called an audio-frequency because, when represented by changes of pressure it is audible. It is convenient to divide up the audible range of frequencies into groups called 'low', 'middle' and 'top'. The low range might be considered to start down from the octave below middle C (roughly a hundred vibrations a second). The top range could be considered to start at three octaves above middle C (roughly two thousand vibrations a second), and extend to the upper limit of audibility. 'Middle', according to these rather arbitrary definitions, would lie between low and top. A complex sound is composed of a number of pure notes. These pure components combine to make an impure or complex result. Rattling keys and the thump of a drum are represented by different groupings of pure note components. The character of any complex sound is determined by the relative frequency and intensity of its component notes. Keys rattling have a predominance of top components, drums a predominance of low components. The melody of a tune is carried by middle components, the character of the instruments by their harmonics and hence top components, and the 'warmth' of music by the bass components. In human speech the timbre of a voice is a quality of 'middle' while 'top' determines intelligibility.

Anything which acts to reinforce the intensity of one group of notes in comparison with other groups changes the character of the sound. A cave booms because it reinforces bass components, a bath-

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room rings because it reinforces middle, and a whispering gallery gives its peculiar effect by conserving top. This property of an enclosed space to reinforce certain component note groups in comparison with other groups is called its acoustic. Why do men, and especially men, sing in their baths? I think it more probable that men sing in their bathrooms rather than in their baths. The phenomenon is not due so much to a sense of mere bodily well-being as to the ringing acoustics of the hard surfaced bathroom which reinforces the manly tenor. Mercifully the softer furnishings of a living-room give no such encouragement and reveal the voice less flatteringly to its owner.

Electrical reproduction of sound is made by a microphone which converts the sound vibrations into corresponding electrical vibrations, and a loudspeaker which turns these electrical vibrations back into sound vibrations. The link transmitting the electric vibrations between microphone and loudspeaker may be made by wire or wireless.

If, by their imperfections, the microphone or the loudspeaker or both is more responsive to one group of notes than to another, the reproduced sound obviously has a different character from the original. This fact can be loosely expressed by saying that the electrical apparatus has an acoustic; anyhow it can, just like an enclosed space, reinforce certain bands of frequencies in comparison with others and so change the character of the sound. This lack of fidelity in the reproduction is described as 'frequency characteristic distortion'.

A high fidelity sound reproduction system would, according to straightforward theory, be one in which the sounds coming out of the loudspeaker exactly resembled those going in at the microphone. I was, however, for some time fascinated with the idea that it might be possible to give the listener complete satisfaction with an unbalanced reproduction. Just as the eye, I thought, can be completely satisfied by a two-dimensional representation of a three-dimensional subject, so an incomplete sound picture could be made to give a sufficient synthesis of the original. But it was all very highbrow. It is true, for instance, that reproduction which cuts off top and bass is more pleasant than one which only misses out top or bass, but nothing except absolute fidelity is, to a critical ear, really satisfactory.

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Nearly all the crude microphones and loudspeakers of the early days responded to middle and cut off bass and top. This kind of distortion gives the characteristic snarl which is the typical and unpleasant feature of most reproduced sound. The first developments in apparatus lay in putting in more bass. One manufacturer used to advertise a loud speaker by the slogan 'Listen to the bass'. The injunction was superfluous: one heard little else. There have been crazes for 'top' which resulted in an angry spitting as well as a snarl. That too was very unpleasant. Of course all these designs were seeking the level characteristic which gives an equal treatment to all the vibrations. We wanted, we said, 'a level frequency characteristic'.

When we started the problems were formidable. There was no standard to rely on. We wanted to measure things. But it is only possible to measure varying sound pressures by a microphone and it is only possible to test a microphone by a measured varying sound pressure! Most loudspeakers snarled. There was none that could properly judge a microphone and few microphones which were worth judging. It all sounded horrid, but why? Was it the microphone or the loudspeaker or both? And if it sounded nice, was it perhaps because the faults in the microphone were balancing the faults in the loudspeaker?

I was very grateful to H. J. Round, then head of the Research Department to the Marconi Company, who right from the inception of the B.B.C., set to work to develop microphones, loudspeakers and studios. He and I worked together very smoothly. I gave him *carte blanche* to do what he liked while I got on with other work and spared a moment or two to admire what he had done. It seemed that all Round wanted was a magnetic field and some vaseline to produce a result better than anyone else had then achieved.

The character of sound reproduction is a product of the combined characteristics of the microphone, the loudspeaker, the electrical connection between them, and the place in which the original sound is made. This 'place' is frequently the studio. Round tackled his problem by first eliminating the studio acoustic. Kill the studio dead, that is, eliminate any acoustic, and you are only left with the problems

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of the microphone and the loudspeaker. Our first studio at Savoy Hill was therefore designed so as to have virtually no acoustic property. Its walls and ceiling were filled in with frameworks on which mosquito netting was stretched. There was over a ton of this panelling. The panels were covered over with curtains. One felt completely cut off — dead *was* the word — when one came into the studio. The ears suggested that one was on the top of a mountain, and yet the eyes and nose knew that one was in a stuffy room. It was uncanny to get no characteristic acoustic at all. One heard what one's voice really sounded like, and it seemed distressingly unfamiliar. Singers and instrumentalists found the studio intolerable. Not only was there no ventilation and no daylight but the sound had no encouragement. It made the singers 'press' horribly.

But it was all necessary and helpful in getting the microphone and loudspeaker right. The sound in our muffled studio was unaffected by any peculiar room acoustic; distortion, provided we used decent amplifiers and transmitters and receivers, could only be due to the microphone and the loudspeaker.

During the intervening years technicians have made great improvements in the apparatus of reproduction. The American 'Talkie' industry has produced virtually faultless microphones. Patient work has produced some very good medium-priced loud-speakers. An English technician, Voight, has given us a more expensive instrument which gives extraordinary realism.

As loudspeakers and microphones were improved it was less necessary to deaden the studios. The B.B.C. studios have therefore been gradually lightened of their drapery and have evolved from stuffy boxes into what could be called 'good music rooms'. Being good music rooms they can therefore be said to have good acoustics.

What do we mean when we say a room has 'good acoustics'? To my mind the ultimate criterion is that when music is played in such rooms the musical ear should be satisfied. The auditorium has not, as many imagine, been designed around the orchestra; on the contrary the orchestra has been largely developed to suit the auditorium in which it plays. I have no doubt that Frederick's flute took on extra

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brightness from the hard surfaces of the parquet floor and the mirrored walls of the salons of Sans Souci and that Bach chose to write for music combinations which would sound well among eighteenth century furnishings. The strident blare of a brass band would be intolerable in a small reverberent room, but the open air softens its blatancy. The symphony orchestras can only be accommodated in a large hall, so the corps of fiddles, brass and drums balance each other in the acoustical setting where they have to play.

The studio must be designed to take many different musical combinations and give them all the right sort of acoustical environment. The acoustics of an enclosed space depends upon a lot of interdependent variables such as volume, shape, the nature of the coverings on the walls, ceiling and floor, and the rigidity of the wall, floor and ceiling. Because one studio must be used for a great many different musical combinations, some broadcasting authorities have designed them so that their acoustics can be altered by moving curtains or rotating wall panels.

The evolution of studio design has been left largely to technicians. This is perhaps why they do not agree with me that the final judgment should be left to musicians. It seems logical that judgment about music should be left to musicians, but I can see now that those who thought otherwise may have been arguing with me at cross purposes.

There are two ways of looking at the problem. Assuming that the perfect reproducing system will transmit the sounds absolutely faithfully, then the studio should be treated simply as a music room without reference to broadcasting. If, on the other hand, imperfections in transmissions are inevitable, the studio must be treated as part of an artificial sound reproducing system. In the former case the problem is to satisfy the musical ear in the studio itself: in the latter the studio must be judged by technicians listening to a loudspeaker outside. I can see that a musician may not be the best person to judge loudspeaker music, just as I feel a technician may not be capable of saying what acoustic best suits an orchestra. The argument about the relative merits of the ears of musicians and technicians may well have been

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confused by a misunderstanding about the premises. To judge the reproduction of a loudspeaker is an art in itself. The musician is inclined to miss the little technical imperfections which are obvious to the ear skilled in their interpretation. I think the right way to tackle the problem of getting a perfect studio is to satisfy the musician by the effect in the studio and set the technician the problem of reproducing that effect exactly. The latter task is essentially one for a technician, in the former the technician can help the musician.

It is curious to observe the reactions of ordinary people to loudspeaker listening. Nearly everyone likes the loudspeaker to which he is accustomed and detests anything else. This is because the ear gets drugged by the distortions it constantly hears. The ear learns to hear the reality through one particular set of imperfections. Give it a new set of imperfections and it has to learn a new interpretation. No one likes getting used to new things and so all but one kind of loudspeaker distortion is resented by anyone who constantly listens to one type of loudspeaker.

When broadcasting started the best loudspeaker we knew of was a trumpet affair with a chinky snarl. A new type was later developed with a 'ziz' and a boom which, in spite of these defects, was better, we thought, than its predecessor. We asked Mr. Reith if he would like a new and better loudspeaker. Naturally he said he would. Directly he heard it he disliked it.

'Persist for a week,' I suggested.

He did: at the end of the week he had the old one put back.

'Extraordinary,' he said. 'Did I ever like that?'

His ears resented the first and then the second change. They had grown accustomed to each in turn. But he agreed, by making comparisons with a switch, to change over rapidly from one to the other that the new one was on the whole better.

I am and always have been opposed to fakes, that is to say balancing one imperfection against another. Obviously if the studio is a good music room and the reproducing system is faultless the listener will not know he is not in the music room itself; he will get everything that he would hear were he present at the performance. But studios

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are not even now perfect and there are faults in the chain of reproduction. This means that there may be still, as there certainly was in the past, a good excuse for faking.

In the early days studio fakes were necessary because the apparatus of collection and transmission and reproduction of sound failed notably to give enough top and bass. In order to correct these faults, we put the bass and treble instruments near the microphone. In other words an orchestra was balanced artificially in the studio to get the best result possible with imperfect apparatus. The responsibility for balancing was given to a special section of the B.B.C. staffed by musicians who had some technical knowledge. This section was and is called the Balance and Control Section. A member of the section has to rehearse the orchestra and judge the 'balance' in the reproduced sound. In my day the balancer listened on headphones. The players were moved about until the resulting sound in the headphones was, in the judgment of the balance expert, satisfactory. It is to be hoped that headphones are no longer used to judge balance. They give a marked 'middle' response and in no way represent the fidelity that can be given by a good modern loudspeaker. But the B.B.C. has done such good work on studios I have no doubt that the music played in them is balanced against the best available loudspeaker.

Sound reproduction opens up fascinating new possibilities. The crooner, for example, gets effects which would be impossible without the use of a microphone and loudspeaker. Singing very softly near a microphone, with an orchestra in the background, gives a different effect from standing away from the microphone and singing louder against the orchestra. The 'intimate' microphone technique brings the enlarged voice into a new kind of perspective: the voice has all the character of softness but, owing to the electrical amplification, the reality of loudness.

In broadcast drama voices can be contrasted by speaking at different distances from the microphone. The farther from the microphone the more pronounced the room acoustics. Thus artificial differences can be created between voices. A. G. D. West,

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who was for some time a senior member of my staff, introduced the idea of a synthetic echo which can be increased and decreased by turning a knob. The studio microphone energized a loudspeaker which was placed in a very reverberent room. Facing this loudspeaker and picking up the echoing sounds, was a microphone. Mixing the output from the echo microphone with the directly-connected microphone in a dead studio in different amounts, gave any effect between a cave and the top of a mountain. This was useful in dramatic work and 'Echo' in small doses improved music played in dead studios.

The Balance and Control people have another job, namely controlling. There is obviously a correct ratio of intensity between the *fortissimo* and the *pianissimo* of orchestral playing. For the sake of explanation, call this ratio a hundred thousand to one. The broadcasting transmitter has a limited power and so a limited output. The upper limit of power is fixed. For correct light and shade contrast the minimum output of the transmitter should be, according to my arbitrarily chosen figure, one hundred thousandth of the maximum. But a receiver picks up noise. Telephone lines, amplifiers and transmitter also contribute background noise in the transmission. The *pianissimo* passages, if one hundred thousandth of the intensity of the maximum transmitter output, would be drowned by these noises. So unless the *pianissimo* passages are to be swamped by 'noise' they must be increased above their proper relative intensity. In other words the maximum is fixed by the limitations of the transmitter and the minimum is fixed by the presence of noises and so the light and shade contrast in music has to be smoothed out when broadcast. This requires both a knowledge of music and particular interpretive skill. It is usually done by someone who can read a musical score and has some musical sense. The 'controller', as he is called, has the score of the piece that is being played under his eyes and his hands are on the knobs that regulate the volume output of the transmitter. The onrush of a *fortissimo* can thus be anticipated and met by a twist of the control knobs, a *pianissimo*, before it is drowned in mush, can be lifted to safe levels. All this makes reproduction less faithful to the original than it would be if the system were noiseless. Of course gramophone

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reproduction faces the same problem, the *pianissimo* passages must be strong enough to overcome needle scratch, and the *fortissimo* not so strong as to make too deep a cut in the record groove.

Two problems, not dealt with in the foregoing, remain to be solved before reproduction can be faultless. One of these is that the acoustics of the room in which the listener hears the reproduction are superimposed on the acoustics of the studio. This difficulty could be overcome by listening in acoustically dead rooms, but it is hardly practicable for listeners to 'drape' their living-rooms to make such rooms acoustically innocuous. The only way to diminish this unreality in the reproduction (due to the acoustics of the room where the sound is heard being superimposed on those where the sound is made), is to falsify or fake the response of the loudspeaker. This faking takes the form of making the loudspeaker give an increasing response as the sound components it reproduces are of higher frequency. This is the only case where deliberate imperfections in a link in the reproducing chain can be justified.

The second unsolved problem is that the sound from an orchestra itself comes to a member of the concert hall audience from different parts of a wide stage, but the sound from a loudspeaker comes from one point. This unreality could, some people contend, be done away with by using two microphones spaced apart in front of the orchestra, each microphone being connected through a separate channel to two separate loudspeakers spaced apart in front of the listener. This is called 'Stereophonic Reproduction'. As wavelengths are already very scarce, the method is impracticable. Here is another problem waiting to be solved by the provision of more channels.

It may well be wondered why, after all this wonderful, extensive and acute work has been done, the average set sounds like something being angry in a bathroom. The reason is that only a very expensive receiver can do justice to transmission and then only when the signals are very strong indeed. The insulting snarl that jumps out of the average little box is a good illustration of the failure of responsible authorities to evolve the service with an idea of what it is really about. Naturally people will not pay a lot of money to get even a

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perfect reproduction of a hotchpotch of items from a local station, few of which have much interest. The most expensive sets tuned to a foreign station cannot do the transmission justice; if the tone control is turned to give full brightness to the reproduction the loudspeaker gives out a noise like contemptuous spitting; if, to get rid of these unpleasant accompaniments, the tone control is turned to 'mellow', the resulting noise resembles a cow in pain. All this is no fault of the receiver, it is because the channels or wavelengths on which the stations work are much too close together. The plans of the International Union were compromise plans; the demand for quantity forced technicians to neglect quality. In other words the channels were squeezed too close together. This allows some of the signals to overflow from one channel into the next. To get rid of the overflow from a neighbouring channel, receiver response has to be narrowed so that it only takes in a part of the transmission it is picking up; the boomy part. Of course a local station is so strong that it repels the invasion of its channel by foreign stations. It shouts down the interference. If the wavelength plans had been allowed to be made by technicians, foreign station reception would have been good. As it is the discriminating listener who wants pleasant sound is forced to listen to the local national station.

So people get a wireless mainly for the sake of 'the news and the jokes', they quite naturally refuse to pay a lot of money for something which gives so little real entertainment. Moreover high fidelity sets are huge affairs which cumber up the small rooms in which most of us have to live. Hence the popularity of the bijou set; 'sweet', I must say, in all but its tone.

I suppose one could justly sum up the subject by saying that it costs too much money to get high fidelity reproduction and even if one has the money there is no real choice of entertainment, only the local programme can be faithfully reproduced. The authorities are quite satisfied about it if you are.

CHAPTER VII

THE REGIONAL SCHEME

'I WAS allowed a confidential look at your obituary the other day,' said a friend.

'What did it say? Did it do me justice?' I asked eagerly.

My friend giggled.

'Could it, my dear Peter? Wouldn't it require a whole edition of the paper to do that?'

'No! Certainly not,' I replied. 'I want quality, not quantity. Something like "He had ideas, we blocked them", don't you know?'

'They gave you full credit for the Regional scheme anyhow,' he told me.

'Oh, they did, did they? I hope they said I designed the scheme technically and the B.B.C. used it stupidly.'

From what my friend told me I gathered that the contemporary obituary writer was not so certain, as was the future corpse, that the Regional scheme has never been used by the B.B.C. as its originator intended.

If I get fame it is for the simplest things. Things like saying 'Don't do it' to listeners who made their receivers oscillate — or thinking of the Regional scheme. Very few took any notice of my analysis of distortions caused by asymmetrical treatment of side-band components which took me two years to work out. The conception of the Regional scheme came to me in two minutes because it was a logical development of a clearly seen policy. I had tried to arrange the transmission service so that the reproduced sound was free from interference and a faithful copy of the original and could be picked up on cheap and simple receivers. This was done, but for only one programme. Now my ambition was to give listeners a choice of programmes which could be equally clearly heard and likewise picked up on simple sets. The Regional scheme was a step on the way to an ideal scheme

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whereby all listeners could get any one of a multitude of clearly heard and faithfully reproduced programmes, each programme being of a different type.

Owing to the wavelength shortage I was only able to arrange for two instead of a multitude of programmes. But two I thought were at any rate better than one; it at least offered an alternative. The wavelength scarcity was not likely to be overcome; indeed from all that was going on in the International Union it seemed likely to get worse. We had used twenty wavelengths in the old one programme system, now it looked as though we could not expect to keep more than ten for our exclusive use in the future.

I got the idea of the Regional scheme in about 1924. The first permanent London station was completed in 1929. The five intervening years were spent in overcoming every conceivable opposition. Setting aside of course my own staff, who were just as keen as I was to get the scheme going, Sir John Reith was the only person who gave us consistent support. If he had not we should never have got our way.

Some people, senior people in the B.B.C., said they 'didn't see why listeners wanted alternative programmes at all'. This attitude was typified by one who 'didn't see why' we should broadcast on Saturday afternoons. 'People ought to be out on the river,' he said. No doubt at that rate we should not have broadcast on Sundays because people ought to be in church, or after nine-thirty because people ought to be in bed, or in working hours because people ought to be working. Even seven to eight broadcasting would seem to be wasted because 'people' would be changing for dinner.

A less frivolous opposition came from those who said that the introduction of the scheme would cause 'dislocation'. This meant that receivers would have to be altered to take account of the new location, increased power and rearrangement of the new Regional scheme transmitters. The receivers of those days were mostly crude affairs adjusted painstakingly to fit in with local conditions of transmission. Any change of conditions would make a great many readjustments necessary.

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The Regional scheme involved scrapping practically all the existing one programme transmitters. It could only use ten wavelengths instead of twenty, and therefore to make up for the loss of stations, the new ones had to be of much higher power. Being of much higher power the new transmitters would have to be located in the open country so as not to swamp too many receivers with overwhelmingly strong signals. Thus we would have to close down the stations which had been working at sites plumb in the middle of a number of towns and cities and substitute their service from fewer high power transmitters some way away, but not too far away, from the densely populated areas. Signals at places close to the old transmitters would still be adequate under the new scheme, but they would be much weaker. Signals at other places some distance from the old transmitters but nearer the new would be vastly increased by the change over. This would be the cause of 'dislocation' and, according to my critics, would damn the scheme.

To-day's listener may have forgotten or have never known how crude sets were in the early days of broadcasting. Instead of a shiny box and an illuminated scale, 'old Bill's' receiver of 1924 was typically a cigar box haphazardly attached to a jangle of earphones. Its back garden aerial was indifferently a clothes line or a collector of wireless waves. With a super signal from a transmitter in the same town something faintly resembling a receiver could get something faintly resembling a programme.

Then there was Mr. Ingenious who had a vast collection of valves, coils and condensers which he knit together in more sensitive combinations to pull in more raucous noises night by night from more distant foreign stations.

When the new service was instituted old Bill's cigar box receiver would go dumbly silent on him while Mr. Ingenious' contraption would rise gently from the table and sink back dead from a surfeit of signal. Both Bill and Ingenious would bitterly complain.

Nor was this all. The basis of the Regional scheme was to give two programmes. The best way to do this was to locate two high power transmitters side by side at the same site or transmitting centre.

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So the complicated set, designed for air fishing, would find escape from super signals doubly difficult, and the crude set, if it got anything at all might get both programmes at once. It might not be selective enough to separate the two.

My reply to all these criticisms was that if we had to wait until everybody gave up using old junk and expensive toys before we could institute any new schemes we might just as well never make any changes at all. Transmission, I said, is to reception what environment is in the evolution of species. When a climate gets colder naked little beasts grow fur; when signals get weaker insensitive little sets will grow valves. Surely listeners would want an improved service, so they would naturally improve their sets to get it.

My critics were unconvinced but we pushed ahead nevertheless. In 1924 we only had a paper scheme based on very rough calculations. This was modified to take ten wavelengths and used two at each of five transmission centres. These centres were to be based on different Regions of the British Isles so that in combination, and with their much higher power, the transmitters would spread their dual programme over all the territory to be served. The Regions chosen were (1) London and the home counties, (2) Birmingham and the Midlands, (3) the industrial north of England, (4) Scotland, and (5) West of England and Wales. By 'synchronising' certain wavelengths and transmitting the same (National) programme at each of the Regional centres, we had some surplus waves out of the ten to cover Belfast, and the north-east coast (Newcastle upon Tyne) from single wave transmitters.

But this was a paper plan. After only very limited experience we had no way to calculate the rate at which the strength of waves would die away. This we knew depended on their length and the type of ground over which they travelled. But what was the relationship? It had been shown in theory that using aerials as high as half the length of the wave they radiated gave an increased efficiency. But was there any practical snag? I had an idea that a lot of transmitters could work on the same wavelength and still have a sufficiently large area of good service around them provided they sent out the

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same programme. This would work in well with the Regional scheme because one of the transmitters at every transmission centre would be sending out the same hotchpotch National programme. The Regional wavelength would be used for a special programme alternative to that to which listeners had become accustomed. No one agreed with me that we could share a wavelength in this way, and I could only prove myself right by experimenting. We wondered furthermore if we could handle the increased power; it would mean using water-cooled valves which were tricky things and got trickier as the currents they had to handle were of higher frequency.

I was allowed to expand our research department so that we could make the necessary experiments. Kirke, lately come from Writtle, was put in charge, and under his able and often inspired guidance we gradually solved our problems.

It was essential first to find out how rapidly the strength of the waves died away or as it is called 'attenuated'. T. L. Eckersley gave me information which enabled me to get out theoretical curves of attenuation. These curves had to be checked by experiment. To this end we bought a special kind of receiver called a 'field strength measurer', which measured the intensity of any signal. It was mounted in a van so that we could take it from place to place and measure the strength of transmitted waves at different distances from their source. The 'field strength' van travelled hundreds of thousands of miles and gave us tens of thousands of readings.

I remember a tour which I took to check my theory that waves die away more quickly as they pass over mountains and hills than when their path lies over water or flat pastoral plains. We measured on the Daventry long wave transmitter. Our tour started in Derbyshire and went along the Pennine range to the borders of Scotland. Turning east to Edinburgh I began to see a confirmation of my theory. As we circled back by the flat lands it was abundantly proved. We had seen some memorable country and had done some memorable work. It was all very satisfactory.

On the Pennine Moors we tested another theory about the possibility of two stations sharing the same wavelength. The Bradford

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and Sheffield relay station transmitters were chosen for the experiment. The work had to be done after midnight when the normal service ceased. At the end of a hard night's work, as I saw the dawn coming over the hills, I had convinced myself, but no one else, that the scheme only wanted some adaptation to make it successful.

Another experiment was done to find out what extra radiation we might expect by using taller aerials. A kite balloon, such as we now call a barrage balloon, was lent to us by the military authorities and we suspended a vertical wire from it to use as an aerial. Besides measuring the signals sent out from the kite balloon aerial, we wanted to know the distribution of current flowing up it. Instruments were therefore connected in the wire at varying heights from the ground. Some were so high they had to be read through a telescope. They twisted and bobbed about so much that we were sorely tempted to guess the readings. But we resisted and were able finally to confirm some theoretical work published by Stuart Ballantyne in America. We therefore decided to use these 'half wave' aerials.

When this experimental and theoretical work was completed, or near enough, we knew how fast waves attenuated as they passed over ground of different natures, we knew what restrictions to expect when two stations shared the same channel and we could calculate the efficiency of aerials. We next had to find out whether a high power station could be made to work efficiently and reliably.

After a lot of argument with the Post Office we were given permission to set up an experimental station typical of those we planned to build at the Regional centres. As we already had one long wave transmitter at Daventry, which was the only one in the old scheme we decided to keep in service, the addition of this second transmitter (medium wave) gave us the conditions of a dual wave sending station. So we chose to do an experiment at Daventry. It was made clear to us by the Post Office that no consent to go ahead with the whole scheme was implied by the permission to set up this experiment.

'Daventry Experimental' gave us a lot of trouble and therefore a lot of knowledge; the two usually go together. We built a new house for the new transmitter, a few hundred yards away from the long wave

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transmitter buildings. Not wishing to spend a lot of money we bought two very old masts from the Marconi Company. These had been standing for years at Poldhu. They were taken to bits in Cornwall and assembled again at Daventry. A Mr. Trost was put in charge of the work. It must have been a heartbreaking job because all the component parts of the masts, quarter sections of iron tube, had been twisted by age and strain and refused to go together properly. Our gentle Trost felt unnecessarily ashamed of the asymmetrical spirals which materialized. As a result of lying on his back in wet grass gazing at the crooked masts, trying to straighten them out, he got pneumonia and, to everyone's sorrow, died.

When eventually we had cured the troubles in the transmitter and when fifty thousand watts were obediently working, we got permission to put the station into public service. This would give us not only technical information but experience of public reactions to the new dual wave service. Birmingham was the chief place likely to be affected by the change-over. Ever since broadcasting had started the inhabitants of Birmingham had got their service from a local low-power transmitter installed in the centre of the city. We proposed to shut down this local station and substitute the service given by Daventry Experimental.

We knew, from measurements, that the new station would give perfectly adequate signals in Birmingham, albeit weaker than those the Birmingham people were accustomed to receive, and so we knew that while there would be plenty of complaint it would not be justified. But unjustified or not the volume might be embarrassing. Indeed it might be so great as to prejudice the whole scheme. So 'changing over' was a crucial test of the problem of 'dislocation'. Would listeners willingly adapt their receivers to the new conditions or would they just howl to get back the super signal they were accustomed to receive?

On the night the change-over was to be made, I went to Birmingham to explain over the air what was being done and what listeners should do to adapt their sets to the new conditions. My friend, Robert Best, who lives in Birmingham, listened to me on his simple

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crystal set, adapted to the old conditions. The first part of my speech was carried by the old local station, the last part by the substituted Daventry experimental transmitter. Robert said afterwards that as my speech proceeded his anticipation of the benefits to come kindled an expectant enthusiasm. It was therefore, he explained, a little disappointing to hear absolutely nothing when the change-over was made. Robert was my friend, he knew and trusted me, and thought it unlikely that I was executing a gigantic hoax. His fellow-citizens were far less tolerant. Letters of protest appeared in the local press. At the height of a campaign for the restoration of the old service a clergyman wrote to *The Times* on behalf of the poor of his parish who heard nothing and could not, he alleged, afford to buy new sets. We demonstrated a cheap set which picked up Daventry perfectly well in Birmingham. Sir John Reith gave me unreserved support. Once Sir John had made up his mind to back you he never let you down. I wish there were more like him. Complaints gradually became fewer until they died away completely. We could thus cite a contented Birmingham as the justification of the Regional scheme and the chi-kying of the critics became less violent. But it had been 'a damned close run thing' as Wellington said of Waterloo.

After this experience of public reaction we took steps to forestall criticism on future change-overs. Rolls Wynn, then head of the Engineering Correspondence Section, prepared a series of pamphlets dealing with every expected complaint and question. It was planned that, in any future change-over, every letter would be answered by posting back the relevant pamphlet or pamphlets. It worked admirably.

As half a million pounds had to be spent building the stations, and because obviously the administrative side of the Corporation knew very little about the technical side of broadcasting, Sir John thought it advisable to appoint an independent technical committee to examine my proposals. Dr. Eccles was appointed chairman of the committee and was assisted by Professors Appleton and Turner, of London and Cambridge Universities respectively. They sanctioned the scheme virtually without modification.

But the Post Office withheld its sanction because the 1927 World

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Wireless Conference was yet to be held. The bureaucratic outlook saw that the High Contracting Parties, the Sovereign States, had not officially recognized the right of broadcasting stations to use the wavelengths they were actually using. Until they did it seemed to the Post Office wrong to use these wavelengths for a permanent scheme; the implication was that the World Wireless Conference might say that, on consideration, broadcasting stations must use some other waves. If they did say this it would only make about three hundred million pounds worth of receiving apparatus useless; I hardly thought the bureaucrats would be as silly as that. The Post Office thought otherwise. I mean it preferred to wait and see. We waited and saw red.

It may seem as if I lose no opportunity to criticize the Post Office. I am trying to tell my story simply and truthfully. The responsible people in the Post Office were upholding a system. They did so ably and thoroughly, without personal prejudice. The nicest letter I got when I left the B.B.C. was from one who, in his official capacity, blocked and criticized every idea I put forward. Any criticism implied or stated in this book is directed against the results of a system. Critical examination of proposals and new ideas is fundamentally necessary, but when a civil servant takes up the attitude that he has failed in his duty if anything gets done then there is little virtue in the system he represents.

The habit of criticism, the desire to be thorough, results too often in too much discussion and too little action. The Regional scheme was better planned and better executed because of outside criticism. But 'a good thing' can be preserved so long that it goes bad.

I heard an Englishman say to an American, 'We can't understand the way you Americans jump about so much.'

'Well,' said the American, 'we may jump but we get a better view,' which is another way of saying that if one never makes mistakes one never makes anything.

However, we eventually did get our permission. In face of the success at Birmingham, the Eccles Committee report and, at long last, the inevitable favourable decision of the Washington World Wireless

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Conference, the Post Office had to give in. I remember the letter of sanction coming down to me from Sir John's office with his friendly note: 'This will please you'. It did. We could start construction at last.

The first Regional transmitting station was set up at Brookmans Park, fifteen miles to the north of London. I was very keen to have a building which expressed the spirit of our enterprise. A high-power wireless station is such a lovely thing. The process is silent, there is no gas or smell or fussy reciprocation, no sound except a purposeful humming. One is conscious of power contained and controlled. I felt that the building should be fitting to performance.

I was equally disappointed by sketches of architectural designs based, so it seemed, on the 'Boy's Own Building Set in Seventeen Pieces' and others too functional to be beautiful. At last Mr. Guthrie, an understanding architect, disciplined some indicative lines I drew at a lunch on the back of a menu. These lines were inspired by someone outside the B.B.C. who sympathized with my desire to put the station in a fitting framework. The completed building, a composition of big windows framed in Portland stone and a rather pompous entrance, is good, but it fell short of our imaginings. We resisted the temptation to carve a motto on its wide front though I had one apt for the purpose saying 'It is more blessed to send than to receive'. In any case it might have been difficult to translate into Latin.

Too late I was given a sketch for a building I thought almost perfect. My staff did not. It was certainly unconventional and I expect that is why some thought it ugly. My concentration on the aesthetic issues in an engineering scheme was a source of tolerant mirth among B.B.C. technicians. One of the engineers called it 'art nonsense'. I felt when the station was built that the main transmitter hall at any rate justified my childish preoccupation with appearance as well as performance. The decoration scheme was conceived by the same person who had helped over the architectural features. She had chosen a scheme of red, grey and white, because the engine room floor was inevitably red and the engines traditionally grey. The transmitter hall was about sixty feet long and well proportioned. The transmitters, one on one

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side, the other on the other, stood on red composition flooring running down the two longer sides of the room. Between them a wooden floor, planked like a ship's deck, ran up to a switchboard alive with coloured lights. The great flanking windows poured light against the walls of whitewashed brick.

The building stands on a tray of grass, looped to the entrance gates by an asphalt road. I wanted a hairpin road so that the public could walk or drive round the building and see, through the windows, the care and skill that goes to the building and running of a modern broadcasting station. The B.B.C. said, 'NO'. As I was leaving I did not press the point. Theirs is the attitude of monastic seclusion. It is opposed to that taken up by the Americans, who want to show and to share. In New York they let you see into their studios and control rooms: anyone can buy a ticket for a tour of their headquarters. I have always thought the idea good.

I thought too that it would be a good idea if the engineers could wear some kind of uniform. I do not mean a battledress and a peaked cap: a white coat, perhaps, or a blue serge coat and flannel trousers. I thought the general effect was spoiled by an engineer in plus-fours, waistcoat and shirt sleeves, drinking tea out of a thick white cup balanced on the edge of an aluminium control table. But the implications of my idea (which actually was purely aesthetic) were looked upon with great suspicion. This was art nonsense carried to unwarrantable extremes. Even my plea that I had seen technicians all over Europe and in America serving their machinery in a white coat made no impression. What foreigners do is their business, not ours. I am afraid the engineers thought I was going authoritarian when all I wanted was a harmony in the appearance of the station.

The London station was only just completed when I had to leave the B.B.C. Almost my last act in planning further transmission centres was to pace out a site on a wind-swept plateau high up on the Pennine hills where we intended to build the station to serve the industrial north of England. We were a little frightened that in such an unsheltered spot the buildings and masts would be too exposed to the weather. Since the station has been in service the winds have at times

been brutal and once brought the aerials tumbling to earth. Lightning has struck the masts, blizzards have isolated the staff, windows have been blown in, but — pause for the roll of the drums — the service has gone on.

All this technical planning and construction was the means to carry out an idea. The idea was to give listeners a choice of programmes. Long before the stations were built, before even Daventry became a twin-wave sender, we had long discussions about how we should use the new facilities. Some suggested that the contrast between the programmes should be that of highbrow and lowbrow. Others thought that whenever talk was sent on one wavelength, music should be radiated on the other. The educational people wanted to use Daventry long wave as a 'Minerva station' to be devoted exclusively to schools and adult education talks. It was difficult to define highbrow and lowbrow, the words meant different things to different people. They meant nothing to me. It was a waste of good wavelength, thought those who wanted more space for Music or Variety or Drama, to fill it exclusively with talk. I firmly refused to allow Daventry, on which a large number of people depended for their alternative service, to be used for a specialized service.

In the end we decided to call it a Regional scheme because the additional programme was to be typical of the taste and culture of the Region it served. Listeners had become accustomed to the national programme which, with its varied and constantly changing items was supposed 'to please most of the people most of the time'. The Regional programme would be a contrast to this.

The idea was good, but it presupposed that Regional directors would be appointed who had taste and culture and that there was taste and culture in the Regions. As the idea was never put into practice it is impossible to know if the presuppositions are justified or not. But, if the scheme had been tried, the old style hotchpotch programme, to which listeners had become accustomed, would have persisted and the new channel could have been used for all sorts of fun. The Regional scheme gave full scope for enthusiastic and non-conforming programme directors to use their new wavelength experimentally.

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What did happen is an excellent illustration of the administrative mind interpreting a cultural idea. In practice the extra channel has been used as an overflow of accumulated 'hotchpotch' material rather than an outlet for new ideas. The extra wavelength is an administrative convenience, not an extra facility to expand the scope of the service. It might have been thought that the two programmes would always be different both in items and inspiration. Not only have they, in to-day's practice, the same inspiration but often the two wavelengths both carry the same items. Certain programmes are apparently so sacrosanct that they cannot exist in the presence of an alternative. Examples of these 'not-to-be-missed' items are the current prices of fat stock, religious broadcasts, pronouncement by 'important' figures, and unexceptional music described as 'light', to distinguish it one supposes from good. It is difficult to find the operative word that gives a common characteristic to all these items. Important? only if a pronouncement is as weighty as the fat stock. Serious? The music is light. Interesting? My foot!

It is clear that this transmitting of the same programme on both wavelengths is more than anything an easy way out of organizational difficulties. The fat stock prices are a part of 'the news'. If half of one per cent of listeners found it more difficult to get the news on one wavelength than the other there might be complaints. So the news and the fat stock prices are sent out simultaneously. Avoid criticism, always evade an issue. Again, it would have just that flavour of disrespect if one wavelength played anything seemingly frivolous or gay while the other carried the voice of authority. Questions might be asked. The fact that a question can be asked, apart from any idea whether it can be answered, seems all important to the administrative mind.

Then there is the economic point. On a weekday afternoon the audience is 'quite satisfied' with some nice light music. Why pay for two programmes when one is quite good enough? In the same way a restaurant manager might say:

'Everyone is hungry about one o'clock, they only want food, so why offer them anything except "Meat and two Veg." and a steamed pudding to follow?'

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Why indeed do anything unnecessary like offering people variety and amusement when they are quite glad to be drugged into insensibility (on both wavelengths).

I was so unhappy about the official attitude to the Regional scheme that I sneaked the Regional Directors together at one of their periodic Head Office conferences and tried to make them revolt. I wanted a 'Declaration of Independence': I wanted them to say to Head Office:

'Give us the money and we will do the rest. Hang your continued interference, give us a broad policy and trust us that, within a loose framework, we will make interesting and individual programmes.'

But I was being disloyal; disloyal that is to the B.B.C., loyal to my idea. It is just one of those questions; when is loyalty most loyal? I was reprimanded for having wrong ideas about loyalty anyway. My action came from enthusiasm. I wanted to see the scheme I had designed intelligently used.

Indeed my disappointment prompted me to make the revolutionary suggestion that commercial broadcasting should be made the alternative to national broadcasting. I shall have something to say about commercial broadcasting in the next chapter. I believe an unprejudiced view would see that there is a lot to recommend it. It is in any case an excellent alternative to national broadcasting, because it is inspired by quite different ideas. Unless Regional Directors are both competent and free they inevitably produce programmes of the same general character as those made by their counterparts in Head Office. The contrast of motive in commercial broadcasting ensures a contrasted programme. English and French cooking produce dishes made from the same ingredients, but, even if the ingredients are the same, they taste very different according to the different styles of cooking. So a true contrast, because a contrast of style, exists between a B.B.C. and a commercial programme.

My suggestion was politely and even sympathetically discussed, but obviously there was no intention of adopting it. I am glad it was not adopted. The Regional scheme should be used by the B.B.C. for B.B.C. programmes, but it ought to be used to give programmes which are truly alternative. Commercial broadcasting services can be given

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from continental stations and, when wire broadcasting is instituted, on some of the many extra channels wire broadcasting provides.

This question of contrast makes me reiterate that if Regional directors were given more scope they might give listeners the contrasts between one individual's interpretation of broadcasting and another's. This is not a theoretical idea. In the early days we had an example of individualistic interpretation of broadcasting. Major A. Corbett Smith was appointed as Station Director of Cardiff. He 'took a line'. Those who thought his programmes good thought them very good, and those who thought them bad thought them horrid. This shows that the programmes were individual, a 'something' rather than a compromise. Complaints, of course, came to Head Office. It was impossible to reply to them, as we might under the Regional scheme, saying 'If you don't like the Regional, listen to the National'. Complaints are, in the B.B.C.'s eyes, more important than praise, and so Corbett Smith was asked to come to Head Office, where he would have 'more scope'. The scope offered was, in fact, curiously limited, so he left. As a Regional Director, with a national alternative programme to justify his experiments, he would have been excellent. I expect just the same he would have come up to Head Office on his way out of the service.

The Regional scheme embodied an idea and is used as a convenience. It was meant to be a technical means to give alternative outlets for alternative programmes. It is used as a double outlet for virtually the same material. My chapter on 'A Possible Future' suggests how the alternative programme system could be better used. As the one who conceived the idea I cannot help feeling disappointed that it has never been applied. But it was fun making it work technically. We travelled hopefully *and* we arrived.

CHAPTER VIII

BROADCASTING FOR PROFIT

I FIRST went to America in the autumn of 1924. I went to America chiefly to go to America, but ostensibly to persuade the American broadcasting organizations to join or affiliate themselves in some way with the European Union of Broadcasters. I did not feel particularly sanguine about my mission; it was not long since the Americans had cut themselves off from the League of Nations, but everyone thought it would be a good idea if the British and the American broadcasting organizations could get to know one another better.

I 'fell for America' during that first visit. I have never ceased, after many others, to be captivated by its energy and enthusiasm. 'Let's go,' say the Americans; 'Go,' say the Dictatorship countries. 'Mind you stay here,' say the English.

Two outstanding incidents bracketed my visit; the first, on landing, receiving the courtesy of the Port of New York, the second, just before returning, 'talking on the air'. The sight of millionaires, harassed by customs officials while I was bowed out without formalities, proved that the dollar, if almighty, is not all-powerful, while the response to my broadcast talk showed that Americans, if opinionated, could accept forthright criticism.

The American system of broadcasting was, and is, quite different from ours. In Britain the money necessary to run the stations and provide the programmes is given by the listener to the State and, some of it, by the State to a national authority which is charged to do broadcasting 'to the satisfaction of the Postmaster-General'. The American listener does not pay for a licence, he gets a free service of programmes because a proportion of these is provided by manufacturers of proprietary articles. This apparent generosity is rewarded by larger sales and larger profits for those who pay for air publicity. The

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American system is one therefore in which the owners of radio stations sell 'time on the air', just as the owners of newspapers and magazines sell 'space on the page' to advertisers.

Advertisers are always looking for ideas. They attract a reader's attention by a picture of a pretty girl, they leave a message of hope in serial drawings pointing the proprietary way to social success, or they try to 'catch a humorous fancy' with 'a snappy slogan' as a 'practitioner in advertising' expressed it to me. Similarly, the radio advertiser tries to make popular programmes to focus an audience's grateful attention upon the 'courtesy' (and the name) of the firm which provides the amusement.

When I first went to America in 1924 their broadcasting was in its early stages, and while much of its modern practice had not yet been adopted, it was based, then as now, on a commercial system. Mr. Reith had worked in America after he was wounded in the war and so he was able to give me a great many useful introductions. I visited the great Bell Laboratories, the Mecca of communication engineers, I saw the practice of advertisement broadcasting in the National Broadcasting Company's studios, and I heard varied and informed opinions from politicians, sociologists, technicians and business men about the merits and disadvantages of advertisement broadcasting. I was fortunate in this, as in other visits, in having the almost continuous company and hospitality of Doctor A. N. Goldsmith, whose wide range of information and incisive comment gave me a clear appreciation of the salient points, esoteric and general, of the American scene.

I am not quite sure that my impressions of how American broadcasting started are perfectly accurate, but, so far as I know, it was, just as in Britain, due to the initiative of a technician, Mr. Conrad, an engineer in the service of the Westinghouse Company of Pittsburg, Pa. Mr. Conrad set up, in 1919, first on his own account and then in co-operation with his company, a wireless telephone transmitter and so stimulated public interest in wireless telephony. It did not take publicity minded and technically ingenious America long to see the potentialities of commercial radio broadcasting. Once it was proved to be so easy to 'tell the world', and obvious that the world rather

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enjoyed being told, manufacturers, religious societies, garages, chain stores, prophets, and so forth invested recklessly in the necessary radio transmitters. Vantage points in every city, from the roofs of the skyscrapers to vacant lots, became decorated with transmitting aerials, while listeners could not be supplied fast enough with receiving sets. The Federal Department of Posts and Telegraphs had no power to prevent stations multiplying: they could only limit the band of wavelengths within which the broadcasting service had to be contained. This merely increased the confusion. The citizens of a free country are free to make a mess of things and, in this matter of the beginnings of broadcasting, a mess they certainly made. But clearing up a mess and making order from the things muddled up is better than having nothing, not even a mess, from which to make order.

I spent the last night before my arrival in hectic parties on board ship. My first morning impressions of New York were as stimulating as they were tiring. That same afternoon I went to Washington and found my bed at last in an hotel very late at night. I could not sleep. Maybe I was overtired or the hotel room, though super-comfortable and full of lovely gadgets, was too warm for English habits. Or maybe the club sandwiches I had eaten and the mass of facts I had been given in Mr. Sarnoff's suite downstairs were equally indigestible. Mr. Sarnoff, then a senior official and now head of the Radio Corporation of America, had told me that no American listener need buy a licence to listen, nor were there as many restrictions on American as on British broadcasting. He seemed to imply that the American free service was due to the philanthropy of American advertisers.

He explained that the Convention which I was to address the next morning was convened by the Ministry of Commerce (Secretary, Herbert Hoover), in order to see if some arrangements could not be made to limit the number of stations and prevent mutual interference. Already in America, as in Europe, broadcasting facility had to be limited and controlled because the demands for wavelengths exceeded their possible supply. But the control had to be voluntary; it could not be imposed. In spite of the fact that America was one country its people were so free that they were able to refuse the domination of a

federal broadcasting authority. The situation was therefore much the same as in Europe where each nation was 'free' to refuse the rulings of the international union.

Mr. Sarnoff explained to me that there was another aspect of the matter not analogous to the European situation. The Convention was representative of two groups which might be called the 'small men' and the 'big men'. The small men represented small companies, societies and the like, which had bought transmitters to advertise their goods and ideas. The big men represented expert radio companies. The latter wanted to set up properly planned high-power broadcasting systems having a nation-wide coverage and programmes representing more culture and less commerce. The small men said that 'the financial octopus was trying to wrap its greedy tentacles round the succulent sources of money'. The big men said that the 'ignoramuses' were blocking channels which ought to be used for 'real public service'. I was naturally in favour of a technical scheme planned on a nation-wide basis. I realized that Mr. Sarnoff was quite convinced of the purity of his company's financial motives. Having heard that there were powerful anti-trust laws in America, I felt that the public was certain to be protected from predatory finance. Of course, later on, Mr. Sarnoff became head of the Radio Corporation of America, hence the National Broadcasting Company of America, one of the big broadcasting chains which now exercise so great an influence. Doubtless his success at this convention, which I came to appreciate more the longer I stayed in Washington, was but a small step in his steady progress towards a clearly seen goal.

While I was eating my sandwich I had asked Mr. Sarnoff what I was expected to do at the Convention beyond just making a speech. I gathered that to be allowed to do even this was a great privilege. Mr. Hoover would be in the chair, and the whole business must be treated seriously. I asked if this convention were typically American. On being assured that it was, I said I didn't see why then it was assumed that it had no sense of humour. Mr. Sarnoff said that the delegates, if a bit angry at times, were real 'good boys' at heart, but that Mr. Hoover never laughed. I had a side bet that I would make

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Mr. Hoover laugh during my speech. It seemed, lying sleeplessly in this strange hotel room, that it was rather a silly bet.

I woke up to a skyscraper view over a blazing patchwork of autumn forest. Stimulated by an American breakfast I felt in no mood to make my speech unnecessarily pompous. When it was finished I stepped off the platform into a welcoming applause and some lifelong friendships. I also had the happy impression of Mr. Hoover's genuine laughter. Mr. Sarnoff generously settled his bet by taking me to see the final of the 'World's Series', a baseball game between Washington and New York. I spent an afternoon sweating ankle deep in peanut shells and 'rooting' for Washington. As the game was prolonged to a wildly exciting finish its intricacies became more comprehensible; indeed, as the time passed, I became less and less astonished when the pretty girl beside me stood up and shrieked like a banshee. We became firm friends and I bought her a hot dog. She was about seventeen and alone. I wonder if, as a staid mother, she still stands among a frantic crowd, slashed by the sunshine, and roots for Washington.

I wonder too if it is American enthusiasm which makes their broadcasting programmes so vital, or if the advertisement system, applied anywhere, would release those same forces, considered by the English hardly respectable.

'That,' said Mr. Davis, an executive of the Radio Corporation of America, 'insults a man's intelligence.'

We were sitting before an elaborate radio in his hotel room in Washington and an apocryphal memory records a penetrating voice saying:

'Ladies and Gentlemen, we now come to a snappy quarter of an hour's entertainment brought to you by the courtesy of X's Baby Soap Incorporated. Have you a baby? Oh, baby, have you our soap?'

'Is this insult endured because possibly Americans have no intelligence?' I asked.

'No,' said Mr. Davis. 'It's because we know that we, like everyone else, have to pay for everything: listening to that blurb about the soap is our payment for a programme which, whatever else it is, you will find pretty good of its kind. Now I have been to England. I know your

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B.B.C. is very young, but it seemed to me you too are paying something. You are paying the heavy price of having old heads on young shoulders. You're so damned pompous. We're darned vulgar, if you like, but I think we get a better programme.'

Although I was everywhere impressed by the vitality of American programmes, I was at that time convinced that the system was wrong. It may be that my views were more a product of loyalty to the B.B.C. than of a detached judgment.

'You have no Symphony Concerts and Operas, such as we have, it's all Baby Soap,' I said.

Round went the dials and I was able to hear a symphony orchestra 'sponsored' by commerce.

'Politics?' I asked.

'Well, we more or less let anyone speak, which is more than you do,' was the reply.

It was not so easy to lay one's finger on just what was wrong.

Mr. Hoover was kind enough to spare an hour or so to discuss these questions with me. He said that, as a supporter of free institutions, he felt that it was better, right from the start, to have freedom and chaos until ways and means were found to get rid of the one without eliminating too much of the other. He admitted that the cultural side of broadcasting might seem to be neglected by a system which was sponsored by commerce. But American business men, he said, were idealistic. In time he was sure that a cultural phase would develop. The fact that the money came from business would be neither here nor there: it was the tradition of American money to sponsor cultural activities.

'But,' I replied, 'there is always a boss; the boss here is money in private hands. With us it is the "Elected Representatives of the People".'

Mr. Hoover smiled. I was very innocent and he was a politician. Mr. Hoover must have been something of an idealist as well as a politician, because, our talk drifting into generalities, he told me how America was living more and more in the future and how if some realist were to examine the economic situation factually there might be an almighty crash. That was in 1924 and I have since wondered

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why so accurate a forecaster got caught in the storm which he predicted.

Before I left for England I was interviewed over the radio. I was told that 'America was always glad to know about happenings in Britain' and was 'mighty interested in your funny radio'. I did not hesitate to try to uphold our monopoly system of broadcasting as vigorously as I could. Towards the end of the interview my interlocutor said that my audience must realize by now that I was 'a pretty good citizen' and would I tell them just what I thought of the United States of America?

'Well,' I said, 'this is my first visit but it seems to me, from looking and listening, that everything in America is the biggest in the world and everything in Europe's the best.'

This was not very polite and so I went on to explain that forthright speaking was the basis of friendship and a lot more about quantity and quality. I was headlined in the newspapers. 'British Engineer Says America Worships Quantity Rather Than Quality. Quality Is Better But Not Appreciated. Leaving On Tuesday On S.S. *Mauretania* For England. Views Of Leading American Broadcaster On British System'. Four thousand people wrote to me. Four thousand letters make a big pile. I could not read them all, but those I did intensified my liking for America and the Americans: here were nice people who were more interested, than insulted by a criticism. Some of the letters, however, were very pungent.

At Plymouth I was met by a journalist who scooped the story of my impressions of American broadcasting.

'America,' I summed up, 'has nothing to teach us about our own problems.'

The headlines said: 'Eckersley's Visit To U.S.A. America Has Nothing 'To Teach Us'. I have seldom taken the trouble to prepare statements for the Press but this incident showed me why people in important positions make it their invariable rule to pass the copy before it is published. I had a bad time explaining to my American friends what had happened. But this was the only occasion when I had real reason to complain of the Press. All the time I was in the B.B.C. and when I was therefore 'news', I was treated with great consideration

by reporters. Those who sneer at the Press for its 'Paul Pry' vulgarities should rather decry a system which forces journalists to do things they dislike than criticize the men themselves.

In spite, or perhaps because of my visit, I still upheld the superiority of the B.B.C. system. I did my best with arguments which I now believe to have been as fallacious as they were cheap. That is to say I laughed at the incongruities of soap and symphony instead of explaining the superiority of the B.B.C.'s detachment. Maybe I was getting a bit shaky about the latter. Anyone can sneer at the advertisement slogan, few people take the trouble to examine the spirit and content of the programmes which fill up so much more time than the 'advertisement blurb'. I returned to America again and again, both before and after I left the B.B.C. Incidents illustrating the evolution of their broadcasting from the chaotic days of my first visit to the comparatively ordered system which now holds the American air, are telescoped into a confusion which cannot be readily disentangled. At least it can be said that there is now order where in my first visit there was chaos and that programmes are still more exciting than at the beginning.

At first there was a host of small stations, each doing their own local advertising. Then gradually the big firms bought up, for use or elimination, those which could not stand the pace. In time two great organizations, the 'National Broadcasting Company' (N.B.C.) and 'Columbia', were the dominant features of American broadcasting. 'Mutual' now claims a place of importance and there are still many individual stations both large and small scattered up and down the continent. The big radio companies own a chain of stations, one, say, in New York, another, maybe, in Chicago, another out on the west coast, and more besides in middle west and north and south. They are interlinked by telephone wires. This land line interlinking, which we called 'Simultaneous Broadcasting', was christened 'Chain Broadcasting' in America and the companies using the method are referred to as 'Chain Companies'. Chain-owned stations are not found in every city in every state. The chain companies are therefore not capable of giving what is termed a 'nation-wide coverage', unless they arrange, when they want their biggest audience, to hire the services of individually owned local

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stations in places where they have no station of their own. When an individually owned station is not supplementing the services of the big organization it gets on with its own local work. Thus there are two distinct organizations, the big chain broadcasting systems, and the smaller local stations owned by some 'local' company. These sometimes combine and sometimes work separately. Moreover, just as the local station may at times become part of a chain, so a chain station may at other times become a local station.

The business between the owners of the broadcasting stations and the advertisers is usually fixed up by a go-between called an advertising agent. The latter is expert on all publicity questions, whether to do with posters, newspapers, magazines or radio.

In the early days of American broadcasting 'radio' was used more blatantly than now. This is not to say that a voice kept repeating:

'This is the A. soap station; buy A.'s soap, it's better for the complexion, it's cheaper than any other. In units at ten cents or boxes of ten cakes at ninety cents.'

But certainly there was too much soap and too little entertainment. The antithesis of the 'Town Crier' type of broadcast was an ordinary programme which was labelled by the name of the firm which sponsored it. For example, listeners came to know that from, say, 8 p.m. to 9 p.m. they would hear the 'Ford Hour', and although the programme would be announced and advertised as the Ford Hour, the items were quite unconnected with Ford Motor Cars. Manufacturing firms paid for broadcasts of operas, symphony orchestras, jazz bands, celebrity singers, etc., during the hours identified by their names. Most of the advertisement programmes are announced as: 'Z Products Incorporated now have pleasure in presenting A.B. — the famous "whatever"'. Don't forget that X Products are better, brighter and bigger, etc.', taking about half a minute to a minute. Most advertising programmes last from a quarter to half an hour, seldom longer.

The business of radio advertising is similar to that of newspaper publishing. Both are commercial activities and make their profit because advertisers take time on the air or space on the page to advertise goods and services. The success of the newspaper depends upon its

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circulation, the success of a commercial radio station upon the size of its audience. A newspaper keeps up its circulation by pleasing its public, the radio station builds and holds its audience by making its programme attractive. A newspaper with a larger circulation charges more for advertisement space, a radio station charges for time in proportion to its audience. Thus the vital necessity for a radio advertising station is to build and hold its audience.

It is believed that the radio audience would fade away if nothing but advertisement programmes were given. This is why the station owner puts on 'sustaining programmes' which have no direct commercial motive. These are designed with the sole purpose of amusing and interesting the listeners so that they make a habit of tuning in the station. Analogously, a newspaper really sells because its feature pages and editorial policy please its readers. If it had too many advertisements, or if its reading matter were dull, people would not buy it. The station owner must be sure that the programmes put on by the advertisers are of a good standard otherwise the audience will tune in to another rival station. The system is competitive; no chain of stations has a monopoly of the air. Every stimulus, every condition of operation, impels the station owner to study his public's reactions and give the public what it wants. This is usually cited as the worst feature of the system. It is, however, certain that the American public at any rate is not so uncultivated and stupid as is presumed by English critics. If the station owners adopt a reasonably idealistic policy, the commercial results are gratifying. For instance, in America, twice as much time is spent on sustaining programmes as that sold to advertisers. Many of the sustaining programmes might be described as highbrow; I should call them essentially interesting because the people who make them are interested.

A newspaper can give the advertiser a certified figure of sold copies and so has a measure of the value of space on its pages. The radio station cannot give so accurate a picture of the size of its audience. The price of the time sold is therefore estimated by results. Let us say a manufacturer, M, wants to use radio to advertise a product, M's toothpaste, for instance. M knows his normal sales. The advertisement pro-

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gramme is put on. Immediately the sales of the toothpaste increase. How much? The amount of the increase is a measure of the value of the time. There have been some fantastic results. In Britain, even though commercial radio is opposed by the government and is done from stations abroad, certain firms have made increases in sales amounting to thousands per cent by using radio advertising.

A Frenchman said of the motor-car gearbox: 'C'est brutal, mais ça marche.' It might be said of radio advertising: 'It's crude, but it works.' In many ways it works better than our nationalized system. But why anyone should buy a product in gratitude for the gift of an amusing programme, no one knows. Perhaps it isn't quite like that: the simple radio reminder is enough to keep a name before the public. Radio is a 'Sound Billboard', as they would say in America.

They call the Rockefeller Centre in New York 'the show place of the nation'. On successive visits I saw it planned; I saw it half erected; and I saw its main blocks, containing the N.B.C. studios and the cinema, finished. Fifth Avenue is dominated by it, a flat up-ended slab, measuring a thousand feet from base to top, flanked by two smaller blocks at either side. The tall centre block contains a nest of studios and offices belonging to the N.B.C. You can buy a ticket for a dollar and see almost as much as I could, even with my privileged introduction. A lift takes you up ten stories or so out of the sixty. A guide in immaculate uniform will show you to a balcony fronted by a double glass partition through which you can see into the studios, where, maybe, a programme is being rehearsed or produced. You seem to be in the studio, informed, through your ears by a loudspeaker and your eyes through the glass panes, of all that is going on. The people down on the floor below are oblivious of your presence and undisturbed by your comments because the partition is sound proof: their eyes are on the microphone and the viewing balcony is dark. You can also look into the control room in another part of the building where all the elaborate switching of telephone wires is carried out. You may not know the care and skill that has gone into insulating the sound, the thought that has planned the building so that on your tour you never fill a corridor used by the executives: you may not care how the air has been cleaned

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and conditioned (except that you feel as if you were walking into a just-used bathroom on going out again into the summer streets), but you will leave impressed by the worth and consequence of a great enterprise.

A 'radio' in America is what it is designed to be, a source of continuous entertainment. The city listener has a large range of choice of clearly-heard programmes. This is because the stations are all grouped around the dense centres of population. The advertiser wants a maximum number of people to know about the products he advertises, so he naturally places his stations near where a lot of people live close together. Just as it is foolish to put up an advertisement hoarding in the Sahara and expect much return from the expenditure, so it is useless, in commercial terms, to locate an advertising broadcasting station in the centre of the prairie. The resulting wide range of choice of clearly-heard programmes in the cities is thus given at the expense of the rural listener. The American rural listener 'gets' the distant urban station in conditions similar to those in which the British listener 'gets' foreign stations: they are heard, but more strongly at night: they can give enjoyment but their reception is marred, more or less, by interference noises. I used to argue the merits of the planned British system against the haphazard grouping formed through the population distribution in America and say that we considered the claims of all the inhabitants, wherever they lived. Who, I asked, deserved good radio more than those who were isolated from the urban amusement and excitements? But the big cities of America have a large range of choice of different, although not purposely contrasted, programmes. The Americans never adopted long wave broadcasting: their motive was profit and they could afford to neglect the wide open spaces which the long wave could most efficiently cover.

A city householder in America could well say that the profit of money to the commercial broadcaster results in profit of amusement to the urban listener. Tune in to one programme and hear the end of a play sponsored by such and such a company and 'bing', in two seconds you are hearing San Francisco where maybe they are doing something at the 'Fair', and in a little while 'bing', and the voice comes from the

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deep south commenting on a horse race, and so 'bing', again, back to your own city, a tour of ten thousand miles in three thousand six hundred exciting seconds.

American programmes are distinguished by their vitality: they are vulgar in the sense of popular, but never common: their motive is obvious, but their content seldom meretricious. They give information without being pompous: they are gay without being salacious, funny rather than pawky. To say that the American air is never burdened by dreary or vulgar or salacious programmes would be an exaggeration; to say the general run of the studio output is amusing, vivacious, gay and vital is a fair generalization. The programmes are full of ideas, probably because the commercial mind, competing for the public's attention, has to fight against a jaded appetite. Every quarter or half hour finds something original, even if at times a trifle obvious. Variety performances are distinguished by the world's best talent. The fees paid are enormous. Fast moving short plays romanticize a commercial product, a pearl diver's adventures or a motor-car's tour. Children make plays for children, serials recount fantastic adventures, commentators like the late Will Rogers and 'Amos and Andy' delight millions by their wit, their spicy comments, their political daring. The stations give running commentaries ranging over the world from arctic explorers to central European revolutions, from baseball games to political games, from speed records to African dances.

One is conscious of some 'vulgarity' as the English highbrow would call it, but, to my mind, this is compensated by the enthusiastic spirit in which everything is done. The loudspeaker is 'a reporter at large' picking up the world's events and the specialist's knowledge. Nor is it all circus; thoughtful and original people, professors, priests, and ideologues come to the microphone and bring the listener into contact with cultivated minds as well as pure amusement. Above all the air is alive with controversy.

'You should hear our President snuggling up to the boys on a Saturday afternoon,' said an American to me. I did, but I also heard the 'Radio Priest', Father Coughlin, doing his best to loosen the embrace.

So much for American commercial broadcasting. The idea has been

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copied here. British listeners began to hear advertising programmes even before I left the B.B.C. in 1929, but the transmissions, if not illegal, were and always have been frowned upon by grandmotherly authority.

A song, remembered from an adolescent interest in musical comedy, used to say 'Money talks, money talks, it's the next best thing to rank'. To-day money is rank, and in this business of commercial broadcasting it certainly talks. Wireless waves flip across frontiers with persistent disregard for regulation. Any country close enough to Britain can make money by granting a concession to entrepreneurs to operate a wireless station for the purpose of sending advertisement programmes to England. The Duchy of Luxembourg gave such a concession to a French company and this company set up its agency in London to secure advertising contracts from British manufacturers. The French people 'made a packet of money'. In another venture a British company, calling itself the International Broadcasting Company, entered into agreements with owners of foreign stations, notably with the proprietor of a French station, Radio Normandie, on the Channel coast, to allow the transmission of advertisement programmes in English. The I.B.C. has been highly successful.

The B.B.C. resented the establishment of these alternative broadcasting services which, it said, undermined the policy of the Government, which was to establish a single authority to control all programmes specifically made for British listeners. Such views were strongly expressed by spokesmen for the Corporation in evidence given to a Select Committee (the Ullswater Committee), appointed by the Postmaster-General to advise him as to the conduct of broadcasting after the expiry of the B.B.C. charter in 1937. The Ullswater Committee condemned the practice of sending programmes in English from foreign stations and recommended that steps should be taken to suppress the practice. I listened to the Parliamentary debate on the report and was impressed that, while lip service was given to the recommendation that the foreign station advertisement service should be suppressed, no member seemed particularly convinced on the subject. This was probably because constituents had written some angry letters

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to their members protesting against a proposal that Robert Boothby described as 'an intolerable interference with the liberty of the subject'. Both before and after official expressions of disapproval had been made public the B.B.C. had been very active in trying to put a stop to the commercial programmes. They persuaded the International Union to make several *vœux* (a *vœux* is something between a resolution and a hope) framed to make it difficult for any country either to allow the continuance of the advertising transmissions or to grant new concessions. In order to give the resolution a general application, it was agreed that no nation should, as a general practice, broadcast in languages other than its own. The B.B.C. was among the first to break this rule by its propaganda broadcasts made after the Munich Conference. Meanwhile our Foreign Office had been writing to Paris and Luxembourg protesting against a practice which, while not offending against any international law, hardly showed a 'decent sort of spirit'. If we had avoided the war, doubtless the correspondence would still be continuing, possibly on printed forms. In sum, radio advertising services were deeply resented by the B.B.C. and gladly welcomed by the public.

Newspapers have done everything in their power to oppose and discourage advertisement broadcasting. The Newspaper Proprietors Association has agreed that no newspaper will mention any news or views in connection with these broadcasts or publish their programmes. Any newspaper failing to observe this agreement must pay heavy fines and will find itself deprived of transport facilities and concessions enjoyed by rivals. One Sunday paper defied the ban but was soon forced to give in. Obviously these actions were prompted by purely commercial considerations. Radio Advertising is of course a powerful rival to Newspaper Advertising.

In spite of the opposition of Government and Press, a formidable combination, British radio advertising has, thanks to the public's support, become very profitable to those who were foresighted enough to secure the necessary concessions. Provided the advertising transmissions can be heard by British listeners both by day and night, 'time' can be sold for even as much as ten pounds a minute. This

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is for 'peak Sunday time'; the average over the week is about fifty pounds for a quarter of an hour. Naturally the cost of time is proportional to the size of the audience.

Sir John Reith has been largely responsible, not only for the power and prestige of the B.B.C., but also for the fantastic commercial success of British radio advertising. Sir John is a strong Sabbatarian and his convictions determined the character of the B.B.C. Sunday broadcasts. This religious Sunday policy restricted the quantity and decided the character of home programmes. The quantity was limited, and the character, according to the public's estimation, dull. The ordinary listener did not feel that he was committing any sin in being amused on Sunday and turned from what he considered dreary local broadcasting to amusing foreign programmes. When this foreign broadcasting contained programmes in English of a novel kind, designed only for his pleasure, the listener simply thanked whatever gods there be for his good fortune and so assured a large and enthusiastic audience for the Sunday commercial broadcasts. On a weekday, when the B.B.C. broadcasts more popular programmes, the listener naturally turns to his local station, which is often just as amusing as the advertising station and certainly easier to tune in. Weekday time is therefore sold at relatively low rates.

After leaving the B.B.C. I became interested in radio advertising. I was fortunate enough to be asked by the Allen Brothers (Directors and Proprietors of David Allen & Sons) to help them to secure radio advertising concessions in Europe. The work was fascinatingly interesting and my principals both generous and enthusiastic. I would like publicly to thank them for all they did. It is sad that the coming of the war has robbed them of the rewards they deserved.

My work took me, alone or in the company of a 'brother', to practically every European capital. In the course of my wanderings I found myself in Italy. I stayed a day or so with Senator Marconi on his yacht, lying in Santa Margharita Harbour. Marconi looked ill and it was only occasionally that the old gaiety seemed to take hold again. He was angry because the British Company had taken his assistants from him and had reduced his facilities for research.

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The Abyssinian war had but lately finished. He told me that he had said to the business men in London: 'You may put another quarter per cent on your dividend but that will never make you great men.'

On the day I was due to get back to Paris I had great difficulty in getting a compartment on the Rome Express. The agents told me, late in the morning, that they had telephoned to Rome and the train was full. It is an old story. I told my host that the new regime had not seemed to make all that difference; here was the old ramp of making a passenger tip extra to get a place which all the time was vacant. I did not see him all that afternoon but he said he would see me off and I was not to bother about the place on the train. When the evening came, we set off, a considerable retinue piling into the launch, and came to the station to a special waiting room. We were presented with Cinzano to drink and Empire chairs to sit on while we waited for the train. Marconi said:

'I have made a fuss about your place. I've been on to the Chief of Police. I said you were the most important foreigner I've had to see me for a long time. For heaven's sake, when the train comes, try to look important.'

The train was hardly still before it gushed officials, offering me any number of cabins. The train moved and I waved my sincere thanks. Marconi was to be dead in a few months. He has been spared a lot of bitterness.

I met, notably in Paris, that curious thing the professional introducer; one who convincingly proves that quite a small sum will enable you to meet people who can 'do anything'. The people who can do anything will, for a rather larger reward, in cash or kind, introduce you to the responsible officials who can do everything. I often found myself, after tiptoeing up expensive and confidential paths to inner power, triumphantly presented to old friends from the Union who said it was hardly necessary for them to explain to *me* that the thing could not be done. It was particularly amusing to see rival concession-hunters hunched over expensive lunch tables, whispering to the same dear old faces: even the friendly warning ('after all, we're both English, my dear fellow') was neglected and assumed to be merely a com-

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petitor's manœuvre. We managed, by hook or by crook, to interview Prime Ministers, Finance Ministers, Ministers of Posts and Telegraphs, indeed all the hierarchy of government, in many countries, large and small, but in only a few places did we get any nearer success than a serious consideration of our proposals.

It was possible to work downwards, talking politics, or upwards talking technics, but it was always to meet the same hard official, unvarying in his attitude whatever his nationality, who asked the unanswerable question, 'and even if this were recommended by Government, what wavelength would you use?' The old, old problem — too many demands for channels, too few channels to satisfy the demands. A wavelength gradually assumed the form of a national property. Belonging to the nation, it was not for sale without the nation's consent. The nation, quite understandably, wanted to use its own hardly-won property for cultural rather than commercial purposes. But it costs a lot of money to run a national broadcasting service. The licence revenue in a small country barely supports a monopoly broadcasting service. It is tempting to supplement this income by granting an advertising concession to the English financiers who seem as certain of success as they are apparently generous with the noughts following the index figure of pounds sterling. Then there is publicity for the station itself. 'Radio Ruritania' said over and over again on the air puts Ruritania on the map and draws a profitable tourist traffic. Many countries were tempted: a station was half built on the heights of the Pyrenées in Andorra: the Liechtenstein station was built from private capital as a nucleus of an advertising service; Vienna was ready to start with a short wave advertising station when it became part of Germany. A great many other propositions were still simmering when war put an end to hopeful travelling.

But, while we hunted, Radio Luxembourg and Radio Normandie were working. These stations and these alone have established the industry because they can be heard both by day and by night and because the majority of their transmission time is devoted to advertising. Listeners therefore get into the habit of 'tuning them in'.

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Other stations such as Radio Méditerranée, Radio Toulouse and Radio Lyons have occasionally let time to advertisers but none of them can be heard in Britain in the day time. Besides, like Petit Parisien, which can be heard in daylight in London, they have a duty to their local French audience which gets tired of not understanding the announcements about the virtues of this or that product and find the British advertising programmes foreign to their tastes. Athlone is in this category, it has often flirted with the idea of profiting by advertising British goods but it has to be careful not to annoy Irish listeners.

No account of British radio advertising should leave out the names of Captain Plugge, M.P., and his partner, Mr. Leonard. Plugge was a pioneer, one who got an idea and followed it regardless of difficulty and official blocking. He has been greatly rewarded, but then so have listeners in getting another amusing programme. It is invidious to mention names, but British advertising broadcasting would not have advanced along such sound lines but for the quiet and experienced guidance of Mr. Rae Smith, head of the J. Walter Thompson Company, who saw the potentials of a young industry and used the resources of his firm, a powerful advertising agency, to help its infant growth.

The Post Office, loyal to the B.B.C., naturally opposed foreign station advertising. It has therefore refused to hire telephone circuits to connect a private studio in London with an advertising station in another country. This difficulty has been overcome by recording the advertising programmes on film or compound in London and sending the records abroad to the stations. Recording technique has been developed to such perfection that a listener gets the impression that live talent is performing at the moment he hears the broadcast. He is really hearing a record. There are many advantages in recording programmes in this way: mistakes are eliminated, timing is perfect and censorship absolute.

The business of radio advertising takes much the same form in every country. The fundamental difference between American and British advertising is that the British, being officially discouraged, cannot

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embark upon ambitious sustaining programmes. American stations sustain their time with running commentaries on world or national events as well as political and sociological talks. These are additional to the normal advertisement programmes. The British advertising station leaves practically everything except 'Variety' to the B.B.C. It would be foolish for the British stations, located as they are in foreign territory and having little security of tenure, to dabble in political or sociological or reportorial fields.

The success of an advertising station depends upon its ability to 'hold' an audience. If the programme is thrilling but the reception poor it gets as big an audience as something moderately dull but easy to pick up and free from interference. The ideal is a strong signal and an exciting programme. The reception of the foreign stations which send out the British commercial programmes is seldom as good as that given by a nearer B.B.C. station, so the advertising programmes have to be very popular or the B.B.C. programmes very dull before a big audience can be assured. That is why the British advertising service cannot show up very well in an intellectual sense; its virtue is that it has concentrated on amusing people. Perhaps this is all wrong in some eyes. Not mine. If the official view could 'make a nice change' and find something else to disapprove of, advertising broadcasting could grow unhampered, when I am sure its virtues would be more widely appreciated. Just before the war some of the commercial stations were beginning to adopt more far-sighted policies and were experimenting in giving their listeners 'something slightly better than they think they like'. The experiments looked like being successful.

In spite of the relatively poor technical service and largely because of the Sunday programme policy of the B.B.C., radio advertisement services to British listeners are a proved financial success. This means that a very large number of people enjoy listening to commercial programmes. I would say that this is not only because the programmes are designedly popular, but just as much because a commercial stimulus forces an attitude which the B.B.C. has never really adopted, namely to please and amuse the audience. Whatever the item, vitality

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and originality are the most telling qualities of presentation. Commercial programmes are designed with this knowledge.

America began commercial radio advertising and Britain State broadcasting. Australia gets the best of both systems by using them together. Advertisement as well as State broadcasting was strongly established before the war in France, commercial broadcasting was feebly operating in Belgium in competition with monopoly services. Canada is now largely dominated by a State system but the Canadian listener can be amused from American stations. South Africa started with a commercial and changed over to a State service. The French Government was officially opposed to, but actually tolerant of, commercial services.

If I were asked to say which is the better, a purely State-run or purely commercially inspired broadcasting system, I would find it impossible to give a definite answer. I would say that monopoly broadcasting systems could afford to take a much wider view of their cultural responsibilities, but that they have a danger of being too dominated by government in the field of politics and sociology. I would say on the other hand that the freedom of any reputable individual to broadcast his views is a great recommendation of the commercial system. The justifications for advertisement broadcasting are exactly those used in support of the free Press. Newspapers are commercial enterprises kept alive by a revenue derived from advertisers. Commercial broadcasting also gets its revenue from advertisers, and the word 'free' in 'free press' might have the same connotation as in free broadcasting, namely a freedom to do anything, except lose money for long periods. The free Press is counted, particularly in articles in newspapers and periodicals, as the corner stone of democracy, but the Press seems to be determined to keep this corner free for itself. The Press has quite naturally done everything it could to put down commercial broadcasting, just as any commercial enterprise will always fight a rival interest. The Press will therefore always praise the B.B.C., however dull, but in recommending the Corporation's programmes because of their 'cleanness' one might whisper: 'Whose proprietor hasn't been using Persil yet?'

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The often alleged value of our free Press is that anyone who can spare two or three million pounds is free to start a national newspaper, or, not having quite that degree of freedom, can get his views published in one of the many existing 'organs' having so many different policies. In America 'broadcasting time' is given, not sold, by the station owners to all sorts of different reputable people with varying and opposed views. Controversy gets on the air far more completely in America than in Britain.

It is truly surprising to hear people, whose whole life is spent in trying to make profits, sneering at commercial broadcasting. Such people see nothing odd about the commercial theatre and commercial films. They are glad to read their newspapers which only continue to appear because their proprietors make money. Such people judge practically everything by its 'economic soundness'; this or that cannot be done because 'it would not pay'. I do not share these views. As Sir Richard Acland says, the trouble about competition, as we know it, is that someone is apt to win. I might add that that someone is seldom a member of the general public. But so long as the country continues to be driven by the power of the profit motive I see no reason why broadcasting should be totally excluded from industry. But I do see that the monopoly system could be of great sociological and artistic value. The next two chapters explain how I think the monopoly principle could be better used. It can only be used in the ways I suggest just because it is freed from the profit motive. Obviously, however, this freedom might be abused. To minimize any chance of abuses why not have both systems working simultaneously? This seems to me to be an excellent form of competition because, as I conceive it, neither side is apt to win and, in this rare case, the public actually does benefit.

CHAPTER IX

LEAVING THE B.B.C.

I RESIGNED from the B.B.C. in the summer of 1929. To anyone asking me why I resigned, I said that my reason was such a well-known secret that I would not on any account reveal it. After the lapse of eleven years, and after Parliamentary debates and public discussion on the 'B.B.C. private lives' question, no one will be surprised to learn that I was forced to send in my resignation because I was about to become what is called the 'guilty party' in an action for divorce.

It is seldom appreciated that ours is officially a Christian country, ruled over by a King who is called 'Defender of the Faith'. Sir John Reith, as both a Christian and the head of a national organization, had the right to order my dismissal and the integrity to uphold his convictions. It might nevertheless have been thought that a national conscience which sees no ideological obstacle to an alliance with an officially anti-Christian country, and which permits atheistic schoolmasters to prepare boys for confirmation, might have found a way to accept the services of a technician who only wanted to readjust his private life. The liberty given to more famous and responsible people was, however, denied to me, because I happened to come under the control of that rare individual who acts according to his spiritual convictions. I, for my part, felt unable to continue to serve an organization which attempted to usurp the functions of my conscience in a matter which I believed only concerned my private life.

My feelings were not always so impersonal. I was hurt and angry at the time and I said and wrote things I afterwards regretted. I regret nothing that I have written here because what I have said, and shall say, is criticism guided by a constructive conception of what broadcasting should be. I have no doubt that there is a lot to be said on the other side, but this is not the place to say it. I criticize a policy; not individuals.

Just before the announcement of my resignation a number of other

pioneers of broadcasting had also resigned for one reason or another. When my name was added to the list the newspapers made a lot of fuss. It was felt by many that there must be something wrong with an organization which made no attempt to keep people obviously suited to its service. I object to wearing my heart on a headline, so I refused to do more than confirm the bare fact of my resignation. But the 'inner story' soon became known to 'inner circles' and I was invited to meet several members of Parliament to 'talk about broadcasting'. The occasion was unique in that I took the words literally and for once did not talk about myself. I was, however, persuaded to talk about my 'resignation' to an important political personage. He was very cautious and warned me before I told my story that he would make no comment. He kept his promise to say nothing and afterwards did nothing. 'Behind the scenes' indignation grew, but, without my knowledge, was countered by rumours spread about by the B.B.C. which hinted that there were 'other things', unmentioned because unmentionable, that really justified a dismissal. The divorce, said these rumours, was only an excuse. Doubtless B.B.C. propagandists thought they were doing their duty by their chief, but he, I am sure, would not feel that his actions needed the support of lies.

My friends told me that, divorce or no divorce, some way would have been found to get rid of me because I was not sufficiently subservient. It was certainly true that I was always telling responsible people in the Corporation what I thought about its programmes and policy. My criticisms were perhaps more forcible than coherent. But they were inspired by my genuine conviction that the B.B.C. was missing a great opportunity. This pause in my story gives me an opportunity to explain what I felt then, and still feel, to be wrong with our broadcasting service.

First and foremost it is clear, that whatever I or anyone else might wish to do with broadcasting, the public will always look upon it as a distraction and an amusement. The most worthy and painstaking programmes will not be listened to if the public thinks them dull. All this talk about broadcasting automatically elevating public taste is so much blither. Nothing can be elevated unless something catches hold of it,

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and so public taste cannot be elevated if the would-be uplifter fails to get down to it. This does not mean that I think broadcasting should pursue that cheap policy commonly, but wrongly described, as 'giving the public what it wants'. Performance should lie between these two extremes. It should be the aim of broadcasting to show the listener that words such as 'culture' and 'education' describe a means to a wider enjoyment of life, not some dull task to be mastered.

Secondly I want to express a dislike — hatred is not too strong a word — of the intellectual pretensions of those who poke their noses into public services such as broadcasting, education, and 'doing things for The People'. The term 'highbrow' in my interpretation, describes the 'shamateur' of the intellect, one who makes pronouncements or repeats phrases without understanding their implications. When I speak of broadcasting being managed by cultivated people, I hope it will not be thought that I want a lot of men with black hats and dirty flannel trousers imposing their bland patronage upon the service in the name of 'cultchar'. Culture is defined in the *Oxford Dictionary* as 'the training and refinement of mind, taste and manners'. Evidently, according to this definition, cultured people have greater opportunities for being interested and enjoying life more completely. The ability to appreciate art is not some annoying pose adopted by 'superior people', but the knowledge of how to recognize and enjoy beautiful things. Enjoyment, I repeat, is the outcome.

If these points are not appreciated, I fear it will be thought that I want broadcasting to resemble a pince-nez'd schoolmaster talking down at a class of bored listeners. The loudspeaker ought, on the contrary, to be more like a witty and informed companion.

Broadcasting is a powerful medium of propaganda. It is oracular and yet friendly. It is not what is said but the way in which it is said that influences its listeners. There is no need to say things directly over the air: the attitude of mind revealed in day-to-day behaviour is itself powerful propaganda. Political beliefs need not be imposed: they can be made to grow out of men's minds by suggestion. British broadcasting suggests that 'it will be all right, stick to the old things, you can trust us, obey and be loyal and everything will be lovely'. There is no

open insistence on conformity, no talks extolling the virtues of neither thinking nor dreaming. There is no necessity to rub this in when example is so much more potent. The B.B.C. exalts the value of compromise and escapism by not letting the loudspeaker say anything exceptional, thus implying that it is better not to let anything exceptional be said. The loudspeaker is the voice of God suggesting moderation.

I have no desire to 'write up' broadcasting. I want to say that it is the very sameness of British monopoly broadcasting, its day-to-day persistence, its banality, which makes it classifiable as a dangerous drug. It does enormous harm if left about uncontrolled; people sniff it up in little soporific doses. Used intelligently, this same persistent power could be made to open up the mind and to inspire creative effort. Everything depends on the type of control under which it is administered, and the facilities at the disposal of its directorate. An intelligent control and an abundant facility would change the whole character of the service. It would be just as disastrous if the pompous investors in uplift whined their way into power as if control were handed over to the banalities of a purely commercial outlook. Something does lie between the mentality of a cocktail party in lower Bloomsbury circles and the ideas of a factory management committee.

It is this something that I want to define. The best definition I can make is to say that broadcasting should be, in politics the rostrum for contending political theory, in sociology a means to show the community to the community, and in art the patron of the artist. I would like this definition to convey some idea of the new civilization that might develop out of present turmoil. There are many urgent reforms required. 'Many of them as urgent as hot drinks and blankets to a shipwrecked crew', as J. B. Priestley writes. Broadcasting could, by its attitude, its presentation and the things it said, help enormously towards true reconstruction.

I mean by broadcasting being the rostrum of contending thought that it should demonstrate its impartiality by disseminating all points of view. The resultant of n equal forces acting in n different directions is zero: there can be no bias in a policy which allows free expression to all

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controversial opinions. Some degree of censorship is, however, unavoidable. The degree and form of the censorship must depend upon the directorate's interpretation of its duties. What is wanted is a wise and witty directorate having the courage of its intellect rather than its convictions.

If it were proved impossible to find this in a government-appointed organization, balance could be restored by arranging for commercial broadcasting to work simultaneously. This would be an outlet for more unorthodox opinions. This point has been dealt with in an earlier chapter.

Talks not purely political in their content are those which can be said to 'reveal the community to the community'. They could do this the more completely if skilled talkers rather than pedagogues dealt with subjects which had a direct bearing upon community life. I shall have more to say about this in the chapter on 'A Possible Future'.

It is more difficult to explain what is meant by broadcasting being 'in art the patron of the artist', without using words often misinterpreted. A patron, as I use the term, means one who is both rich and cultivated: rich enough to fend off material worries from the artist and cultivated enough to know what to encourage.

Broadcasting is a cultural activity and demands the services of creative, imaginative and expert people. Such people cannot do good work unless the atmosphere in which they function is congenial, and only the 'patron' mind can create such an atmosphere. There is both a material and a spiritual side to this question. The material requirements are that the carrying out of ideas shall not be unduly restricted by lack of money and that someone other than the artist must worry about how to get it. The spiritual requirement is that if the programme builder puts up ideas they shall get a sympathetic, because understanding, consideration. Technicians know how irritating it is to have to put up schemes to those who do not understand, or try to understand, the spirit and language of technology. Similarly the artist is hampered if his ideas have to be explained to those who cannot understand either the intention or the form of his suggestion. The administrative mind must agree that the making of programmes is an expert's job: therefore it should further

agree that the direction and control of broadcasting should be given to those who are expert. Being expert in a cultural field implies being cultured. Being expert as a patron means being both cultured and businesslike. So the administrator who can only administrate should give way to one who can both administrate and understand what he is administrating.

How does the B.B.C. measure up to these standards? Badly, I think. But let it be clear that these are my standards: others may not agree with them. The B.B.C. has done a grand job of work, but I don't like the job. Those who have made, and continue to run, the B.B.C. are serious-minded and conscientious people. They are doing what they think right, but what I think wrong. The following is a criticism of the B.B.C.'s interpretation of its duties, measured by the standards I have tried to define.

How, in the first instance, does the B.B.C. interpret its responsibility for disseminating political opinions? A chapter on the foundations of the B.B.C. showed that the circumstances of its birth made it liable to be cautious and the environment of its upbringing gave it a narrow and conformist outlook. Certainly the Corporation has shown an almost undisguised tendentiousness in its handling of controversial issues.

Labour supporters said that broadcasting, more than any other weapon 'used against the workers', broke the 1926 general strike. When newspapers ceased publication the public turned to wireless sets for news. I had been told to take every precaution to see that the broadcasting stations should continue to function in spite of a possible failure of 'essential services'. There was nothing for me to do when the strike started but to hope that my arrangements would be successful; I could not travel and it was difficult to telephone. As the news department was shorthanded I was roped in to help. My job was to sort out the news as it came in higgledy piggledy and arrange items under headings. My tidy sheets were sent to the Admiralty where, so we gathered, government censors would pass it for broadcasting. I therefore shared with a few others the staggering experience of comparing all the news as it came in with that which was considered fit for public consumption. Many of those besides myself who had been proselytizing the B.B.C.

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as the impartial public servant were bitterly disappointed. It was not so much that the news was altered as given bias by elimination. This, I now know, is an old trick, but it was new to me then.

The strike was soon over; Mr. Baldwin's voice booming through a million loudspeakers asked 'can't you trust me?' and the Labour leaders had unaccountably answered 'yes'. A few of those in the B.B.C. who still hoped that broadcasting might be used impartially, as its constitution implied that it would be, started a feature called 'Appreciation of the situation'. There were protests on all sides; the newspapers said broadcasting was usurping their functions, Labour said we were unfair to their point of view, capitalists said we were nothing but reds, and the Government simply said 'stop'. We were not of course doing broadcasting to the satisfaction of the Postmaster-General. It is worth remarking that had there been commercial stations Labour would undoubtedly have had its own station to put its own point of view. This is not fanciful, Labour runs a broadcasting station in Australia and in several other countries.

I have lately been reading a book called *Guilty Men* in which politicians in power during the last peace are condemned for hiding the truth. This is not entirely fair. When Mr. Baldwin was honest enough to say that had he told the truth he would have lost the election, he was demonstrating the disadvantages of a system rather than the cowardice of a politician. The 'trade of politics' may not 'become a gentleman', but to quote the eighteenth century again, 'it is the aim of a politician to remain in politics'. Mr. Baldwin could not have been expected to supply his own opposition. There were, according to the author of *Guilty Men*, those who knew 'the truth'. Why were they not more widely heard? I suggest because their views were unpopular. Democracy may be government by the will of the people but what makes that will? I should say that the will of the people is the residue after eliminating the won't of the people. In this particular instance 'the people's won't' was that everyone refused to believe in the possibility, probability or necessity of war. 'The truth' was unpopular. Peace ballots, Dick Shepherd's pulpit eloquence, resolutions by conscientiously objecting university students all showed the public mind, its hatred of

war, its belief that its leaders would find a way out. Mr. Baldwin was truly the people's representative. So newspapers, as keen upon their circulations as politicians on their votes, played along with popular opinion; they could not afford, small blame to them, to be unpopular. Those who felt that a firmer attitude backed by larger armaments was the only way to preserve an armed peace had no means to make their views insistent and widely heard.

But what was broadcasting doing? Nothing except refusing its microphone right and left, realizing there was a lot to be said on both sides and so letting neither side say anything.

There have been other examples of partiality and escapism. Several years ago Mr. Bernard Shaw used a B.B.C. microphone, a B.B.C. studio and a British inter-continental wireless link to give a broadcast talk to America on his views about Russia. Not a syllable of what he said was allowed to escape into our free and democratic air. Sir Oswald Mosley and Mr. Harry Pollitt represent minorities but they have never been allowed to broadcast their views. In true democratic theory the views of a minority are valuable, even those which say that democracy is out of date. Mr. Churchill was forbidden to speak on the Indian question. The denial of what would be called by some revolutionary speeches might be understandable, but to cut us off from contact with well-trusted statesmen like Mr. Churchill is, whatever the circumstances, ridiculous.

A capitalistic press has frequently had no hesitation in publishing B.B.C. censored talks which were forbidden the air, because of their 'working class' bias. During the Spanish war, neither side was given a fair broadcast hearing, and yet all politically minded people were vitally interested in issues so likely to affect us. The responsibility for partisan political talks during election time has been very cleverly shelved and passed on to the 'Party Managers' to agree to a 'fair arrangement'. This frees the B.B.C. from responsibility, but it does not assist the workings of democracy.

'Revealing the community to the community' is interpreted by the B.B.C. by revealing a parade of 'trustworthy' and censored opinion. Each and every talk on political or sociological subjects is given the

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most careful scrutiny by the Corporation's officials and is often subjected to a considerable alteration from the sense intended by its author. Mr. Williams, in his book *Goodbye to the West Country*, gives an amusing account of the handling of a broadcast on stag hunting which reveals the cautious self-protective postures of the B.B.C. censorship. Of course stag hunting involves some difficult, even vital issues. Many British people are more concerned with cruelty to animals than with man's inhumanity to man. The B.B.C. was embarrassed. A nice subject, a good name. But soft! do not suggest that stag hunting involves pursuing a noble beast down a steep place into the sea; stress the air, the exercise, the lovely folds of Exmoor purple and gold in an August sun. To my mind Mr. Williams has proved himself as a writer of sensibility with a real feeling for wild life. That some ridiculous office boy should be able to ride rough shod over his manuscript is plainly ridiculous.

If talks are to be interesting they should certainly be given by authoritative people, but the speaker's delivery is at least as important as his knowledge. The title of an essay called 'Chinese peasants through the ages' looks awfully well in an adult education syllabus, but its broadcasting may occupy a supremely dull twenty minutes when mumbled by even the most profound authority over the air.

Another point, which seems to be so obvious that one is astonished it can have been missed, is that a talk should be a talk, not an essay read aloud. I have broadcast a great deal, but I have never taken a manuscript into the studio. I think my talks have been popular. On occasions, when explaining the B.B.C.'s technical policy I made mistakes which threw extra work upon my staff, at other times I fell into regrettable facetiousness, but the gain in spontaneity from talking from notes rather than reading a manuscript quite offset the occasional lapses.

I was once told that a talk, to be interesting, could not last more than twenty minutes. I took an hour, on our Midland experimental station, to explain the technical bases of wireless broadcasting and got as large a response, measured by congratulatory letters, as anyone else talking for a shorter time on a subject more easily understood. I attribute this to the fact that my talk was a talk, informal, casual even, though with an underlying order.

It is said that if broadcasters do not have something to read from they become nervous. This may be so, but why have nervous talkers? And more than that why make people more nervous than they need be? A friend of mine, asked to broadcast, told me that she was reduced to jitters before she even got near the microphone. She came early, as she was asked to do, and was shown into a room which, however interesting to a student of modern interior decoration, was, an American lady might say, 'not very homey'. Made to feel strange by this death house atmosphere, she was further oppressed by the kindness of those who took pains to spare her the worst of what they hinted was going to be pretty awful.

'Don't forget to keep your head up and raise your voice at the commas, not dropping it too much at the full stops. Don't shout or rustle your papers, or you will deafen millions, and remember above all things, *don't* be nervous, or no one will listen to you.'

This was all meant in kindness and I daresay the 'expert' had hurried from his dinner to comfort a pretty girl. She tells me that she was not very good all the same.

Talking to a microphone involves no more than talking to one or two people in a room and, if anyone can do this well, he or she is a good broadcaster. The idea that broadcasters are talking to millions may be correct in fact but it is wrong in implication. People tremble before an instrument which, they imagine, opens out into an audience of unimaginable vastness. The microphone is really a link between a voice and a multitude of isolated groups, each oblivious to the existence of the others. No crowd psychology is involved. These small separated groups are composed of relaxed and interested people who are amiably critical, just as they would be if anyone were sitting talking to them in their living-room. Imagine solemnly entering such a room, drawing up a chair, spreading out the pages of a manuscript (being careful not to rustle them), clearing the throat and then plunging into the reading of what is ruined by nervousness and meaningless from over-rehearsal. Poor hosts! They could not even switch off their caller as they do their loudspeaker.

The B.B.C. has a motto. What it says I forget. Anyway it is in

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Latin. The B.B.C. buildings are plastered with Latin inscriptions. It demonstrates a passion for the past, I suppose. Or is erudition confused with education? The first motto was in English however. It was out of the Bible. It adjured nation to speak peace unto nation. Was it foresight which substituted another or just a desire for more Latin? I suggested long ago that the B.B.C.'s motto should be copied from a phrase which is printed on the outside of the *Larousse Dictionary*. Under a picture of a blown dandelion this reads: *Je sème à tout vent*. An English version saying 'A seed is sown in every wind' or 'A seed in every wind' would give a picture of broadcast intelligence falling on the listeners' aerials and growing in the listeners' minds. This idea no doubt reflects the spirit of the education departments of the B.B.C., but the people concerned are not always very clever in the presentation of their material. No one could be more enthusiastic than I am that knowledge, as a means to make life more interesting, should be widely spread, but it is a profound mistake in psychology to label such activity as 'Broadcast Education'.

'I don't want to be educated,' says the tired breadwinner. 'I want to be amused.'

So called 'education broadcasts' are nevertheless often excellently done: they lie compactly within imposed limits and have none of that dreary flavour which comes from pretending to give the public what it wants by despising it. It is the label 'Education' which is wrong.

It has occurred independently to broadcasting authorities all over the world to set aside an 'hour' for the entertainment of children. The B.B.C. does not seem to have realized that it is the children who are to be entertained and not grown-ups thinking of themselves as children. Children are born wanting to know. Curiosity may have killed the cat but it made the human being. A grown-up who treats a child's questions frivolously is behaving with ghastly irresponsibility. Those who talk down at children with false voices and falser sentiments are behaving just as cruelly to immature minds as if they were starving, or beating immature bodies. Children are serious people, their games are serious thought processes, and they suffer, often silently, when they are cut off from an unguessed at but seemingly fascinating world inhabited

by grown-ups. When we think a grown-up is behaving foolishly, we say 'Don't be childish', and so when a child behaves childishly we imply that it is being silly. Mothers being 'serweet' to their children, by keeping them as long as possible in ignorance, are hurt by a sulky repayment. They therefore take to keeping dogs, which are always obedient, and do not understand, as children do instinctively, the difference between love and exhibitionism. Some of the B.B.C.'s children's hours are instinct with every fault of the unthinking parent. Hearty uncles and dear little aunties (oh, why, if anything, not aunt?) simper, prance and giggle among themselves and talk at the children with saccharine sweetness. Christian names are bandied about as at a Mayfair cocktail party. Why this familiarity, instead of dignity and friendliness? I wonder they do not substitute 'uncly' for 'uncle'. The B.B.C. is soft and its softest part is the mushy children's hour.

As a patron of the arts the B.B.C. is certainly patronizing, but seldom artistic. The Corporation plays more music than it gives talks. Music is obviously the mainstay of its programmes. In face of the opposition of the vested interests of commercial music the Corporation formed an orchestra which is probably better than any other in Britain. This and other good work has been done in spite of the administrative mind which rules the Corporation. But the musical experts have learned to put up their schemes not on account of artistic merit, but as a saving of money or efficient use of facilities, or even good publicity.

The late Mr. Percy Pitt did much for the cause of broadcast music but his services were little appreciated by an organization in which, as a senior official once said to me, 'he did not fit in'. When Mr. Pitt's age exceeded the statutory limit he was asked, on that account, to leave, though the same rule was not applied to an older and more elderly minded administrator. Pitt was a professional musician who thought that music was more important than the Corporation's rules and regulations. That the two should clash is a criticism of the organization, not the musician. Mr. Pitt's superannuation is not an isolated instance of the Corporation's lack of sympathy for the artist. Its behaviour to Sir Henry Wood on the subject of the Promenade

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Concerts during the war was despicable. But what is a mere orchestra conductor against the vested interests of a corporate body which had 'neither a soul to damn nor a bottom to kick'?

The new candidates for Mr. Pitt's post were judged by whether they could be handled by the B.B.C. rather than by whether they could handle an orchestra. I recollect a case of a conductor who might be going to be cited as a co-respondent. The question whether or not he should be sacked seemed to resolve itself into whether he was accused of bad conducting or misconducting. His competence was really never in question because those discussing the case had no ability to judge it.

A scheme was instituted in which guest conductors of international reputation were asked to give concerts with the B.B.C. orchestra. If they had been political figures of public men, I have no doubt they would have been well entertained in the houses of the administrative hierarchy. World famous musicians, however, had to be content with a supper at Mr. Prada's restaurant off the Tottenham Court Road. The meal was not uncommonly paid for by the Corporation's Chief Engineer, who, while more than willing to do what he did, and rewarded by some lovely parties and excellent food, was not exactly appointed for the duty. In such an atmosphere music goes on but enterprise cannot flourish.

'Ware experts,' say the Administrators. 'They don't fit in. Besides they never answer letters and cannot be on time. Enthusiastic? Knowledgeable? Yes, but we cannot spare time to handle them.'

Handling bright things takes off their polish!

Those who proselytize the B.B.C. are never tired of saying that broadcasting has spread musical appreciation among 'the masses'. I well remember the rapture of an elderly B.B.C. bureaucrat on hearing a platelayer in an Edinburgh tunnel whistling the refrain from the Unfinished Symphony. My remark that it would have been better if the worker had had something finished to whistle about was considered to have too much political flavour.

No doubt the whistling platelayer was a sign of the times. No doubt, owing to broadcasting, more people can show they are on

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terms of affectionate equality with music by whistling a theme from Mozart or Bach and calling it 'a jolly little thing'. More people have heard more music than ever before and can talk more knowingly, if not more knowledgeably, about it. But in spite of all this, does broadcasting help people to enjoy music more? Because when all is said, and it often takes a long long time to say it, music exists only to be enjoyed. Some prancing amateurs who probably have never composed a note of music and who often cannot read even a score, imply that music cannot be enjoyed unless it is 'understood'. Accordingly no one can enjoy a drive in a motor car without knowing all about how it works. A lot of people spoil the enjoyment of motoring by fussing about with the motor. Similarly the 'music lover' implies that you cannot join in the enjoyment of music unless you understand 'the works'. Certainly some appreciation of how music is made adds a thrill when well-made music is excitingly revealed, but this rare knowledge of technique is only a small plus to the total pleasure of a layman's hearing. It is not necessary to understand music to enjoy it, it is however necessary to hear it. The appetite comes with eating. But I doubt if loudspeaker listening does more than overhear music, it is really an adjunct to not a substitute for the real thing. The real thing is actually going to a concert.

I think the policy of the B.B.C. should be to whet the public's appetite for concert going and to provide concerts to satisfy the appetite. A little of this is done, but haphazardly and with far too few concerts. In the next chapter about 'A Possible Future' I outline a scheme in which the B.B.C. becomes the patron of public music performances whether symphony concerts, brass band contests, music festivals, operas, or jazz bands. I think the B.B.C., if, besides broadcasting music into the homes, invited the homes to the concert hall to hear music played, it would be vastly increasing the public's opportunities for enjoyment. My contention that overhearing music is not the same thing as hearing it is particularly true when the loudspeaker reproduction is bad. In wireless listening reproduction is mostly very bad. People who have a feeling for music use a gramophone more than a wireless set. They can get what they want when

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they want it, and what they hear is better reproduced than in most wireless sets. But even a perfect reproduction cannot reproduce the personal experience of going to a concert.

If this point were realized by the B.B.C. its music policy would concentrate less on mass production, less going through the music library from A to Z, and more on a conscious choice in the arrangement, classification and presentation of music. I do not think 'good music' should be rammed down the public's sore throat as a kind of a nostrum to cure vulgarity, but it should be made obvious to the public that 'good' in good music means permanently enjoyable. This does not mean that meretricious music is bad music. Meretricious music is music which gets a bit sickly after a few playings, just as sweets, while lovely on their first tasting are hardly satisfactory as a permanent diet. This 'bad music' as the 'music lover' describes it makes me laugh with pleasure at the clever way it tickles the tears out of me. But one gets tired of being tickled all the time.

The B.B.C. cannot, because it sticks to wireless as contrasted to wire transmission, give us more than a limited amount of the solid and permanent enjoyment which comes from listening to good music. All programme material has to be poured through only one or two channels; good music can seldom be played for long enough at a time to do it justice. If the B.B.C. really desired to increase the opportunities for people to enjoy music it would long ago have supported my proposals to scrap wireless and use wires to distribute programmes. I pointed this out in a letter to *The Times* recently and was surprised at the number of letters I got backing up my point. Evidently there is a widespread demand for good music and the B.B.C., in proportion to its opportunities, has not supplied it.

But relatively few want good music. The great majority enjoys Variety. The Corporation's variety programmes are very popular, but I see no reason why they should not continue to be so without the smutty music-hall joke as their most constant theme and commonness as their sole inspiration. A visit to the music-hall, in company with those 'out for an evening', is made in the expectation of jokes which are not the stock of day-to-day conversation. Staring at the

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mournful round hole where the noise comes out of 'the wireless', it is truly shocking to hear an innuendo which, in the warm and smoky atmosphere of a music-hall, would be tolerable. I find jokes about women's underclothes, swindling landladies, lodger's infidelities and drunkenness unfunny at any time, but when they appear in the unsympathetic environment of a living-room they are merely embarrassing. The B.B.C. has nevertheless proved itself able to find good broadcast variety talent. Artists such as Clapham and Dwyer, Gillie Potter, Mabel Constanduros, the Western Brothers, Flotsam and Jetsam and others, who know how to adapt their technique for the microphone, are often excellent.

Another popular feature of broadcasting is the eye-witness accounts of sporting and other events. But unfortunately many running commentaries give the impression that the commentator is a privileged and bored person who is paid to giggle about what he cannot see very well. Mr. Alison's football commentaries are an exception. They are quick, vital and illuminating; there is no nonsense about them. But in spite of such exceptions the B.B.C. motto for running commentaries might be: 'I can't quite see, but . . .' In Latin, of course.

The spirit of good commentary is that the person describing the event should seem to want to share his or her excitement with less well-placed people.

'Oh, I wish you could see it all,' I heard an American commentator say. He was perched on a skyscraper over New York, describing an airship just come from Europe, 'The sun is shining and the mists are going away. At one point I can see right up the Hudson. The water is blue and sparkling. The air's so good up here. Think of those poor folk down there in the trains. Hello! Look! There she is nosing through the clouds . . . silver . . . she's turning round, circling. You can see the little gondolas underneath her great round sides. Her shadow is riding up and down the skyscrapers. Now, if only you could just see it — Gee, it's swell!'

And, in contrast, the blasé B.B.C. commentator at a race:

'I say, John, what horse is that, do you think? Oh, it's . . . no, is it?

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I bet old Tom's pretty excited, don't you? Dear old Tom. What . . . :
The race? Well, I can't quite see, but . . .'

An incident of the war reveals B.B.C.'s running commentary at its worst. It gave an eye-witness account of an air fight over the English Channel. Writing in *The Times*, Major-General Dawnay wrote of it as 'the latest deplorable manifestation' of the B.B.C.'s 'standard of taste, feeling and imagination', 'surely revolting to all decent citizens'.

I did not hear the broadcast, but I endured an extract on a news reel. It was truly horrible. Done in the manner of the description of a sporting event, except that a sadistic excitement dispelled the usual boredom, a gloating 'got him' climaxed 'the show'.

The chief executive of the B.B.C., replying in a published letter to General Dawnay's criticisms, wrote of the need for 'gaiety' in war. If one can be gay about young men fighting out a life and death contest over the sea 'instead of bathing in it' it is difficult to see how also one can claim to be a suitable head of a cultural organization. The government order goes out 'Don't be gloomy about the war' and the B.B.C. interprets it by treating the populace to what is made by its description into a gladiatorial contest. The gay fighting spirit of young men who face death for their country is fine, but what the B.B.C. commentator had to be gay about except that he was facing a microphone and not death is not obvious. 'Refinement of mind, taste and manners!'

The Corporation has realized that it sets an example in taste in its buildings, publications and pamphlets. It is a pity it shows such poor taste. Its headquarter buildings are made from an embasured bandage of Portland stone, enclosing an exhibition display of modernist decoration. The *Radio Times* cannot make up its mind if it is to copy *John Bull* or the *New Statesman*, while much of the material reads like a national Parish Magazine. Even the transport vehicles are painted the wrong shade of dark green. I attempted, as I have described, to make the London transmitter buildings exceptional. Whatever the results of my efforts, the evolution from the original design, as seen in the provinces, has been towards a truly staggering mediocrity.

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This is not to blame those responsible. No engineer could expect a non-technical person to design a good transmitter, so why should we expect an engineer to make good architectural designs? It may seem rather beside the point to bother about these things when neither the shape of a building nor the style of printing of a pamphlet makes the least difference to the programmes. But the lack of taste in the one shows a lack of taste in the other, and if commercial firms take such trouble in external presentation, obviously it has importance. This lack of taste in the presentation of things is similar to the presentation of the programmes. So many of the announcers are so smug and self satisfied. I heard a story, as apocryphal as it is apposite, which told of some giggling young men getting out of a railway carriage, which investigation proved were B.B.C. announcers who had found a dead *Punch* joke under the seat. But I must add that lately, during the war, there is a marked improvement. Some are still smug, others give the impression that they are responsible for the more brilliant successes of our forces and superciliously regretful about failures. But they have a difficult job and are evidently conscious of their responsibility. The words DON'T BE SMUG ought to be printed above every announcer's microphone. And in war time: BE OBJECTIVE.

The Corporation has attempted to standardize pronunciation. This reveals a passion for the order of rule rather than the guidance of culture. If a language can be said to live, it changes. The poetic quality of English speech is a consequence of its freedom. A language is a part of self-expression and changing circumstances rightly bring about changing forms of speech. The Americans, who are vital people, have enormously enriched the English language by new words and phrases. These Americanisms, on their first introduction, were considered to be vulgar slang; now usage has made them respectable and even sometimes pompous. A B.B.C. Committee, comprising a Scotsman, a Welshman, an Irishman and two Englishmen sat down to rule for ever how English words should be pronounced. If this had happened a hundred years ago and if the rulings had been accepted, we should now be saying 'gel' for 'girl', 'obleege' for 'oblige', 'chimist' for 'chemist' and 'Cundit Street' for 'Conduit Street'. Now and

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for ever, if the B.B.C. has its way, lamentable will rightly be accented on the first and not on the second syllable, while through and threw and bough and bow will be represented by much the same sounds. These are all examples of educated usage. But if enough uneducated people say lamentable we may all get to do it. Why not? Why? The Americans pronounce words differently from us, they spell some as they pronounce them and pronounce some as they spell them. They justify their different usage by calling it rational. Let the language live and it will grow, standardize it and it will get like a statue, very reminiscent but very dead.

I am conscious that there are many listeners who will say that the Corporation tries hard, that it is impossible to 'please all of the people all the time' and that the programmes are 'not so bad, considering'. (Considering what?) It is true that the B.B.C. tries hard — it is always trying. The programmes are probably not so bad. Are they so good? Like the baby rabbit in the Walt Disney picture, which was granted its wish to have wings, programmes are frequently 'just a nothing', astonishingly like the rabbit in their unnaturalness. It would be ridiculous to suppose that nothing of any value ever came out of the B.B.C. I have been thrilled and excited many times by isolated performances. I have admired talks, plays, musical performances time and time again. Obviously the Corporation's periodical the *Listener* is served by talented and cultivated critics. Moreover everyone in the Corporation is hard working, conscientious, and often enthusiastic. But my criticism is of policy. No one given the control of the mechanism of broadcasting could fail to use it, at times, to let us hear important, amusing or cultivated people. The B.B.C. is like a suet pudding with a few currants in it, it ought to be a currant pudding with a solid foundation. I have listened during the war to some of the Sunday evening postscripts. There has been only one currant so far; Emlyn Williams gave us a talk which was a model, which in its restraint, humour and presentation was all that a talk of that kind should be. But it was Emlyn Williams using a mechanism, not the B.B.C. typically illustrating policy.

I must say too that there seems to be a dim consciousness that

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the old days were bad old days; some B.B.C. apologists might even reply to the criticisms I have made by saying they are out of date. I feel on the other hand that the old days had a rather magnificent monasticism. The present people behave as if they were having a glass of port after a funeral. The worst is over but it is bad form to be gay. They still seem rather afraid of the ghosts of a self-denying past.

The character of the B.B.C. largely determines the character of the programmes it produces. It might not seem to matter whether the B.B.C. were ruled with an iron hand or allowed to sprawl over Portland Place in self-satisfied freedom. Actually it does matter how the organization is ruled. From the very first the B.B.C. staff has been subjected to rigid control by the Directorate and the rigidity of the programmes is largely due to the rigidity of the organization. This control may have been necessary at first but it is not desirable any longer. Many of those who have left the B.B.C. have complained in public and in private of what they describe as the harsh domination exercised, notably during his term of office, by Sir John Reith, and now, to a milder degree, by the inheritors of his tradition.

I think many mistook Sir John Reith's determination for harshness and his leadership for domination. The policy of rigid control of the staff has never been arbitrarily imposed for its own sake. It has on the contrary been consciously used because it was thought to be the only way to hold together a so diversely constituted personnel tackling such complicated problems. I never found Sir John Reith unreasonable provided you accepted his premises, nor arbitrary provided you understood his technique. If anyone expressed a reasoned disagreement they would invite a discussion from which, if they were intelligent, they could learn a great deal about administrative method. Those who entered the presence in sickly fear were those who, having no policy of their own, were afraid of another's. Sir John Reith's policy was deliberate: a few of us knew exactly what he was driving at. I think I saw what he was driving at but I never liked what I saw. That he drove at it straight, competently, and in the full conviction that he was right is obvious. It may seem impertinent, in view of

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our different degrees of worldly success, for me to uphold views contrary to that of my one-time Chief, but I maintain that loyalty to one idea which results in success is no more valuable than loyalty to another which authority rejects. It is possible to respect another's singleness of purpose without agreeing with its aim.

According to my way of thinking, the B.B.C. was made far too self-conscious, thereby destroying its creative power: it was too busy taking in its own washing to work for the public. I used to say the B.B.C. was more like a public school than a public service. Maybe it could be more aptly compared with a regiment, blind in its loyalty to itself and giving absolute obedience to a colonel. In such circumstances it would upset a beautiful harmony if it were necessary to give battle. The bayonets were too bright ever to stain them with blood, the uniforms so spick and span that it would be a pity to spoil them in a belly-to-ground advance.

During my six or so years of service to the broadcasting monopoly I saw the gradual tightening of control and the beginnings of corporate self-consciousness, resulting in the formation of unsympathetic little rules which turn effort inwards to the organization instead of outwards to the product. The B.B.C. contains a great deal of intelligence and enthusiasm, but, in all except the Engineering Section, intelligence is perforce mostly applied to routine and enthusiasm is devoted to a department rather than to broadcasting itself.

If these generalizations are doubted, the sceptical should read Mr. Lambert's *Aerial and all his Quality*. Aggressive action against the weak is sometimes excused by saying that it is all done for their protection. The B.B.C. in the Lambert case was provedly aggressive but it tried to justify its actions by saying that it was using its power over an employee to prevent him doing something which was thought not to be in his best interests. (Nor, incidentally, in the Corporation's.) The arbitrary way in which they set about protecting their charge must have staggered anyone who did not know the character of the Corporation. I daresay some of the B.B.C. hierarchy still think of Lambert as tiresome and prickly; as one who would rather insist upon his rights than be loyal to his employers. But I contend that

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this upholding of the organization rather than those who serve it is utterly wrong.

The Lambert case is one of the few windows through which one can see into the inner workings of the Corporation. That a lovely fantasy about a psychic mongoose which lived in the Isle of Man, like any alien, and knew about different makes of motor cars, sang, and spoke seven languages, should have been the inspiration of such pompously cruel behaviour on the part of the B.B.C. shows a mentality which is typical of the 'gentleman bureaucrat'. A witty directorate, having at least some pretensions to sophistication, would have unofficially cheered Lambert and his mongoose through the libel action and received them back to a fête of congratulations and laughter. In the circumstances, neither Lambert nor the Corporation had anything to laugh about. It was a revealing incident. It was revealing too of what I mean when I say that the B.B.C., when Sir John Reith left his subordinates to interpret his policies, became neither one thing nor the other. I believe that had the Director-General known about what was going on earlier, he would have made someone laugh before it was too late. In my experience, Sir John could always treat administrative absurdities with tolerance and humour.

The founder of the B.B.C. was basically an organizer and a disciplinarian. This was excellent at first, but not so valuable when the Corporation was established. It was asked of every applicant for a responsible job in the B.B.C.: 'Is he a gentleman?' To yield to the temptation to reply: 'So much is he so that he does not worry if others are,' would have been unfair to the spirit of the inquiry. The term 'gentleman' was not meant to describe an easy-going member of the landed aristocracy, but rather someone apt to obey blindly and put behaviourism before intelligence. In these circumstances, it was inevitable that broadcasting should have reinforced conformity.

The B.B.C., examined in the light of what I think is an ideal, fails completely. It was well established but it has never used the power it so efficiently secured for cultural ends. On the contrary it is neither impartial in its attitude to controversy nor an upholder of good taste and original behaviour. B.B.C. broadcasting makes vulgarity more

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vulgar, accepted things more acceptable, and lays stress on tradition for tradition's sake, and, sin of sins, it is dull. Its constitution and the interpretation of its duty has made it a thing of consequence in the framework of governing bureaucracy: it has revealed itself as cautious and careerist and become a perquisite of ruling power with values which are mercantile rather than cultural. Broadcasting, in its present form, is a wonderful help in teaching us the art of being ruled. But Democracy is said to rule itself.

CHAPTER X

A POSSIBLE FUTURE

AT the beginning of the war, after an uncomfortable series of setbacks, a daily newspaper headed a part of its front page patchwork with 'Nothing makes any difference—Official'. I particularly liked 'Official'.

The official view may well be that nothing makes any difference because seemingly nothing makes any difference to the official view. In my unofficial way of looking at things differences are not only possible but probable. Indeed the abnormal circumstances of the war suggest, even semi-officially, that when peace comes it will be a different kind of peace from the last. There may be a chance therefore to clear away the old rubbish and build something rather grand instead. I hope that among other things broadcasting may change and become that 'rostrum of contending political theory' and 'patron of the arts' which is my ideal.

I have criticized the past and present performance of the B.B.C. in the light of my definition of an ideal service. It would be typical of the careerist mind, for which I have little sympathy, if I left a damning criticism without adding some constructive suggestions. So I shall try in this chapter to outline a scheme which I think might make a difference, in spite of official views to the contrary.

Some of the changes I believe should be made have been indicated in former chapters. I have tried for instance to show that commercial broadcasting, working in parallel with the B.B.C., would both increase the enjoyment of listening and prevent the monopoly service from becoming too dictatorial. In the same way the commercial Press is able to criticize Government and the actions of too arbitrary government servants.

I have shown how the lack of wavelengths made the B.B.C. all-powerful and I have implied that the provision of more channels for

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the distribution of programmes would solve all the major problems of broadcasting. These latter advantages are more fully explained in the next and the concluding chapter.

In the following I want to show how there could be a change for the better even if the constitution of the B.B.C. were unchanged, even if there were no parallel commercial service organized on a national basis, and even if we have to persist with the present scarcity of wavelengths. The differences I suggest would be brought about if the B.B.C. were managed by a different kind of directorate, and inspired by a different kind of spirit, and organized in a different kind of way. All these changes would be made to free broadcasting from the hypnosis of the official view, under which it dares not come to life.

Government must be ultimately responsible for the performance of the broadcasting authority it appoints. But I think it would be disastrous to have a Minister answerable in Parliament for the detailed actions of the B.B.C. Such an arrangement implies the very thing that ought to be avoided; it implies that broadcasting is part of the machinery of government, a welcome acquisition for any political party in power.

The principle upon which my suggested reforms are based is one in which authority is, as far as is possible, delegated. The principle implies that this delegated authority is capable of being used by trustworthy executives. My proposed policy is the antithesis of control from above and detailed supervision; on the contrary it looks for competent people and leaves them alone to get on with the job. More than that it gives them equipment and help so that there is less need for detailed interference and supervision.

Since my reforms aim at making broadcasting a cultural and not a political force they demand a Minister who will be sympathetic to a cultural policy. The Government of 'Business Britain' does not include a Ministry of Arts which would be so obviously suitable to safeguard broadcasting interests. Perhaps, after the war, and in a period of reconstruction, intangibles may be more highly valued. It is often said that a Ministry of Arts is not necessary and that 'it does not pay'. Broadcasting pays. This might encourage the institution of

a Ministry which we ought to have in any case. However, this Minister of Arts is not essential to my scheme, however desirable.

I want to be clear that the constitution of the B.B.C. remains, according to these suggestions, unchanged. The scheme would not indeed succeed unless the B.B.C. continued to possess its monopoly. My suggestions are based only on changes in directorate and changes in organization. Not changes in constitution.

In the past the B.B.C. Governors have been chosen from among those who have had worthy careers in business or politics or public service. I think that future B.B.C. Governors should be appointed who are actively engaged in cultural pursuits such as music, literature, education, drama, architecture, and painting. Typical of those who might be chosen would be James Agate, Sir Kenneth Clark, Ashley Dukes, Clough Williams-Ellis, Lord Elton, J. B. S. Haldane, Aldous Huxley, Maynard Keynes, Percy Wyndham Lewis, H. G. Wells, Rose Macaulay, Ernest Newman, Bernard Shaw, the Sitwells, Rebecca West, Vita Sackville West, Emlyn Williams. I should like to include someone representative of light entertainment, but among a large number of names which occur to me I cannot think of one which stands out above the rest.

It would be more difficult to find someone fitted to become the chief B.B.C. executive. Now that it has become so firmly established by the administrative genius of its founder, the Corporation requires a different type of person to use it. Such a person should be both an idealogue and a man of action. First-class people are capable of acting as well as thinking. I would demand one who had had experience in national and local politics, who had travelled observantly and made himself known as a writer. I think he should have seen something of physical danger and physical hardship and had been, at some time, 'up against it'. His opinions about literature and painting and music would be informed as well as sincere. His education would have given him historical perspective and he would be able to inspire and lead others, whether in action or in intellectual activity. It is a fairly comprehensive specification and is given more to indicate a purpose than to hope for its complete fulfilment.

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I should expect that those directly and indirectly responsible for national broadcasting — the Minister of Arts, the new Governors and the new Chief Executive — would make the service more lively, vital and interesting. In the past broadcasting has played an official role, it is not my intention that it should change into whining highbrowism. Under my proposed directorate I do not think it would. I think people such as I have suggested, who have the assurance of knowledge, would not be afraid of being gay and unselfconscious. They would not fear failures because they would be sure of successes, they would have no need to cringe to Government because their background would have no concern with the official world. The sole aim of their policy would be to amuse and interest the listener. If I am wrong I have chosen my candidates badly.

The new directorate would need to employ organizers capable of understanding its policy. My criticisms of the administrator do not imply that I despise order and organization; what I think is wrong is when organization organizes itself for its own sake and ties up creative effort in a lot of tricky little rules. Organization should be the servant of creation, not its master. The programmes are more important than the body which is responsible for them. The B.B.C. clerks, those not directly engaged in making programmes, should occupy themselves in removing material worries and providing material facilities for programme executives. It should be appreciated that it is difficult enough to fill a broadcasting channel with interesting material without having to fill up forms with dull facts.

Effort and initiative are encouraged if left to themselves, but thwarted if continually nagged. A true leader should be sufficiently interested to praise or damn a result, but he should never, unless obviously necessary, interfere in its preparation. I think that those who frame the programmes should be given a much freer hand than in the past. There would necessarily be a few guiding rules, but, within a wide framework, responsible people ought to be encouraged to use their own initiative and judgment. Just as I should expect the responsible Minister to devolve his authority in the widest possible terms, so the broadcasting directorate would give its programme

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executives the greatest possible freedom. If criticism, within or outside the Corporation, were persistent and informed it would be acted upon; if spiteful and irrelevant it would be ignored. The important people, those who make the programmes, would be highly paid and respected; they would, in other words, be given plenty of rope. If they ended by hanging themselves they could never in justice whine the so often heard complaint of the dismissed, 'I never had a chance'.

From the very first the B.B.C. has appointed executives called Station Directors. It might be assumed that a station director would be made responsible for all the material sent out from the station he directs. Up till now, however, station directors have been made to obey head office rules and these have been so stringent and numerous that individual responsibility has been extremely limited. I think there should be responsible people in charge of programmes, but I would call them 'Programme' rather than 'Station' directors and make them as responsible as possible for all the material that flows through one channel. The Regional scheme provides one National and several Regional programmes and so, according to my scheme, there would be one National Programme Director and several Regional Programme Directors.

I want to use the Regional scheme as the basis of a reorganized B.B.C. But I ask that the scheme should be used for the purpose for which it was designed. The Regional scheme was meant essentially to be a means to give listeners a choice between two *types* of programmes, not just a means to provide alternative programmes. So under my proposed reorganization the Regional Programme Directors would be left as free as possible, not only to put on a programme representing the tastes and culture of a particular Region, not only to be free to refuse 'London' (which is properly National programme) material, but also encouraged to try out new interpretations of broadcasting practice. In sum, they should be free to make experiments, to be outlooking and bold and enthusiastic. Further to help in this autonomous Regional Policy each Region would become a completely equipped B.B.C. in itself; it would have its own symphony orchestra, its own choirs, its own repertory players.

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'The B.B.C.' would be built up from a number of Regional B.B.C.s; broadcasting would be federalized. Each unit could have its own policy always providing this did not run counter to an overruling B.B.C. policy. Clearly London would also be a 'Region'. The contrasted National Programme would be made in London and broadcast at all Regions. It would be the alternative programme, contrasting with the Regional programme.

I do not want to make the mistake of leaving my suggestions so vague that an organizer could dismiss them as impracticable nor do I want to make them so exact that their main lines could get lost in a discussion of details. I appreciate that, when all is said and done, it has got to be known who can sack who. But in my way of looking at organization it has also got to be obvious to everyone concerned why the sacking is necessary. I could publish a chart of the proposed organization, but then people with an organizing mind might not realize how it could be used; they would be too busy counting up how many executives were 'above' such and such an executive to see that the chart was a framework and not an end in itself. Without a chart, however, it is easy to criticize the suggestions as 'woolly'.

It is a dilemma. I would be delighted to go into detail with a bureaucratic expert, but not here. I would like a sympathetic organization expert to show me how the programme directors could be given freedom without the necessary day to day working getting out of hand. I think I know how it could be done, but the help of a critic to tidy up my scheme would be helpful. I would chiefly rely upon my ideas coming into practice by having idea'd people who are practical enough to carry them out. This is where a pure blooded organizer would disagree with me. My scheme aims at making the programme units as free and responsible as possible, consistent with order. The best kind of order is made when people are free to make it. My chart of the organization would show who had the power to tighten up discipline if it were necessary. But the way the whole B.B.C. would be run and staffed would seldom make this tightening up necessary.

I would like what is now called Head Office to be rechristened 'The Office of the Chief Executive'. This office would contain personable

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men and women whose authority on their own subjects would never be disputed because it was indisputable. These people would be looked up to by programme units for advice, not relied upon for orders. The office of the Chief Executive would represent leadership, not domination. It could only lead if it were informed, tactful and encouraging.

It is more than likely that, in the present set up, Head Office would for instance forbid Manchester to do *Parsifal* in October because London was going to 'do' it on Good Friday. And of course, alleges London, much better. In the future I should hope that the Manchester programme unit could do *Parsifal* when it liked provided the same idea had not occurred simultaneously to a lot of other Regions. Someone in the Chief Executive's office would have to stop any 'bags I *Parsifal*' attitude on the part of the different programme directors. There is a great deal of jig-saw work to be done before the programmes are all complete and an important function of the Chief Executive's office would be to correlate all the activities in all the Regions and in London to prevent clashing and overlapping. But when some programme unit was going to broadcast some particular work the office of the Chief Executive would be ready to supply advice and help which was both expert and informed.

If, to give another example, a new headquarters were going to be built in, say, Glasgow, the Glasgow director would surely be allowed a very large say in the planning. The office of the Chief Executive would see that the common stamp of taste was applied to all B.B.C. buildings, but that within these limits local ideas and initiative should be encouraged.

There are all sorts of material requirements before a broadcasting service can run efficiently. Remarkably money. Head Office financial control is much too prevalent; or was becoming so in my day. Accountants will gladly spend a hundred pounds on a safe to be sure of not losing a penny. I remember a pile of papers an inch thick coming into my office. These were all memoranda on the subject of the installation of a tap for charwomen to get water for washing the corridor floor in the Leeds station. Nonsense of that kind is a sign of over

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organization. I would like to see blocks of money for all purposes allocated to the programme units to spend as they thought fit. A financial expert on the staff of the programme making headquarters would help in seeing that the money was not wasted and extravagance would be checked by the Chief Executive or his delegate in general rather than in detail. The Programme Director should be trusted not to overdraw on his account for programme expenditure. The income allowed to a programme unit would be decided by the Chief Executive, the Chief Accountant and the Programme Director. After that blocks of money would be passed over to the programme unit from the office of the Chief Executive.

Activities common to all broadcasting would be supervised in the office of the Chief Executive. These comprise among other things publication of the B.B.C. journals, engineering, and information. The aim of the experts in these subjects would be to give the programme directors all the help in their power rather than nag them about 'returns' or details of this and that.

I think these very generalized suggestions would be appreciated in America where executives of large organizations seem to understand better how to work 'with' than 'under' each other. The basic ideas underlying these proposals are first devolution of responsibility to responsible because expert people, secondly helping such people by a centralized guidance rather than domination.

I am conscious of the raised eyebrows of some who may read the above.

'Why, except for one thing, this is just exactly how we run the B.B.C.!' the Corporation's apologist will exclaim. The 'one thing' is the shocking proposal to allow the programme units to form their own orchestras, opera castes, repertory players, and so forth. And my scheme most definitely does not describe the way the B.B.C. is at present run. It is so difficult to distinguish the description of something from the description of how it is intended to be used. A golf club — I mean the thing you are intended to hit the ball with — is a golf club, something with a head and a stick. But what a difference when the expert uses the club from when it is clumsily handled by the un-

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practised! What a difference when a cultivated directorate uses an organization of the B.B.C. from when administrators get hold of it! But perhaps I labour a point. At least there is a direct issue about the self-contained programme units.

I scarcely dare imagine the scorn with which this proposal to have little B.B.C.s at the Regions would be dismissed by the present B.B.C. head office officials. It would be characterized as wasteful, inefficient and unworkable. It would be said that one orchestra, one choir, one drama section formed from the nation's best talents and based on London, is bound to be better than that of many different units scattered up and down the country. This may be true, but it misses the whole point of my suggestion. If there were, say, six orchestras, then evidently there is six times the opportunity for instrumental players than if there were one. The same applies to drama, singing, solo playing and the rest. The federation of broadcasting means the widening of opportunity for artists. To-day opportunity, because of the policy of centralization, is so small that many are discouraged from taking up music or 'entertaining' as a career. My scheme supplies a much greater outlet for the nation's talent. I do not care if at first performances are everywhere worse than those given by picked and centralized talent. I am sure that the friendly rivalry of the different units, local pride, and local enthusiasm would soon raise the standard of each to the present level of one. When some great occasion merited a picked performance there would be more and better talent to pick from. Our national performance would thus far surpass that given under a policy of centralization. My suggestion is designed to tap that latent musical and acting talent which undoubtedly exists among us but which is thwarted for lack of opportunity. The war has shown its existence; the coming peace and the federalization of broadcasting should give it its opportunity. Efficiency be damned!

But now my opponents are ready to give these suggestions a *coup de grâce* — Money! Think how wasteful it is to set up all these different complete units! How absurd to have a corps of clerks, a mass of artists, hideously expensive orchestras, at a number of places when they could all be centralized at one! What a waste of money to buy a

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good dinner instead of popping in somewhere. But how nice! My scheme is so valuable that if the money exists it should be spent. Enough money is available. Over nine million listeners pay ten shillings each year for their broadcasting service. I calculate that after paying all overheads, each of six programme units could receive half a million pounds per annum. This is enough. But at present Government taxes the wireless licence fund. The B.B.C. gets less than half the total subscribed. I suggest that the full ten shillings should go to pay for broadcasting, and, if taxation is necessary, it should be paid as a supplement to the ten shillings. If the listener paid about a halfpenny a day he could make an annual subscription of ten shillings for his broadcasting and five shillings for tax. The B.B.C. would get four and a half million pounds and the Government two and a quarter million pounds every year. Both should be satisfied and listeners surely would not be overstrained paying such a small sum for such a great opportunity.

I have drawn a broad outline. The Governors and Chief Executive become the patrons of many independent though 'obedient servants'. These, the executive programme makers, are left as free as possible to make programmes under the encouragement and guidance of their patron who smoothes their path by removing material worries and provides them with facilities, expert encouragement, and supervision. But obviously the Government and the Governors must frame some broad lines of policy which would be interpreted to the programme directors by the Chief Executive. The following therefore suggests the lines of the overruling policy which could be common to all broadcasting.

The National and the Regional programmes should be of contrasted types; their form and ideology should be different even though the basic material is perforce the same. I think the National programme would have to be of the short item type in order to fit in the different 'services' which broadcasting gives its public. By 'services' I mean news, sporting results, time signals, charity appeals, short talks, official announcements, running commentaries and so forth. The National Programme would thus be of the 'hotchpotch' type, where different

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items succeed one another quickly and (necessarily), incongruously. There would be no need, however, for such programmes to be dull. American broadcasting makes a success of the fast-changing-item type of programme both because the timing is perfect and because each part of the kaleidoscope pattern is bright. The National Programme Director, secure in his own headquarters, free to get on with his job, could make a virtue of necessity and learn something from the Americans.

The Regional Programme Director could and should adopt a different policy and produce a different kind of programme contrasting with the National Programme. These Regional programmes would give more time to each item they produced. This would be in contrast to the usual breathless rush of broadcasting, always making way for incongruity, which spoils the enjoyment of things which require an unhurried presentation. I see 'the Regions' giving complete operas, whole evenings of jazz, large-scale drama broadcasts, musical festivals, complete new works, full symphony concerts, soothingly continuous light music programmes, each properly because completely done. This would all be practicable if the Regional Headquarters possessed their own orchestras, singers, solo instrumentalists, and if they were left free to frame their own policies.

Regional broadcasting should encourage local talent and foster local custom. I see each region as the focus of local artistic ambitions. Every thoughtful person must favour the preservation of local language, custom and music, provided this does not encourage a narrow provincialism. True federalization seeks to preserve different local characteristics without letting them clash with the sense of existing in a larger community. There is a tendency for Britain to be dominated by its capital. The hold of London finance upon the country's industry as much as London's insistence on crowd mentality thwarts a great deal of provincial initiative and aspiration. Regional broadcasting could challenge this London domination and make the challenge effective.

This basic policy would thus provide a contrast between a 'service' or National Programme, patterned by a mosaic of items quickly following one another, and a continuous item Regional programme

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forming an outlet for Regional talent and Regional characteristics. The Regional Programme would be made independently at Regional Headquarters in the provinces, the National Programme would be made at the National Programme Headquarters (presumably in London). There could of course be a London Regional Programme also made in London separately from the National Programme.

Overriding Government policy would have to say something about talks on political and sociological subjects. The Government's chief preoccupation with broadcasting is political; it must ensure that nothing shall be said over the air which might 'endanger the safety of the State'. The Chief Executive would be responsible for interpreting this flexible principle to the programme units. The Government and the Governors would have to agree on some generalized ideas. I think the only possible agreement, fair to all concerned, would be one that said that justice can only be done to all points of view by excluding none. Censorship would only be applied to those who wanted to use the microphone to organize revolution through a minority.

I do not want to make this an essay on politics. The principles I have set out are based upon the often stated slogan that Britain is the stronghold of freedom and that her free speech, free criticism, is essential to her ideals. Broadcasting, by spreading contending views far and wide, would become the rostrum of democracy. The principle of free publication is all very well but it is based on commercial motives. Broadcasting under a monopoly is not. It is the one medium which should be free from any bias, commercial or political. Its obvious duty is to give every argument its chance to be heard, but with a balanced presentation of controversy, that is to say by giving every argument its answer. Broadcasting must trust democracy, not bamboozle it. It might appear to some to 'endanger the safety of the State' to allow, for instance, a Communist the use of the microphone to explain his beliefs. Such fearful people can have little faith in their opposing case and no confidence in their power to expound it. Nor can they have much trust in what they describe after a good dinner as 'peoples' common sense'.

These principles may seem dangerous to the conservative and

mawkish to the doctrinaire revolutionary. They are really nothing more shocking than an application of the principle of what we call democracy. It would be rather fun to try it out some time. The Governors of this reformed broadcasting system might persuade a Minister of Arts to let them try the experiment. They would be brave men to do so. But they would have been chosen for their courage and independence. There is no doubt that politicians and the Press would squeal their protests against the broadcasting 'of subversive opinions to an ignorant mob' (their words, not mine), but the squealing would give way to purring when their own advocates held the air. It might be pointed out that we have an incorruptible judiciary and why not a fair-minded broadcasting authority? Broadcasting as I see it demands the presentation of all the bright facets of controversy, not the pedantic and careful dullness of a bias towards conformity. Why should not we try to make democracy a reality?

Educational policy would also be framed in consultation with the Government. I may have a bee in my bonnet on this subject but I do feel so much more could be done. I do not say that some responsible officials do not realize the shortcomings of our educational system. But I maintain that this recognition has not so far resulted in many obvious reforms. My impression is that the average child looks upon school as a routine misery and as something entirely detached from enjoyable life. Learning things is looked upon as a necessary chore. Examinations are barriers which, unless climbed over and passed, block the way to earning money. Pupils feel that 'subjects' must be separately mastered. This feeling that 'subjects' are separate things is encouraged because they are taught in separate classrooms by separate teachers. Little is done to fit subjects together into the common pattern of knowledge.

Broadcasting to schools might be arranged with the chief object of making the meaning of education clear to the often puzzled and bored child. In other words broadcasting talks could make formal teaching intelligible in its relation to day-to-day life. Children could be made to see that what is happening to them now is due to what has happened before and that history is the story of these happenings.

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Literature could be seen to be more than a jumble of words never used in ordinary life. It could be explained that writing describes how people have felt and thought and how they have seen the world around them. The elegance and form of writing makes it enjoyable for itself. Science, which seems to many a bewildering jumble of words, symbols, smells, and erratic convulsions, should be explained as a convenient code to show how material things behave. Mathematics would lose much of its horror if seen as a game with symbols. Its use is in working out problems which cannot be solved in any other way. Arithmetic is a code too, useful in everyday life or fascinating as an abstraction. Learning would be thus seen to be the process of getting to know what human beings have found out in the past so that there is no need to find out all over again, knowledge might thus be seen to be a practical equipment which can make life so much more interesting and successful in whatever terms success is defined. It might well be stressed also, in these knitting together talks, that Art is not a scholastic subject but rather, in essence, a feeling for beauty for its own sake having neither moral nor mercantile standards.

Talks explaining such things to children might here and there awaken that curiosity to know more which would ever afterwards make some lives more interesting and amusing. The speakers for these talks ought to be chosen to have the power to think through children's minds, they would be useless if they only paraded their own superiority. Those misers of the intellect who hoard their knowledge and guard it by long words and circumlocution, those 'great authorities', which a snob broadcasting system would engage by name, would be useless.

One word on the mechanism of school broadcasting. Broadcasts to schools are at present given by loudspeakers talking to all the class. I think it would be much better if each child had a separate pair of headphones. These allow for better concentration, they make their wearer feel that the voice, so near the brain, is in it. The loudspeaker, competing against the too often atrocious acoustics of a schoolroom and energized from a cheap receiver, makes children concentrate more on hearing than the subject matter of what is heard. I have been told that headphone bands would get lousy from contact with

unwashed heads. But I would prefer lousy headphones to a lousy education.

This concludes an outline of general policy. For the rest the programme directors would dictate their own policy and frame programmes as they thought fit. A B.B.C. formed, organized and inspired by these ideals would become a sort of national university which anyone interested in art, sociology or politics would respect and consult. The staff would not, as to-day, be so much envied for having a good job, but rather respected for having a good mind. Men and women would be chosen for their talents, not because of a family background, or a pull in official circles, or some exceptional ability to charm a boss. The buildings would illustrate the Corporation's taste and originality even if it meant employing architects who were commoners and decorators who never decorated a highbrow cocktail party. Everyone wants to buy the *Radio Times* because it is the Bradshaw of broadcasting. What a staggering opportunity to forego large profits and set an example of taste and wit in presentation and material! But because the government takes such a large proportion of the licence revenue the *Radio Times* is looked upon as a profitable investment in money, not a means to show what can be done when money is no object. And through it all it would be implicit that broadcasting is essentially an amusement but that there are all sorts of ways to be amused.

I am now going on to state some purely personal preferences about the art of broadcasting. The foregoing has tried to show the broad policy of a service within which individual ideas should be encouraged. I should like to set out my own individual ideas not because I think everyone should copy them or because I think they are the best ideas, but only because they illustrate what might be typical of individual initiative. In other words what follows represents what one person might do within the limits of the general rules and guidances imposed by policy, it does not mean that everyone would do the same. On the contrary the general policy is designed so that different programme directors can try out different schemes. Broadcasting could thus become alive and experimental like the films or the theatre.

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I think broadcasting as we know it is seldom well presented. Announcing I feel might be improved. All this nonsense about standardization of pronunciation should be done away with. The announcers, I think, should be essentially 'men of the world', men of good education, of 'a certain age', and possessing a good deal of generalized experience. (And they might be able to pronounce 'secretary' properly.) Not everyone who has seen a lot, travelled widely, and mixed with all sorts of people has necessarily a good voice, but, if they have, then that voice has the desirable weight and authority. I hate affectation. I doubt, however, if it is a good idea to avoid it by using dialect speakers in spite of the vitality and punch of their voices. Dialect is too frequently ugly in an absolute sense, being spoken in the back of the throat thickly with an over-emphasis on the vowel sounds. Educated speech in all languages is spoken with the lips, succinctly. My sort of announcers would be allowed to pronounce words as they chose because they would have the sanction of educated usage. At all costs I would avoid that self-satisfied smugness which too often accompanies a facility for reading aloud.

Enthusiasm on the part of those responsible for entertainment frequently makes the entertainment better. A film trailer, vulgar as some would call it, whets the appetite. An announcer's enthusiasm is a fine thing to frighten away self-consciousness and awaken appreciation. So I think there would be no harm in telling listeners what programmes to look out for and tell them in a way which would make them feel they are going to like what the announcer likes.

A better way of giving 'Talks' than inviting a lot of whining and mumbling authorities to read careful manuscripts would be to get good talkers to interpret the ideas of others. The Belgian and French broadcasting authorities have a feature they call a 'Journal Parlant'. This idea of a 'Talking Newspaper' expresses just what I mean. The editor of a printed newspaper, which is of course also a 'viewpaper', uses journalists to go about looking at things and talking to people. The journalist describes his impressions on paper. He picks other people's brains and arranges the pickings attractively for readers. In exactly the same way the 'talking newspaper' would be made

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largely by men and women who were reporting their impressions of things and people. This would ensure good voices, attractive personalities, and a lively presentation. Instead of dear old professors obsessed by the minutiae of subjects they know too well some expert speaker would tell us something about the professor and a lot about his ideas. Of course authorities who were good broadcasters would often talk, just as the newspaper prints feature articles written by well-known and well-informed authorities. My suggestion is, in effect, to have fewer prosy bores reading what sounds like a conscientious piece of homework and more expert talkers who know how to make clear word pictures of events and ideas. Talks should exist to let the listener see the working of rare minds, not just tick off 'good' subjects under 'good' names in a syllabus.

I would, as a general rule, forbid talkers to read from manuscripts. This rule governs and benefits discussions at some learned society meetings. Notes would be encouraged so long as they were there to maintain order and not so voluminous as to kill inspiration and block spontaneity. If a talk were interesting enough to be included in the B.B.C.'s journal the *Listener* it could be recorded in spoken word form on a machine and then translated into the formality of an article.

No one, in the B.B.C., if I had my way, would be allowed to talk about 'microphone technique'. I do not say that the phrase is meaningless, but I think the title is much too exalting. If anyone is likely to hold the interest of a small audience in a small room he or she is likely to be a good broadcaster. Learning elocution, concentrating on raising the voice at the commas, holding the head up, and the rest, is liable to subtract from the all important factor of the speaker's personality. Personality is a part of natural speech. Given a voice of character even slipshod speaking, provided it is intelligible, is much more interesting than the pedantic 'prunes and prisms' enunciation of elocution which makes dullness more obvious..

It would, in my opinion, be a good policy if more music were played in public places for the public to hear directly. A loudspeaker only hears music, it misses that retroaction between conductor, orchestra and audience which gives a concert the reality of a com-

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munity experience. I feel therefore that the Regional Orchestras should tour the regions giving concerts to public audiences for a nominal entrance fee. Of course the orchestra could take a microphone with it so that those who could not go to the concert at one time would be encouraged to go at another. There would be lunch-hour concerts too, the success of the National Gallery concerts during the war gives the proposal point. It has been proved that the public does truly enjoy music and the more opportunities for these enjoyments the better.

I would go further. I would attempt opera performances in studio and in public. It is clear that as a nation we are not very good at opera. How should we be with so little encouragement? But broadcasting would supply the encouragement and we might get better. The Sadler's Wells people have done excellent work. It should be expanded through other enterprises fostered by the rich patronage of broadcasting. Even if for years the standard of performance were inferior to that found abroad, still the effort would be worth making. Star artists might be tempted (by good fees) to stiffen castes; they would be vastly helpful if they would sink their pride and increase their bank balances.

I think musical festivals should also be fostered under B.B.C. enterprise. Guest conductors and guest artists would be invited, new works and rare works performed. Why not? Vested interests? Money? To hell with the one and there's a heavenly lot of the other.

My ideas may have been sufficiently illustrated by the examples I have given. But I do not forget the more popular things such as Variety, Musical Comedy, Jazz, and so forth. I think these things are very important because they are so popular. They are far too important to be no more than a reflection of the commercial music hall with its emphasis on smuttiness rather than on robust vulgarity. I know it is boring to hark on 'the good old days' of the music hall, but I do think that the artists of twenty and thirty years ago were more racy of the true English spirit than to-day's slick little boys who make the middle classes simpler. Broadcasting should search for more talent that is vulgar, meaning robust and popular, and should try to eliminate that

which is salacious and dirtily suggestive. It might be too much to ask for wit, that, it seems, has emigrated to America.

Recording will undoubtedly play a useful role in all future broadcasting. Records of performances can now be so well made that they are practically undistinguishable from the living performance. We are no longer dependent for permanent recording upon scratchy discs rotating a placid dog. One day, when it pays the gramophone companies, the public will get the benefit of improvements. The listener could however get them to-day through broadcasting. He sometimes does. The B.B.C. has done good technical work on the subject and has bought the finest recording instruments. It is gradually building up a library of records. How far it has gone I do not know. It cannot go far enough. I hope that in time the performance of every noteworthy artist will be preserved for posterity. But it is an expensive business. A 'celebrity artist' may charge a fee of a thousand pounds to sing or play to an audience of four thousand people. On a *pro rata* basis the broadcasting fee for an audience of four million listeners would be one million pounds. My sweeping aside of money questions recognizes its limits.

'My art really belongs to the people,' said a great diva in my presence.

'So it ought to,' I whispered to my neighbour, 'the public should have completed the instalments by now.'

Perhaps this difficulty about fees might be solved by recording artists in their prime and only releasing the recordings in their dotage. This would be excellent publicity for one of those last long farewell (thousand pound fee) concerts. So between the B.B.C., the artist's agent and the artist's vanity the library would be built up. One can imagine broadcasting in the future imitating the command performance by releasing the recordings of some of the world's best talent. There might be some lovely nostalgic gala nights.

I hope from the above suggestions it is seen that I want broadcasting to become a part of cultural life and a public amusement, not an official voice to damp it down. The idea is to give broadcasting as many outlets as possible so that the listener, overhearing all that is going on,

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is encouraged to join in. Broadcasting should be 'an outlet for the peoples' voices, not the voice of the people'. It should exist as the stimulation of effort, not as encouragement of complacent watching.

If this point is appreciated it will be realized how much more completely the policy could be carried out if there were more channels of diffusion and therefore more outlets both for spoken opinions and artistic performance. The miserable two channels provided by the Regional scheme limits policy and imposes compromises. If there were more channels, if wavelengths were not scarce, then instead of evenings of jazz, opera, musical comedy, debates, light music, and so forth, all these things and more could be going on simultaneously. Each programme unit would contain specialists who were each in control of a channel carrying specialized material. The listener in a mood for variety would switch on to the variety channel. Feeling that he has never properly appreciated Wagner's *Ring* a listener would see if he could sit out an evening's recording of the performance of the best caste that had ever been got together. Debates, talks and discussions could go to their unrestricted and complete length; exact replicas of what would take place in a public hall. But in spite of a more profuse technology the basis of the idea remains the same; devolution of authority to experts, programmes for minorities, and the encouragement of local talent, manners and customs. The broadcasting university I have suggested would, with more channels, become more universal.

This idea of being able to supply a large number of programmes simultaneously is not some academic dream. Technology is ready to give the facilities which an expanded practice of broadcasting demands. The use of wires instead of wireless to distribute programmes provides any number of channels.

The next chapter expands this idea, the one after shows how hopes of putting the idea into practice have been destroyed. The last chapter points out that obstruction has been made by organizations devoted to their own and nobody else's interests.

BROADCASTING THROUGH WIRES

I HAVE a dream about the future. I see the interior of a living-room. The wide windows are formed from double panes of glass, fixed and immovable. The conditioned air is fresh and warm. Old-fashioned people would feel uncomfortable without the fire and fireplace, others might miss the raucous brown box we used to call 'the wireless'. But flush against the wall there is a translucent screen with numbered strips of lettering running across it. The lettering spells out titles which read like newspaper headlines. These are the titles describing the many different 'broadcasting' programmes which can be heard by just pressing the corresponding button.

I glance down the list. Obviously programmes of the same sort are grouped together. The music group includes Scherezada, Rimsky Korsakov (London), Winning Choir, Leeds Musical Festival (Leeds), Beethoven's Ninth Symphony, Kosterkovitch conducting (Moscow). Then some lighter music: Waltz Time (Vienna), More early Italian Opera (recorded), Sea Pieces, Macdowel (Manchester). Lighter still we come to Tango Tea, The South Americans, Savoy Hotel (London), Jazz Festival (Los Angeles) and the Harmony Hitch Hikers (Recorded in New York). Talks break out more seriously: The New Farming (Norwich), The Severn Barrage — Special Reporters interview President Inst. Civil Engineering (London), On parle français (Paris), Discoveries in Central Asia, by a Russian explorer. There is an advertisement group which offers me 'The Tale of the Little Red Drum' (Tobacco Hour), and Horlicks' Current Affairs Debate, besides 'Oss and Boss' whom I gather are 'Leica comedians'.

Television programmes are set apart. I can, if I like, see the repeat of an old favourite, 'The Importance of Being Ernest' or 'Centre Court Men's Semi-finals, Wimbledon'. Not bad for a summer evening at six o'clock. Apparently nothing for children. But I see it now, 'How it works' is the title.

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Even as I run my eye down the titles some have changed, showing that a new item has superseded the old. Apparently I have missed the Choral Symphony from Moscow, which is a pity, but I can still hear the Harmony Hitch Hikers. Everyone is raving about them. So I lower myself into a chair and press the proper numbered button on a remote control panel placed conveniently beside me. The voices are suddenly in the room, startling in their naturalness. A bit loud, so I reduce them with the volume knob under my hand. How remarkable that trivial music can be made so attractive by perfect time and tune! As I listen I remember that to-night is the Television Premiere of a new English comic opera called 'Reading from Right to Left'. I see from my programme paper that it starts at seven-thirty and goes on for three hours. I must get my dinner soon or I shall miss the curtain, otherwise I would stay to see the end of the tennis. But I shall get the result in my house newspaper to-morrow. This will be printed, while I sleep, by a machine in the lobby. Wonderful service the Wire Broadcasting Company gives me for half a crown a week; only a shilling if I cut out television and the newspaper. I'd rather cut out cigarettes — perhaps. Not a hint of background noise spoils the sound even though some of the performances take place half across Europe, the quality is so lovely that reproduction criticizes every detail of the playing and speaking. The television picture I shall see later on will be bright and detailed in spite of a summer evening's glow outside the wide windows. It's a whale of a dream!

Of course it is only a dream, but not so completely fantastic as some might imagine. It could all be done by using wires rather than wireless to distribute programmes. Let a cable, no thicker than a man's finger, be laid along the streets, outside the houses, and the main part of the installation is completed. The cable would only contain two or three conductors and tappings would be made on to these for branch feeders to bring the service into the houses. The branch ends in the houses would be connected to house receivers. The street cables would be taken to transmitters which would inject programmes into them.

The basic idea of sending several messages at once through a single

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pair of wires is well known. Technicians refer to it as a 'carrier current' or 'high frequency' signalling. I prefer the paradoxical term 'wired wireless', particularly for a popular explanation. To my mind wired wireless aptly describes a system which guides wireless waves down wires instead of broadcasting them into the air. In wired wireless the waves are confined within the boundaries of a conducting network, in wireless broadcasting they are purposely forced out into surrounding space. The great disadvantage of wireless broadcasting is that only a hundred or so stations can work simultaneously in a continent-wide area. The great advantage of wired wireless is that the broadcasting area of a continent is shrunk, so to speak, to the size of a copper network. This can be as large or as small as we please, and all of a hundred transmitters can send their hundred programmes into wire conductors without fear that they will interfere with other messages flowing in other networks. The channel spacing (that is the necessary difference in wavelength between different transmissions), can be wide enough to ensure perfect quality reception. The waves, guided down wires and not wastefully broadcast, are so strong at the points where the receivers are joined to the wires that the receivers can be robust, simple and cheap. 'Tuning in' the wired wireless receiver, which selects one transmission from all the others, is not a matter of a hair's breadth adjustment of a pointer on a scale patch-worked by strange names, but a labelled click-switch or push button operation which anyone can make.

Before a wireless system of broadcasting can be set up the world's governments must agree about wavelengths. Then the wireless transmitters are designed by one authority, the receivers by another. The listener buys his home instrument on the impulse of advertisement without any guarantee of continuing services.

In a wire broadcasting system no international arrangements need be made about wavelengths, all the technical arrangements, transmission and reception, are under one control. The listener has nothing to buy, he pays a rental for a guaranteed service regardless of how it is contrived. Complaint can then only fasten on technical faults which can be quickly put right by experts. Criticism can therefore be concen-

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trated on programmes, not on the method by which they are heard. He would be a difficult person to satisfy who could not find something interesting or amusing among the many programmes which could be supplied by wired wireless broadcasting.

The network of cables essential to wire broadcasting could also be used to connect a number of small printing machines, installed in flats and houses, to a master control in a newspaper office. Fed nightly with blank sheets these home printing machines would have supplied a complete newspaper by the morning. This could be done without disturbance to the wired programme service; the two processes could go on simultaneously.

The question naturally arises, why, with these many technical advantages, was not wired wireless used for broadcasting from the first? The answer is, I think, that when broadcasting started no one knew if the public wanted it and so no one would risk more money than was necessary to find out. A low power wireless transmitter, such as was used at first, cost no more than a few thousands of pounds, but it offered a service to perhaps a million households. The installation of a wire network to serve an equivalent population would have cost hundreds of thousands of pounds. No one would have risked this expenditure without some assurance that the public wanted to listen, with wires or without them. The popularity of broadcasting and the practicability of using wires to distribute programmes are now both proved. Wireless has prepared the ground for wire broadcasting.

But a system such as I have dreamed about; a system which may be put into use at some future time would 'cost too much' at present; it would not pay. There are nevertheless limited applications of the principle which make wire broadcasting a perfectly practical possibility because they would pay. The limitations imposed by 'commercial considerations' are quantitative. My dream gave the listener a very wide choice of programmes; practical systems, which are ready to be put into service now, would offer no less than six programmes. The practicability of systems which have been worked out is assured; they do not depend upon having to install a new network of cables, they do not require streets to be dug up to bury fresh wires, or towns

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to be disfigured by overhead wiring. They use either the telephone wires or the electric mains which are already installed. It would cost far too much to bury new wires, the limited applications I talk about use existing wires. I describe in the next chapter how this is done and how the main functions of telephone and electric supply are undisturbed by the supplementary service. These limited applications, if they were allowed to be put into practice, would make a vast difference to our broadcasting service.

Here I come to the crux of my argument: this is the point I have been explaining, pressing, writing about, and talking about, with growing insistence, for fifteen years. Fifteen years is a long time to talk about something without anything much being done. The Regional scheme issue was bad enough – but this – this subject of wire broadcasting beats all records for obstruction of ideas and invention. I find it very difficult not to stutter with anger, but I know how boring it is to listen to a man with a grievance. But it should be as much the listener's grievance as mine. Because for the last fifteen years I have tried to convince the people who could do something that all the problems of broadcasting are solved by using wires, not wireless, to distribute programmes, and for fifteen years authority, as much governmental as financial, has blocked progress.

It is regrettable that the best way I can drive my point home is by proving that if my fifteen-year-old suggestion had been adopted it would have been of incalculable value to the country in helping to prosecute the war. It would be preferable if my point that the cultural and amusement value of wire broadcasting is its fundamental justification, could be as readily appreciated.

But had we been using wires for programme diffusion when the présent war broke out listeners would now have been enjoying a clear instead of a distorted reproduction of programmes and would have had many, instead of occasionally two, different types of programmes to choose between. As it is and because we will persist with old ideas, something very nasty has to be done to the wireless transmission during air raids. This is contrived so that the sending stations shall not be used as guiding beacons by 'hostile aircraft'. This may baffle the

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German pilots, it certainly baffles the British listener. It prevents anyone who is not living near a transmitter from enjoying the music at all, and it makes speakers, who no doubt really have pleasant voices, sound like a crow with a sore throat. Even words can be lost and the sense of vital sentences destroyed by the distortion. But over wires, if only someone had had the foresight to use them long ago, voices would have been clear and we alone, not the enemy, would have heard what they said. 'The Forces', cut off from normal amusements, would have had their choice of light music, symphony or jazz, the reproduction would have been clear, and the usual 'noises off' would have been right off. The civilians in their dugouts could have had an all night earphone service so that some could sleep and some, sleepless, could be sent to sleep with the music masking the noise of bombs. No one would have heard Haw-Haw and Haw-Haw would only have heard things we wanted him (and the Germans) to hear.

It is shaming these days to turn the dial of a wireless receiver and meet again and again the strong full voice of the enemy dominating the air. Our own efforts are but an asthmatic wheeze in comparison. One or two super-power British stations sending out waves only for export, a wire network to contain our own affairs and to give a diversity of good sense and good music to our own people, would have made a magnificent war-time broadcasting system. It would have been doubly justified because it is also by far the best system for broadcasting in times of peace.

Nearly every chapter in this book has harped on the lack of wavelengths which, by limiting the number of programmes which can be clearly heard and faithfully reproduced, has stunted the growth of broadcasting. We owe the existence of the B.B.C. to wavelength scarcity. Channels had to be forced so close together in the international plan of wavelength distribution that the quality of reproduction of foreign stations, otherwise strong enough to give good service, is spoiled by 'splash over' from other stations. The Regional scheme, framed with the idea of giving more outlets for talent, ideas and performances, could only offer two programmes because there were not enough wavelengths for more. I have suggested that commercial

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broadcasting has advantages if run in parallel with a B.B.C. service, but it is impossible, even if the principle were admitted, to set up advertising stations in Britain because all the British waves are being used for monopoly broadcasting. In consequence foreign stations have to be used and a good deal of money for the service leaves the country. The wavelength scarcity has made a pompous broadcasting authority and 'the wireless' a snarling noise in the corner lacking beauty and diversity. In sum, there is no problem concerning broadcasting which cannot be solved by changing over to a technical system which provides numerous channels for programme distribution and there is no better method for doing this than by using wires instead of wireless to link programme with listener. And yet, as I shall show in the next chapter, every organization, directly or indirectly connected with broadcasting, is opposed to making the essential change. My dream remains a dream because its realization is blocked by vested interests, both State and commercial.

There are many who cannot see, or more likely do not want to see, the value of wire broadcasting. These people, who have vested interests in maintaining the old system, use arguments which are either silly or rather sinister. It is not very difficult to refute them but I think it ought to be done.

One can perfectly well realize that people who would lose money by the institution of a better system naturally do everything they can to resist the change. It is not their fault that they do this, it is just the effect of the system, under which we live. It is on the other hand disappointing, to use no stronger word, when State appointed organizations are on the side of stagnancy. There are some B.B.C. officials, and they are quite influential people in the Corporation, who are definitely opposed to increasing broadcasting facilities. These take the view that it is the very restriction of the broadcasting mechanism which enables it to be used more completely for 'good'. In other words these people argue that the B.B.C. have an excellent excuse, in their limited system of transmission, to do good to the public by denying it anything bad. The scarcity of channels is therefore welcomed; it is a means to deny the public a lot of entertainment it

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might otherwise debasingly enjoy. This is dictatorship made easy by scarcity.

The mentality which supports these arguments is the same which would forbid a library to supply books considered to be 'subversive' by a careful committee, which wants a strong censorship over all publications, which tries to prohibit drink, and thinks that menus should be edited by dietetic experts. But a well educated public needs no chains, it will go 'right in freedom'. A sensible public does not dishonour drink by drunkenness, it sees in gluttony its own punishment and reads pleasing things for pleasure. If the public is not well educated it should be given an opportunity to learn. Deny it everything which 'might be bad for it' and it will never see the need for selection. A multi-programme broadcasting service, in catering for every taste, is more likely to elevate some. At least it supplies more palliatives for dreary lives, at most it increases the opportunities for enjoyment. A continuous service of items cultivated people have found enjoyable may teach the less fortunate how to appreciate things they are not at first practised to understand. Conversely the way to kill an unhealthy taste is to over-satisfy it. Anyone who believes that a surfeit of meretricious material is bad for people should see that the best cure is to provide every facility for the greedy to get sick of it.

Dare I introduce that much abused word 'Liberty'? Is not the liberty to hear everything as important as the liberty to read everything and say anything? But without discussing moral and sociological issues too deeply I hope I have at least made the point that a multi-programme service has the same general justifications as free speech and free publication.

It is curious that those who have used wireless broadcasting tendentially should oppose the introduction of a system which, but for safeguards, could be used tyrannically. Perhaps they fear the safeguards more than they welcome a possible power to exercise a greater domination.

One of the arguments used against wire broadcasting was made to me by a politically minded Frenchman who said that it was 'another fascist weapon'. I replied that at that rate it was also another communist agent. What we were getting at was that in wireless distribution a listener can pick up from foreign stations material uncensored by his own

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government. In wire broadcasting his government could make sure that he could only hear what the government chose should be put into the wires.

There are to-day in Britain systems for receiving wireless programmes in which listeners have only a loudspeaker energized through wires from a master set. This is a very limited application of the use of wires because it is only the programmes that are made for wireless broadcasting and sent out into the air which are relayed or rediffused through wires to the listeners. I shall have a lot more to say about this rediffusion business in the next chapter. It has only been applied in a very few places. The point in mentioning it here is that it is a system in which a single authority, usually a private company, chooses which of the many programmes existing in the air shall be sent down the wires for the listener to hear.

A rule has been made by our Government during the war, while of course our liberties are in cold storage, which forbids those in charge of the master set to pick up and rediffuse to listeners any foreign transmissions containing the spoken word. The present day war listener who chooses to get wireless reception done for him on a master set, and pays a company for this facility, is denied the liberty, still possessed by a wireless set user, to hear Haw-Haw or anyone speaking what the Government considers to be subversive propaganda. This is what my political friend meant; he thought it was much easier for a single authority 'to dominate the narrows of programme flow' with wire than with wireless broadcasting. He was quite right.

My answer to this criticism is quite simple. It is the same answer that could be given to someone who pointed out that the Government, controlling as it does the postal services, could forbid the import of foreign newspapers. I would say that provided we had a 'free' Press in the country it would not matter whether the foreign newspapers could be read or not; it would be certain that if they contained something which the public might like to know the national 'free' Press would publish it. In exactly the same way, if commercial advertising programmes were broadcast on the wires as well as the B.B.C. programmes, the rights of the listener to hear unorthodox opinions would be safe-

guarded. Of course if the government went totalitarian this would not be a safeguard because the commercial programmes, like the commercial Press, would also be controlled. But so long as some semblance of the democratic idea persists, then, just as a diverse commercial Press gives diverse comment and criticism, so a commercial wire broadcasting service could constitute a check on an arbitrary B.B.C. censorship. Of course foreign transmissions could be picked up and relayed by wires to listeners. Wire broadcasting does not isolate the national listener unless a dictatorial government chooses that it should. Dictatorial governments are alleged even now to forbid citizens to pick up foreign transmissions on their wireless sets. There might be, according to my suggestions about a future B.B.C., another safeguard. I said that the charter of broadcasting should permit the broadcasting authority the widest possible interpretation of an inevitable clause forbidding it to let anything be said over the air 'likely to endanger the safety of the State'. If the monopoly directorate had a cultural outlook doubtless this interpretation would be bold and generous.

Other critics of wire broadcasting have been more frivolous. For instance a member of a parliamentary committee which was considering wire broadcasting alleged that anyone could, by means of 'a small needle instrument' [*sic*] tap the wires and inject his own broadcast into the common network. This possibility was made to seem more than ordinarily dangerous because, according to the wary committee man, what would be injected would almost certainly be 'subversive propaganda'. It seemed to those of us who knew something of broadcasting technology a difficult technical feat to tap the wires with any instrument let alone the 'needle' affair, and hardly worth the trouble because the audience secured would be so small. Wire networks are sectionalized and a tapping in one house would only connect with a few hundred other wire listeners. Wire broadcasting is in fact more difficult to sabotage effectively than wireless broadcasting. Wireless waves penetrate everywhere and can secure an audience of millions, the wires are cut up into discreet sections each serving a small number of listeners. Yet in spite of the great opportunity afforded by wireless for unauthorized broadcasts I know of only two cases where this power has been

used. In one an American told risqué stories from a transmitter hidden in a lorry which toured from place to place to escape detection, in another a German communist, before the third Reich was instituted, tapped the telephone wires between studio and transmitter and substituted his propaganda for the official talk. The same thing could be done with a wired technique but with much more difficulty and far less result.

I know of no other serious arguments against wire broadcasting which are worth repeating and refuting here. The wireless trade say of course that the institution of the system would throw tens of thousands out of employment because the public would give up using wireless sets and the wireless manufacturers and traders would therefore be ruined. This reminds me of the indignant Labour Leader who, looking at a steam shovel, exclaimed, 'There, rationalization! that machine replaces fifty men with shovels.'

'Yes, and ten thousand men with tea spoons,' replied a logical spectator.

Wire broadcasting would divert profits, not destroy them, it would change the character of employment, not diminish it. Besides wireless manufacturers would still have to make wired wireless receivers. These would be simpler of course and less expensive than wireless sets, and therefore less profitable, but they would represent a grand job for mass production.

Moreover wireless would not cease. There would be no need for so many wireless transmitters, but there would still have to be some; one or two super power stations per country perhaps to give a chance for international programme exchanges and to make listening possible in ships, motor cars, aeroplanes, and so forth. The wireless service would be much better because the wavelengths used by the fewer stations could be spaced further apart, the stations would therefore not interfere with each other as they do to-day. Furthermore the wire method could not possibly supersede wireless all at once; in whatever form, it would take a long time to wire all Britain for sound. How long depends on how hard the experts are allowed to try.

But when it was done what changes it might bring about! My dream, which I recorded at the beginning of the chapter, was too expansive and too expensive for practical realization. But it is perfectly

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practical this day and hour to start setting up wire broadcasting systems which would give six channels for the supply of six programmes. These, under a proper use of the system, would not just be six different hotchpotch's of confused items but six different classifications of programme types. For instance, channel No. 1 might carry Jazz and light music; channel (2) 'Services' (news, running commentaries, short talks, announcements, time services, results of sporting events, stock market reports and even fat stock prices); channel (3) could be exclusively devoted to good music, opera, symphony, music festivals and so on; channel (4) might be handed over to commercial broadcasting and channel (5) might be the 'Minerva' channel. This would be devoted to education, controversy, and 'serious' talks. Channel (6) might complete the classification by giving Drama and Variety. One channel might be wholly or partly reserved for foreign broadcasting. Or if a good symphony or opera were taking place abroad it could be sent on channel (3). It could either come by wireless from a super power sender or better by a telephone wire forming part of 'continental trunks'. I daresay there are many different and some preferable classifications of programme types; my examples are given only to illustrate a principle.

I still think that the organization of the B.B.C., in spite of the great increase in facility, should still be based upon a Regional scheme, the difference being that the Regions as well as the nation would have more facilities. There might well be some more Regions but not too many. Thus the national programme might well take over the responsibility for 'services' (channel 2 in my suggestion) and 'Minerva' (channel 5). The 'good music' channel would be mostly reserved for Regions. Nos. (6) and (1) could choose as they liked to take a good variety show or light music or jazz from other Regions or make their own. I expect they would mostly like to make their own dramatic performances. Big events of national importance would naturally use the national channel which looks like being No. 2, but of course the flexibility of the trunk telephone system makes it possible to pick up an event (speech, football match, opening ceremony, etc.) wherever it takes place. The arrangement of broadcasting programmes is to-day a jigsaw puzzle, the complexity of the puzzle is not diminished by the

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provision of more programmes. It means more work for the B.B.C. but far more interest for the listener. This seems to me to be quite fair.

I claim to be the first to have seen that 'the future of wireless lies with the wire'. It must have been about 1925-26. I had come back on the night boat from Brussels where the Union had been discussing the interminable problem of wavelengths. I was lying in a bath, my mind going over the interminable arguments — 'my country is a very long country — pas d'accord, pas d'accord'. Suddenly it came to me: 'Why use wireless waves to scatter programmes if we can use wires to contain them?' It was only because waves escaped into foreign countries that they became the subject of international haggling.

'Eureka,' I cried, resisting tradition by putting on my clothes before hurrying to the B.B.C.

'How would you like it,' I said to the programme people, 'if you could put all jazz and light music in one channel, classical music in another, all education in a third, and still have a fourth and a fifth and more for different *types* of programmes?'

'Like it,' they said, 'when can we do it?'

'How would it be,' I said to the engineers, 'if, instead of our pure and lovely transmissions being mangled in cheap receivers, we could control reception as well as transmission and make reception do our transmission justice?'

'How should we do that?' I was asked.

'Why, by using wires,' I said.

'Wires, what wires?' I was asked suspiciously.

'Oh wires,' I said, 'just wires.'

I was pretty vague. I was sure somehow that the principle was right, but I had no fixed idea how we should put the principle into practice. This first brilliant flash of the idea took place a long, long time ago, fifteen years I reckon. But as to technique there were plenty of possible alternatives. We might use new wires and wired wireless as I have described in my dream. I realized even then that it was possible to use existing networks like the mains or the telephone wires. But my chief ambition was to get the B.B.C. to accept the principle before we got down to the details of practice.

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But the B.B.C. turned down any idea of substituting wires for wireless whether it were practicable technically to do so or not. It had to. The B.B.C. was after all constituted, capitalized, and controlled at that time by the wireless trade. It existed to create a market for wireless receivers. This revolutionary idea would upset the market. The B.B.C. would seem an ungracious child if, after all the money that had been spent on its upbringing, it turned on its parents and took away their livelihood.

The B.B.C. had another chance, later on, when it was more independent, to take a hand in developing wire broadcasting. I shall tell this story in the next chapter. The B.B.C. pressed pretty hard at this second opportunity to be allowed to control the development of wired systems, but the Post Office refused to allow it to enter a field which, alleged the Post Office, was the rightful possession of private enterprise. So the B.B.C. took no further interest in the matter.

But some time, when some authoritative person or organization decides that the public should be allowed to benefit from new ideas, there will be a great change in broadcasting. Programmes of all sorts, classified in different types, will be heard without a whisper of interference and with a fidelity unrealized by anything save the super expensive set tuned to a (very) local station. This could be done at once now; it is not some unrealizable dream. Technical systems have been worked out and proved to be practicable and economic. I cannot be definite enough on these points, otherwise the innocent may think there is a catch in it all somewhere. The only catch which has held up progress is that vested interests of all kinds have had enough power to stop any wire broadcasting system being put to the uses I have envisaged.

This expansion in technique, which would give programme makers a so much better chance to do their job properly, which would offer artists a better chance for steady employment, which would give so much more amusement information and service to listeners, is forbidden because certain vested interests are frightened.

If anyone should think it inconceivable that such an obviously valuable scheme is held up only by such irrelevant factors they should read the next chapter. It tells a sad story, one sadly typical of the fate of an idea.

CHAPTER XII

THE FATE OF AN IDEA

IDEAS are all very fine. But if they are to do any good they need feeding by enthusiasms and protecting by money. There is not much to spare of either. New ideas are resisted because they nearly always challenge a vested interest. This challenge is felt by individuals to be directed against them personally because it appears to threaten their livelihood. Loyal servants talk of 'the good old B.B.C.' or the 'dear old company'; anything which even remotely challenges the power of organizations, large or small, becomes automatically 'a dangerous new idea'. Those who preach change are 'irresponsible'. Capitalists who make a good thing out of an old idea have no incentive to invest in a new one. Technicians who have mastered the intricacies of one process resist having to expand their knowledge. Financiers therefore do less and less with more and more, technicians know more and more of less and less.

These generalizations fittingly introduce the story of the development, meagre and distorted as it has been, of the idea that broadcasting should be done through wires and not through the air. I have shown why I think 'the future of wireless lies with the wire'; now I shall tell what happened to the idea and how it has been sidetracked and thwarted. Wire broadcasting did not so much fall between stools, it was never offered anything to sit on.

We have to go back a long way to find the beginnings of the use of wires to bring entertainment to home listeners. The idea was foreshadowed in a *Punch* cartoon published in the last century about the time Bell had invented his telephone. *Punch* shows a picture of a Victorian father and mother sitting up in bed listening through a trumpet affair on the end of a tube to a son proposing their health in Australia. This was long before practical broadcasting was even dreamed of.

The first practical system of distributing entertainment by wires used

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the ordinary telephone. Thirty or forty years ago a Company called the Electrophone Company made arrangements with theatre managers and the telephone people so that any telephone subscriber could ring up the exchange and get connected to a chosen theatre.

When one has a telephone conversation one's own instrument is connected by a loop of wire to a similar instrument used by the person one talks to. One hears the distant voice because it energizes a thing called a microphone which is concealed in a mouthpiece and because one holds to one's ear a device called an earpiece. The currents set up by the microphone at the other end flow through the loop of wire joining the two instruments. These currents pass into the earpiece which reproduces the sounds. In the electrophone system 'the other end' had a group of microphones which picked up the sounds on the stage. One heard them just as one hears the other person talking in a telephone conversation. I once listened to a play by this system. I got cramp in my arm holding the earpiece to my head and I was struck by the predominance of feet. Even the daintiest of heroines moved like elephants.

The subscription asked by the Electrophone Company was very high; ten pounds a year perhaps. After all they had to pay for the telephone exchange services, the special stage microphones, as well as the right to 'relay' the stage performances. The introduction of broadcasting killed the enterprise, partly because the subscription was relatively expensive, partly because the reproduction was so poor, but mostly because broadcasting offered so much more entertainment. In Paris a similar company, called the Theatrophone company, survived the competition of broadcasting and lived to equip itself later on with high quality microphones and loudspeakers. It is still going strong; or was before the war.

The telephone systems, Electrophone and Theatrophone, used what we call audio-frequency currents. This description is used because the currents copy, in their frequency and relative intensity, the audible components of sound. These sounds are reproduced if the audio-frequency currents are made to flow through an earpiece or a loudspeaker. A loudspeaker is only a powerful earpiece.

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The development of wire distribution technique grew directly out of broadcasting. It took place in Holland and was conceived, so far as I know, by a Mr. Bauling. This method, similar to the older telephone method, also used audio-frequency currents in the wires. The idea was, and is, to join the output of master wireless sets, picking up ordinary wireless programmes out of the air, to loudspeakers in listeners' houses. One master receiver can supply thousands of houses with a 'laid on' wire service. To this end special new wires are run from a reception point, where the master sets are installed, to all houses 'taking the service'. These wires run along above the street level attached to house chimneys, gables, and sometimes poles. The wires look just like ordinary overhead telephone wires. Several pairs of wires are run in one feeder and each pair of wires carries the output of a different master receiver picking up a different programme. The currents fed into the wires are of audio-frequency form and come out of the loudspeaker terminals of the master sets; they are therefore suitable for direct application to the loudspeakers in the listeners' houses. The householder electing to take the service has branch pairs of wires, connected to the main runs over the top of his house, brought down to a switch in his living-room. This switch can connect the loudspeaker to any one of the branch pairs and hence, in effect, to the output of any one of the master receivers picking up the several different programmes diffused through the wires. I christened the method 'Rediffusion' because the programmes are first diffused by wireless then picked up on the master receiver and then rediffused through wires to the scattered listeners. The scheme is often called 'Wireless Relay' or just 'Relay'. The Post Office calls the central receiving station a 'Wireless Exchange' and gives this name to the whole system. I prefer, and shall stick to the name 'Rediffusion'.

It will be seen that in the Electrophone system each subscriber had his own pair of wires connecting his instrument to any chosen group of theatre microphones, in rediffusion the listeners share the use of common pairs of wires, each energized by a different programme, any of which can be tapped on to by their loudspeaker. The advantages of rediffusion are that the listener gets as good quality reproduction as can

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be given by a fine master set; the home apparatus is very simple and robust, there is no installation fee and the subscription is fixed at the reasonable weekly payment of one and sixpence. Every listener of course has to buy a licence once yearly because he has in his house 'apparatus capable of hearing wireless messages'. This is as simple as it can be, consisting in only a switch and a loudspeaker, but it is still, in the eyes of the law, a wireless receiver. If anything goes wrong it is put right free of cost to the subscriber. The listener has no bother either in operating and maintaining a complicated wireless set which, to women especially, is often frightening and mysterious. It is the reliability, simplicity, and cheapness of rediffusion which makes it so popular.

The disadvantages of rediffusion, so far as the listener is concerned, are that the programmes are chosen for him and that what he gets gives him only a limited choice of entertainment. In Holland the rediffusion listener gets four programmes to choose between, but in Britain only two. In audio-frequency technique, each separate programme must be carried by a separate pair of wires. It is normally too expensive to bury a multiconductor cable and so in the common practice of audio-frequency rediffusion the wires have to be carried overhead. Overhead wiring is cumbersome and conspicuous. Local authorities object to their towns being disfigured by a mass of wiring draped about the streets and houses. That is why in Britain only four wires are used and why therefore the British rediffusion subscriber can only get two programmes to choose between. In Holland they do not seem to worry so much about the ugliness of the overhead wires, they use eight in a feeder and the Dutch rediffusion subscriber therefore has a four programme service.

I want to make it clear that these rediffusion developments (which have taken place, as I shall relate, in Britain as well as Holland) were not at all what I had hoped for when I first saw that the use of wires for broadcasting was the solution of all the difficulties which prevented the service from expanding. I wanted the wires to be used to diffuse B.B.C. programmes which, if there were a multitude of channels to distribute them, could be classified in different types, one type per channel. I wanted to see wires used eventually to supersede wireless

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altogether; I wanted the programmes to be put into the wires straight away, instead of being broadcast into the air and then distorted in a wireless set before being put back into the wires again. This rediffusion business, convenient as it is as a method of reception, does not give programmes any different character, nor does it represent any increased facility for the programme builder.

But it has a potential value, a value which is greater as it provides more channels. It is grand to know that wire systems are being installed because they may one day be used for distributing programmes specially designed to be sent through them. Any rediffusion system can be used for wire broadcasting, the more channels it provides the better, because wire broadcasting, to be successful, must offer a lot of contrasted types of programmes simultaneously.

When I was in the B.B.C. I therefore welcomed rediffusion developments because I saw them as a basis for eventual change over to wire broadcasting. While I was still a member of the B.B.C. I tried to persuade the Corporation to get control of rediffusion. When this failed and after I left the B.B.C. I worked with others on perfecting a multi-programme rediffusion system. This system uses the domestic electricity supply mains to distribute programmes. It could, as I have described in a former chapter, be used to provide six programmes. For this and other reasons I consider it a better basis for an eventual wire broadcasting service than the audio-frequency system which at present only offers two programmes. But this anticipates the story. I feel however that it is essential to make a clear distinction between rediffusion and wire broadcasting, and to show how the former could be used as a basis for future wire broadcasting developments. The story goes on to show that not only has audio-frequency rediffusion been hampered in its developments by indecision on the part of the authorities, but that the multi-programme mains system has so far been forbidden to be used at all, even for rediffusion.

Rediffusion was first heard of in England about 1926 or 1927. I do not know if the English development was copied from the Dutch, who were the true pioneers, or whether the idea was spontaneously generated here. The Post Office wrote to the B.B.C. to say that some-

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one had put up wires to relay the output of a master set to listeners. This development had to be considered in relation to the national organization of broadcasting. The Post Office of course controls all forms of communication and so has the power to regulate and control all the technical developments of broadcasting. It was felt to be unwise to allow rediffusion to grow up haphazard because some rather important issues were involved.

The B.B.C. argued that if there were no State control over rediffusion then it would be within the power of private companies and individuals to arrange what the wire listeners should, or perhaps more important, should not hear. In other words these private bodies, which controlled the master receivers, stood over 'the narrows of programme distribution'; they could cut out this item and supply that. The Corporation pointed out that it had been given a programme monopoly, but this would cease to have any value if other organizations were given the unhindered power to dictate what large groups of listeners should or should not hear. These rediffusion companies might decide to cut off B.B.C. programmes altogether and substitute foreign programmes, they might make it easy for people to hear these detestable advertisement programmes, or they could eliminate all talks giving one point of view and relay those giving the opposite. Therefore, said the B.B.C., 'the Corporation, not private companies, must do rediffusion, otherwise its monopoly is worthless'. All this, as I shall show later, was rather specious and only part of the B.B.C. policy which sought to exercise absolute control over all broadcasting.

The Post Office replied that it could not permit the B.B.C. to do rediffusion because, if it did, the Corporation would be competing directly with the wireless trade. Because obviously every householder who chooses to subscribe to rediffusion may do without a wireless set and so deprives the wireless trade of a customer. If the B.B.C. put itself whole-heartedly behind building up these wire services it would have in effect to say to listeners, 'Don't buy a wireless set, take our wired service instead'. It would, argued the Post Office, be against all precedent for a Government appointed organization, such as the B.B.C., to compete with private enterprise. But, it added,

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the whole question is academic, 'for who will want to take a service which only offers two programmes when a wireless set picks up hundreds?' I thought, even then, that two good reliable programmes would seem to many more attractive than a hundred variable noises. 'Wireless without worry', seemed to me to be quite a slogan.

I want to emphasize these *obiter dicta* of authority which were made when rediffusion began. The Post Office authorities said that Government must not seem to compete with private enterprise, even through its agent the B.B.C., and that anyhow there was no future in rediffusion. These statements are in bizarre contrast to the fact that now private enterprise has proved that rediffusion is popular, the Post Office, a Government department, wants to collar the exploitation of the system for itself.

But the point that private companies, if left unchecked, might be dangerous to the existence of the B.B.C. was appreciated in official quarters. There was an obvious solution to the difficulty. Evidently it ought to have been ruled that the rediffusion companies must at all times relay the two B.B.C. programmes, but that they would be free to supply any others, picked up from anywhere, as an extra. It could not then be said that the B.B.C. programme monopoly was in jeopardy. The B.B.C. programmes would be 'on offer' just as they are with a wireless set. This ruling would have stimulated rediffusion to devise schemes to provide more programmes, it would have ensured that the B.B.C. programme policy would have been unimpaired by selective choice at the master receivers and it would have given private enterprise a good chance to build up a wired service on stable foundations. But, instead of adopting such an obvious common-sense basis for its rulings, the Post Office protected B.B.C. interests only by thwarting and hampering rediffusion. The ruling, which has blighted rediffusion from the outset, was that while the Post Office agreed to licence any competent person or company to do rediffusion (provided certain technical requirements were fulfilled), this licence was terminable at short notice. The Post Office thus reserved the right to take over any rediffusion enterprise, after a period of two years or so, at a valuation to be determined by the

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Post Office without any right of appeal. This valuation would in no case include anything for 'goodwill'. The Government thus gave with one hand but threatened to take away what it had given with the other.

Anyone brave enough to start a business under these restrictive conditions risked spending all his capital and getting only a part of it back when the Post Office took over. The revenue from subscribers might not, in such short a time, make up the difference. But the tantalizing thing about the regulation was that the Post Office only 'reserved a right' to ruin the business; it was by no means certain that it would 'take over' at the stated time. So anyone risking money in starting rediffusion was forced to adopt a get-rich-quick policy involving poor material, skimped workmanship and sometimes under-paid and over-worked personnel. The public of course suffered most and rediffusion was in many cases badly founded. As a matter of fact the Post Office never took over the rediffusion companies in spite of a continuous threat to do so. Those who courageously risked a sufficient capital and gambled on the Post Office's reluctance to exercise its rights made handsome profits. The situation nevertheless was about as silly as bureaucratic compromise could have made it.

Rediffusion is only commercially applicable in densely populated areas where houses are close together. It is therefore only used in urban and suburban districts. It is too expensive, even if the local authority allowed it, to bury a cable under the street to carry the wires which are distributing the programme. All distribution is therefore made by overhead wires. Naturally the overhead wires have to cross the streets. But no one is allowed to cross public highways with wires without permission from the local authority. If therefore a local authority gives any rediffusion company permission to run wires across streets it has in effect given the company a concession to do rediffusion.

The business of rediffusion has proved very profitable. Local authorities in different parts of the kingdom are therefore continuously besieged by requests from rival private companies for permission to

set up wires. It was at first tacitly and then formally agreed between the competing rediffusing companies that once any one of them had secured a concession the others would respect it. A concession once obtained is therefore exclusive. Many town councils however see no reason to allow their towns to be disfigured by conspicuous overhead wiring draped about the houses, and the majority of areas where rediffusion could be applied have not been wired. Indeed I doubt if ten per cent of the urban householders of Great Britain could get a service of rediffusion, even if they wanted to, simply because local authorities refuse to allow the necessary wires to be put up. This is no criticism of the local authorities. I will show later on that, according to a better technical method of doing rediffusion, there is no need to put up new overhead and ugly wiring; existing electric mains or telephone wires can be used instead.

Audio-frequency rediffusion systems have however been installed in some outlying boroughs and some central districts of London. There have also been considerable developments in, among other places, Newcastle-on-Tyne, Hull, Burnley, Swansea, Nottingham, Ramsgate, and towns in South Wales. For a long time Hull had the largest number of consumers, but now Tyneside has more. On the average, given an expert selling organization, good apparatus, and sufficient capital, one household in three elects to take the service when it can be offered.

Rediffusion has scored its greatest success where it has been able to give better service than an individual radio set. For example, the long wave transmission from Droitwich (which now replaces the old Daventry) has a tendency to 'fade' in, among other places, Newcastle-on-Tyne. This fading means that the signals wax and wane in strength. During a 'wane' they may fade out altogether, causing a complete blackout of signal during periods lasting from a few seconds to even a minute. Special aerials, spaced far apart in distance, but connected to a common receiver, overcome this difficulty. The Newcastle Rediffusion Company has set up an 'anti-fading array' of receiving aerials. The rediffused service is therefore much better than that given on an ordinary receiver which cannot use spaced aerials. Further-

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more receiving aerials can be designed which eliminate interference between two transmitting stations which are working on or too near the same wavelength. Such directional aerials receive nothing from the interfering station and therefore only pick up the one required to be heard. These receivers, by eliminating howling noises, likewise give rediffusion listeners a better service than they can get on home wireless receivers.

Rediffusion, in spite of these advantages, has not had a nationwide application. Government interference and the refusal of many local authorities to permit the erection of new overhead wires has prevented widespread development. To-day only about two hundred and fifty thousand listeners out of the nine million use a wired service of reception in Great Britain. This means that rediffusion listeners only represent about three per cent of the total. In Holland, where the system first started and where there has been relatively little official blocking, about fifty per cent of the total number of listeners have their programmes relayed to them. As rediffusion is not applicable to country districts, this means that about eighty per cent of the Dutch urban listeners have preferred a 'laid on' service to the use of an individual receiving set or have used both.

When I left the B.B.C., I was just as keen as ever to see wire broadcasting established. The obvious first step was to join in the development of rediffusion. The Post Office had said that rediffusion was a matter for private enterprise. Now that I had left the B.B.C. I was private and nothing had happened to curb my enterprise. Several firms seemed, however, so anxious to pay me such a lot of money for doing practically nothing that I did not at first try very hard to get into the rediffusion field. I was tired, the B.B.C. had been exhausting. For a year or so I divided a great deal of spare time manœuvring on the periphery of political whirlpools, going abroad, lecturing and writing. I was given a contract to write for one of the big daily newspapers and I was constantly reminded, by my face staring at me from the sides of buses, that another article was due.

A continued association of my name with products I had never designed and a stubborn resistance to permit me to use my brain in

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developing the products, made me eventually throw up some lucrative appointments and look around for ways and means to get into rediffusion. I eventually succeeded. Mr. Powell and his son-in-law, J. C. W. Robinson, two pioneers of British rediffusion, were running systems in, notably, Clacton and Hull. The latter was a very considerable enterprise. Later on Robinson and I joined with B. H. Lyon and W. W. Wakefield and formed a company called Rediffusion Ltd. The object of this company was to centralize the interests of some existing rediffusion concerns and get some more rediffusion concessions in other towns. Robinson supplied a large experience in running the business, Lyon had rights over a very good loudspeaker which he hoped to market through rediffusion, Wakefield was joined with Lyon in the loudspeaker idea, and I rounded off the quartet with a technical accompaniment.

Wakefield, once captain of the English Rugby football team, went into provincial town halls to get concessions with the same energy that he used to burrow into a scrum. Backed as he was by Lyon's loudspeaker, Robinson's experience, and by my name, he often came out holding the ball. In fact in the first few months of our existence we obtained a number of concessions which, when the money making value of rediffusion came to be appreciated in financial circles, could have been sold for several hundreds of thousands of pounds. We tried unsuccessfully to persuade financiers to lend us even a few thousands of pounds. None of these canny people were convinced. Who would want this service? Why did we think they did? How? Which? What? The depression had just come upon us. In the words of one captain of finance 'they had had some'. We therefore got none. Not, that is, until Allan Miller, with typical American go-getting, just went and got.

The agreement to form Rediffusion Ltd. was written on a piece of notepaper in my club after a dinner I gave to the other three signatories, Lyon, Robinson and Wakefield. I mention so small a detail because that piece of paper was the foundation of a group of companies which are to-day valued at over a million pounds. I hasten to add that I got out of the business early on because I wanted

to start another scheme. It was Allan Miller's business competence and Lyon's enthusiasm that guided developments into such successful achievement.

All this time, while working on audio-frequency rediffusion, I was occupied with another idea. The great difficulty in the audio method lay in getting permission, general and particular, to put up the necessary new wires. Many local authorities refused permission altogether and, even when they gave it, local property owners made many difficulties and refused 'wayleaves', that is permission to run wires over their property. Wiring difficulties also limited the number of programmes offered to two. In spite of this it was obvious that the public wanted the service. How much more they would like it, I thought, if they could be given a larger choice of programme. Moreover, how much better in every way if it were possible to use an existing network of wires such as electric mains, for rediffusion of programmes instead of putting up a new one. Town councils could not then refuse permission for rediffusion on account of what they called the 'interference with civic amenities' or what I would call just cumbersome wiring. It was against all common sense to put up new wires if existing networks could be used. My idea therefore was to see if we could not use the electric mains to distribute programmes. This would have to be done without disturbing the normal function of the mains to supply domestic electricity.

It was, at any rate in theory, possible to do this by using 'wired wireless' or 'carrier currents' or 'high frequency signalling'; methods I described in Chapter XI. I shall however use the term 'mains wired wireless' which appears to me the most descriptive. I have explained how in wired wireless the waves are guided down one pair of conductors and how waves of different length, flowing along the same conductors, can carry different programmes and how a receiver, connected to the conductors, can select one of the several programmes by an alteration of its tuning. The currents carrying the waves have a 'high' frequency of alternation, the currents supplying electric power to householders have a 'low' frequency. It is therefore possible to superimpose wired wireless currents on the mains without disturbing

the normal electricity service, and without the normal electricity service disturbing the wired wireless. Transmitters inject the high frequency wired wireless currents into the cables, and receivers in listeners' houses, plugged into an ordinary electric socket, pick them up without being disturbed by the mains currents. These receivers contain what we call electric filters which can be designed to pass the wired wireless currents but reject the mains currents. This is only made possible because the two types of current, power and wired wireless, have such a widely different frequencies of alternation. Otherwise the system is just the same as I described before; the receivers select programmes by tuning, the wavelengths are properly spaced apart, there is no external radiation, and so forth.

All this was quite feasible in theory, the question was would it work in practice? There were difficulties. Domestic electric appliances, such as vacuum cleaners, refrigerators, water heaters and so on, connected to the mains, might create parasitic waves to interfere with the wired wireless waves and make nasty noises in the loudspeakers. Then there was the paramount question of cost. Any ingenious technician can, by sufficient elaboration, make something work, but the complexities may make the scheme uncommercial. The Americans say that a technologist must learn to write 'Science' as '\$cience'. Before therefore I could say with any certainty that my general idea had any commercial application I had to get someone to finance experiments to find out more about the difficulties. The Dubilier Condenser Company sportingly offered to back me and so became the first sponsors of mains wired wireless. I got W. T. Sanderson to help me over the first hurdles and at the end of a year I felt hopeful. The Dubilier Company's directors thought, however, that it would need more money than the company could legitimately supply to continue the experiments and so I had to look around for another sponsor.

It was then I met T. R. Martin. Mr. Martin spends a hard travelled life genially throwing ideas at the heads of wincing captains of industry. He saw the point of my mains wired wireless system and got me to demonstrate my first experimental apparatus to a few interested and

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important people. Rainhill was chosen as the place for the demonstration because Mr. Martin was working for British Insulated Cables Ltd., the works of which are at Prescot near by. Mr. B. Welbourn, chief engineer of the British Insulated Cables Ltd., lives at Rainhill and provided facilities for the demonstration. The first experiments had not told me enough to know if the system would work in these new conditions, and, if it did, how well. It did work: in fact, it worked surprisingly nicely, and my assistants, Sanderson and Blackburn, did a grand job. The late Sir John Brooke, an Electricity Commissioner, came to see what we were doing, bringing with him someone from the Central Electricity Board. Mr. Martin also asked Mr. G. H. Nisbet, managing director of the British Insulated Cables Ltd., to come and see the demonstration. We showed two programmes. The music was quite pretty and there was not even a whisper of interference. Everybody present at the demonstration congratulated Mr. G. H. Nisbet on his enterprise in taking up this new development. This was a little premature because Mr. G. H. Nisbet had not then promised to do so. He immediately however confirmed his reputation for initiative and promised more finance for development. Mr. P. J. Robinson, chief engineer of the electricity supply system of Liverpool, said he would let us have a section of his mains to experiment with.

I went immediately afterwards to Australia to advise the A. W. A. Company about broadcasting. I was away for eight months before the mains wire broadcasting job could be tackled again. In 1932 I started in real earnest. I wanted some more technical help because Sanderson was leaving me. I was lucky enough to persuade R. E. H. Carpenter to join with me. We have worked together ever since. Carpenter is not my partner in law but we are associated, none the less closely, by the more vital bond of shared enthusiasms. In the development of mains wired wireless his sound technical knowledge, his appreciation of the meaning and use of patents, and his business judgment have been of incalculable value to the enterprise. Carpenter is one of those admirable people, too rare in this country, whose inventions have brought him reasonable rewards even though he has

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never had the patronage of large organizations. In spite of the pull of his other interests and even though he has, so far, had no monetary reward out of mains wired wireless, his devotion to its development has never wavered. This records my thanks and admiration.

Carpenter would, I am sure, join with me in turn in thanking our assistant G. B. Ringham whose discretion, loyalty, and competence have been our mainstay. No one who has not had poor assistance in laboratory work can fully appreciate the value of reliable help. Ringham has consistently been 'a very present help in trouble'.

We three worked together from 1933, first in Liverpool and then in London, until the war prevented further development. At first everything went smoothly because we were only concerned with technical work. At the end of a year's work in Liverpool we were able to take the chairman and some directors of the B. I. company round the houses, plug in our selector, and show it play three tunes nicely and without interference. We told the business men that while there would have to be more development work, we were sure that there were no real snags to prevent a practical system being devised. That was in 1934.

Since then our difficulties have been political rather than technical. It was found that it was illegal to send programmes through the mains. A Parliamentary Act, passed into law fifty years ago, could be read to forbid us to give the public better and cheaper listening. This Electricity Act said that the electricity supply companies (called, rather lugubriously, 'Undertakings') might not supply electricity which was to be used 'for the purpose of sending a telegram'. A telegram is a message and a message is intelligence and programmes are intelligence. So the undertakings were forbidden to let us buy power from them for us to work our apparatus. Another clause in the Act said that the cables themselves were not to be used for the purpose of sending a telegram. Thus the Act thwarted us in two ways: we were not allowed to use electricity for energizing our apparatus, nor could that apparatus be used to send programmes through the mains. Note that new and ugly overhead wiring was permitted, but the use of an already installed network was not. Note

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also that the prohibition was contained in an Act made in 1882 when the idea of wire broadcasting could not have existed. Furthermore the undertakings were breaking the law supplying electricity to the Post Office, the War Office, the Air Ministry, the Admiralty, the B.B.C., and last but not least the rediffusion companies. All these were using electricity 'for the purpose of sending a telegram' and the undertakings supplying the electricity were breaking the law.

The Electricity Commissioners, who were reasonably keen on our development, said: 'Don't worry, we'll put this right for you with a little Bill.' This might have been possible but unfortunately an engineer from the Middlesbrough Corporation had seen the original demonstration. He had been told that the demonstration was confidential; he must keep the knowledge of the existence of mains wire broadcasting 'under his hat'. But he must have raised his hat too high to his bosses in the Middlesbrough local authority who got to know about our scheme. They were, at that time, presenting a Bill to Parliament asking permission to improve their municipal services. They wanted to increase the transport facilities, water supply and so forth, and they had to ask Parliament for permission to do it. The Middlesbrough authorities thought it would be a good idea if, included among their requests, was one asking permission to send programmes through the municipal electric mains to householders. They therefore included the necessary clause in the Bill they were presenting. The Electricity Commissioners protested. Better they said to have one little Bill covering the whole nation than to do it like this piecemeal. Higher authorities in the B.I., however, disregarded the official view and allowed the clause in the Middlesbrough Bill to go forward. The Electricity Commissioners said, quite naturally, that they could not in these circumstances go on with their 'little Bill'.

This refusal on the part of the B.I. authorities to listen to good advice lost them a lot of money. If they had done as the Commissioners advised we should have been in full swing by now. But they did not and their decision was the beginning of all our worries. The vested interests directly they heard about the proposals in the Middlesbrough Bill raised their heads; they were about the Parliamentary lobbies,

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they were seen in earnest conversation with suitable Members of Parliament. When the Middlesbrough Bill came up for its second reading, the poor little clause about wireless rediffusion was not so much struck out as torn out. Some M.P.s alleged that it was 'a new and dangerous principle' to send programmes through the mains. This implied that it was an old and safe principle to send messages through cumbersome overheard wires. The particular proposal was said to be dangerous because it extended the vicious principle of municipal trading. Even the Postmaster-General, who knew that rediffusion was not a new and dangerous principle, opposed the clause on the municipal trading issue. The proposal was never considered as a means to provide the public with better listening facilities.

The wireless trade spoke through the mouths of members. The whole principle of rediffusion was said to be no good because the public did not want it. Others said that rediffusion was so good that it would ruin the wireless business and throw tens of thousands of people out of employment. No member pointed out that these two statements cancelled one another. The elected representatives of the people were perhaps too occupied in insulating the public from the shock of new and dangerous principles to worry about the logic of the detailed arguments.

Opposition organized itself in other ways. The wireless dealers raised a fund to oppose any more Parliamentary Bills designed to legalize rediffusion over the mains. The fund would supposedly be devoted to buying legal advice. Wireless trade papers fulminated and I replied reminding their readers, as nicely as I could, of the story about the horse-cab and the taxi.

We demonstrated our system 'secretly', as the Press described it, to influential people, and publicly at St. George's Hall, Liverpool, on the occasion of the I.M.E.A. Exhibition. We talked to journalists, we talked to members of the electrical industry, we talked to members of parliament and we tried, without any success, to promote 'little Bills' of our own. Rediffusion over the mains remained 'a dangerous new principle' to be prevented at all costs.

While this had been going on I had severed all connection with

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Rediffusion Ltd. in particular and audio-frequency technique generally. I should have liked to continue developing my mains wired wireless scheme with my former business associates, but they felt that they had enough on their hands without pursuing new ideas. So in a sense my new enterprise became the rival to the company which I had largely founded. I became a propagandist for my new method. How much better, I argued, even if no more programmes could be offered, to use existing buried wires than put up new ugly ones overhead. But actually we could now give three programmes on our system; we foreshadowed six eventually. As to economics the audio system spent its money on the new wires and nothing on the house equipment, we spent our money on the house equipment but nothing on new wires. Both systems required central amplifiers and master receivers. So far as capital costs were concerned it was a matter of swings and roundabouts. But we did not have to waste three years putting up a new network; once the mains were energized we could canvass every householder to 'come on the service' and, in a month or so, our capital would be earning nearly its full revenue.

This was all very true, but it would have been much nicer if, instead of talking about the wonderful advantages of our system, we had been allowed to demonstrate them in practical service. The public would have backed us up which would have saved a lot of talking and arguing. It only needed Parliament or the wireless trade or the audio-frequency rediffusion interests or all of them, or some of them, to think of the public interest instead of their own to enable us to start.

Our hopes soared when we learned that the Postmaster-General was going to appoint a select committee to advise him on all matters concerning broadcasting. Here was a chance to get our claims impartially examined.

This committee, the Ullswater Committee, was appointed primarily to suggest what should be done after 1st January, 1937, when the B.B.C.'s charter, limited in 1927 to a ten year period, expired. No one imagined that the B.B.C.'s charter would not be renewed, but something definite had to be decided about the organization of the wire reception services. The wretched rediffusion companies had been

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existing for years under the threat of extinction. They never knew when and if they might have to hand over their business to the Post Office. They wanted to know how they stood so they gave evidence to the committee. Naturally we too gave evidence to the committee. This committee was presumably neutral and impartial as well as 'select'; it would see how ridiculous it was to allow towns to be disfigured by overhead wiring when, but for an obsolete Act of Parliament, another system could be used which had no need of new wires. More than that we could supply three or even six programmes while the older system supplied only two.

I was conscious, while giving evidence to the committee, that none of its members was particularly moved by our complaints. They were much more interested in the whole principle of rediffusion itself. I heard my own words, words I had written and spoken when I was in the B.B.C., quoted at me with an air of originality I found hard to bear.

'Yes, yes!' I wanted to say. 'I said all that more than ten years ago, but it's very much beside the point. Now what I want you to see is that we have a system . . .'

One must not talk like that to a select committee so I phrased the point more discreetly. The point, the old point, was made by the committee that the 'Wireless Exchanges', as the committee called rediffusion, were capable of 'upsetting the balance' of the B.B.C. programmes. They could choose to relay this item and they could refuse to relay that. The real point — an old point to me but a new one to them — that I tried to make was that if it were ruled that every rediffusion company were obliged to relay the B.B.C. programmes then no balance could be upset. Our system, differently from the audio-frequency system, I went on to explain, was capable of providing six programmes. We would always be willing to relay the two B.B.C. programmes. How could this upset any balance if we always supplied the two B.B.C. programmes and gave other foreign programmes on the remaining four channels? If the public preferred any one of these extra programmes to the B.B.C. programmes it was none of our business.

What the rediffusion companies said I do not know. Doubtless they

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stressed their good intentions and their worth as public utility companies.

The committee's report, published at long last, combined some rather pained strictures on the internal administration of the B.B.C., it recommended the suppression of the commercial programmes coming from abroad, which listeners had learned to enjoy, and it made the usual platitudes about broadcasting in general. To us, the really interesting part of the report dealt with rediffusion — which it described as 'the wireless exchanges'. The committee did much more than back the old B.B.C. antagonism to rediffusion by a mere phrase about upsetting the balance of the programmes, it urged the suppression of the service in private hands altogether. It was proposed therefore that the Post Office should run rediffusion. A minority report by the late Lord Selsden — once a Postmaster-General in a conservative government — said that not only was the Post Office the only proper organization to run rediffusion, but that the only technical method of any value for doing rediffusion was to use wired wireless on the telephone wires.

It would appear that the B.B.C. had been airing its old grievance about rediffusion being a threat to monopoly. The committee had obviously sympathized. But one wants to examine this point more carefully. This delicate balance of programmes is surely upset when the B.B.C. overweights one or other of them with dull material. No ordinary wireless set user will listen to what bores him, he either switches off or tunes in another transmission providing something more to his liking. A competent rediffusion company tries to give a service approximating to that given when the listener has the full range of choice given by a wireless set. This is difficult, so far as minorities are concerned, and when the rediffusion system only supplies two programmes. But if a minority is dissatisfied it does not subscribe to a rediffusion system. But all these questions are resolved if the rediffusion system has a multitude of channels. In other words, if it were ruled that a rediffusion company must always relay the two B.B.C. programmes, but was free to relay any number of others, the point about balance would be completely met.

THE FATE OF AN IDEA

The committee had taken no notice of that part of my evidence which stressed this advantage of a multi-channel system. Indeed it had taken practically no notice of our evidence at all. Evidently the mice had been at it. The remaining and only piece which got into the published report recorded the committee's naive astonishment at hearing about a system which 'even used the electric mains'. Wonderful thing this Science! One felt, however, that a single courtesy sentence was a rather niggardly memorial of five years' work and an expenditure of twenty thousand pounds. It also seemed disproportionate to Lord Selsden's long and detailed recommendation of a system which had neither been tried nor worked out and which 'might' use the telephone wires. But the evidence on this subject had been given by authorities of which the committee had every reason to take notice — Post Office authorities, I mean. After all the committee had been set up by the Postmaster-General, its secretary was a Post Office official and three ex-Postmasters-General were on its strength. Besides it is clear that the Post Office is a money making department of the State. This idea of using the telephone wires was also an idea to increase the earning power of the telephone system. I do not want to imply that the scheme of sending programmes through the telephone wires by wired wireless is impracticable, on the contrary a German firm perfected it some time later. But it is not the only way of using an existing network for distributing programmes. Moreover in Britain the electric mains, which we had proved could be used, go into five houses where the telephone only goes into one. Therefore, apart at all from technicalities, the mains system has a democratic superiority. It might have been expected that some of these points, stressed in evidence, should have been recognized and recorded.

The Ullswater Committee's report was of course a recommendation. Decision could only be made by the Cabinet in consultation with the Postmaster-General. This decision was to be guided by Parliament. Parliament did not vote on the subject, it went 'into committee' for a free debate. Those ultimately responsible for deciding about the future of broadcasting could thus get 'the feeling of the House' — and thereafter neglect it. I listened to the debate and while naturally interested

in the B.B.C. 'private lives' issue and the question of commercial broadcasting, both of which were freely ventilated, I was obviously more concerned about the future of rediffusion. Mr. Lees Smith, in his speech favouring the nationalization of rediffusion, became quite rapturous about the principle of 'high frequency' — what I have called wired wireless. Listening in the gallery among much more 'distinguished strangers' from B.B.C. and Post Office I began to feel that what I always thought was a method of signalling was something of great political power which had strong Socialistic leanings. No one mentioned that 'high frequency' was the basis of the method we had developed for use on the mains because no one mentioned that we had developed a method at all.

The 'feeling of the House' left me feeling bewildered. Long ago, according to the Post Office view, there was nothing in rediffusion. Now the subject had occupied hours of polemical debate among the 'People's Representatives'. Long ago authority had said that on no account must the State compete with private enterprise; State rediffusion could never be run in competition with the wireless trade. Now 'the House', of all important bodies, felt it was only right that this, and only this, should be done. It was quite understandable that Labour members should 'rise to support' the recommendation to nationalize rediffusion, but strange to find so many Conservative members, who owed their position to 'liberty of Enterprise', sympathizing with their 'Opposition'. Conservatives and Liberals alike seemed to look askance upon the idle profit making and irrelevant enterprise of the rediffusion companies. These members, if less passionately than their Labour colleagues, implied that the pioneers of wired reception had done nothing except, disgustingly, make money. Only one champion for the private companies rose again and again from the conservative benches, to put a point of order and interrupt his opponents. Unfortunately for his advocacy this member of Parliament was also the Managing Director of the largest group of rediffusion companies in Britain, a fact his opponents did not forget to stress frequently and pointedly. In the end 'This House', complimented on its eloquence and good behaviour by the Postmaster-General, gave the clearest indication

that could be shown, without a division, that it fully supported the Ullswater Committee's recommendation that rediffusion should be taken out of private hands and put in charge of the Post Office. A *Times* leader commenting on the debate next morning went out of its way to be very rude indeed to the rediffusion interests which, of all low types, were relegated to the ranks of 'middlemen'. I could only conclude that a nation of shopkeepers had suddenly appreciated the sting of a hundred year old taunt. Or perhaps distributing programmes to the public was considered by the authorities as propaganda and therefore a State possession not available for private trading.

Committee, Parliament and Press thus pronounced the death sentence of rediffusion private enterprise. We expected a Cabinet decision to confirm the sentence. Our surprise was therefore boundless when a Government White Paper recorded a decision, which followed neither the recommendations of the Committee nor Parliament but instead decided to decide nothing. Or perhaps the decision might be said to postpone decision. Three years, it was ruled, must elapse. During this time the Post Office was to make experiments, full-scale experiments if necessary, to tell the Government what was the best technical method of doing rediffusion. Then a decision would be made.

The whole position, after this ponderous mountain of consideration had given birth to an inconsiderable and undecided mouse, was just as unsatisfactory as before. Indeed the effects were disastrous. The rediffusion companies, foreseeing their extinction at the end of three years, stopped all expansion and set about drawing as much profit as they could from existing enterprises. The sponsor of our mains system, the British Insulated Cables Ltd., was so discouraged by the Government's attitude that it decided to cease financing us and get on, among other things, with making wire for the wireless trade. To wait three years in uncertainty and, even if a favourable decision were forthcoming, to have to face the hampering provisions of 'the Act' (of 1882), was to expect more courage than rich companies normally possess. I accepted my defeat with bad grace and took a long holiday. I had no prospect of continued finance, my dream was over, nothing but the spectre of employment with a vested interest, one of those

vested interests which had successfully thwarted my ideas, stared me in the face.

Back from my holiday, however, I got into touch with T. R. Martin, the good fairy of this story. He introduced me to Sir Leonard Coates of Leeds. Sir Leonard and his two friends, Mr. R. B. Stephens and Sir George Martin, most gallantly stepped into the breach and rescued our staff, our plant and our invention. Later on the firm of David Allen & Sons joined with Sir Leonard and his friends to form a syndicate which eventually blossomed into the Wire Broadcasting Company.

While waiting for the Government decision about the future of rediffusion we took the opportunity to do more development work. At the same time we were not idle in the political field. We stressed the value of wire broadcasting in time of war and we pressed our claim for recognition. We were told that Government experts said our system did not work. We only asked permission to prove them right or wrong. We gave successful demonstrations on a section of the Brussels electric mains to all leading wireless bureaucrats of Europe on the occasion of a meeting of the Union Internationale de Radio-diffusion.

Meanwhile the Post Office carried out its experiments to find out once and for all which was the best way to do rediffusion. The first experiment was to be an example of a full-scale working system in Southampton. Realizing that the root disadvantage of the audio-frequency method hitherto used was the necessity for ugly overhead wires the Post Office people decided to bury theirs. A four conductor cable was therefore to be laid beneath the pavements of Southampton to give householders a four programme service. The scheme, however, required miles and miles of streets to be dug up and the local authorities, encouraged by local and national wireless trade organizations, forbade this 'disturbance of civic amenities'. So this phase of the Post Office's investigation was abandoned. This was a pity because it would have been most interesting to learn from the experiment how much it would have cost to install the buried cable and therefore what loss would have been made in operating the system. The service would have been excellent. The Post Office, of course, knows a great deal

about audio-frequency practice and has developed a remarkably good loudspeaker. But private companies would not have risked the initial expense of burying cables.

The Post Office next turned to an investigation of the possibilities offered by the mains network. It was decided, after tests, that the mains system was no good; it required, according to Post Office conclusions, too much transmitter power to enable it to pay. This seemed an irrelevant objection in view of the proposal to bury cables for an audio-frequency system. When we heard, long afterwards, how the tests on the mains had been conducted by the Post Office we were not surprised at the conclusions. A good deal of time and money would have been saved had the Post Office engineers been allowed to talk things over with us before the tests were made. We had managed, by special schemes, to overcome the difficulties of using the mains for distributing programmes and that is why we maintain, in spite of the Post Office tests, that they can be used successfully and economically. We would have been delighted to co-operate with the Post Office engineers, but we were not asked to do so. Indeed, so I gather, precautions were taken to prevent our knowing that the tests were being made at all. Queer, somehow.

Unable to dig up streets, and failing to see how to use the mains, the Post Office finally decided to use their own telephone wires for the rediffusion of programmes. This meant that they eventually decided to follow Lord Selsden's minority report in the Ullswater recommendations and copy the German scheme.

The ordinary telephone conversations made by telephone use audio-frequency currents. The maximum frequency of these is four or five thousand vibrations a second. The wired wireless currents used on the Post Office system alternate, at minimum, hundreds of thousands of times a second. Electric filters in the wired wireless receivers can thus reject the ordinary telephone messages and accept the wired wireless programmes. This is just the same principle as used in our mains system. Thus anyone can conduct ordinary telephone conversations on the same pair of wires as are carrying the programmes. Similarly wired wireless currents can co-exist with the power currents in the

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mains without mutual interference. The proposed Post Office system is perfectly feasible, practical, and economical, but it has the disadvantage that, in this country, relatively few people have a telephone while so many have a mains supply.

Before the three years set apart for Post Office experiments had passed the possibilities of war brought the question of rediffusion into official limelight once more. The use of wires rather than wireless for broadcasting was seen to have advantages as part of national defence. We know now that German stations go off the air and our own have to give a poor service on the approach of hostile aircraft. This is because otherwise the stations form guiding wireless beacons. Wire broadcasting could continue to give excellent service, in spite of enemy planes, and it would have the further advantage of not discussing domestic affairs in the enemy's hearing. Wireless could then be devoted wholly to propaganda. All these points were appreciated by the authorities and it was thought vital to build up a national wire system as quickly as possible. The Post Office was too busy to install its proposed system universally, and besides, however hard it worked, so few houses had the telephone. The Government therefore decided that the Post Office and private firms should go ahead together, so that the work should progress as rapidly as possible.

The Labour Party was furious, it insisted on a debate in Parliament. The Government, alleged the Labour members, had 'sold out' to private interests. The Postmaster-General was however firm; this was a Government decision and the 'feeling' of 'other parts of the House' was irrelevant. The maximum of national effort was, said the official spokesman, essential.

The Postmaster-General implied that the Labour opposition should be comforted because it was revealed that the Post Office was going to set up its own system of rediffusion as a State enterprise. This was, explained the P.M.G., a nationalized thing and happily a wonderful thing. An ordinary wireless receiver would be given an attachment to connect it to the telephone wires so that it could play programmes sent by the Post Office down the conductors. The ordinary receiver could therefore receive the ordinary programme out of the air, or

alternatively others sent by the Post Office down the telephone wires. Then again the wireless set, attached to the telephone wires, could get the speaking clock time service.

All this seemed to me to miss the point that the great advantages of a properly conceived and designed rediffusion system were that it did away with a wireless set (which seldom gives good quality reproduction), and that it made the reception of transmissions difficult to pick up on an ordinary set easy. Neither of these advantages were supplied by the Post Office system. On the other hand the scheme ingeniously avoided competition with the wireless trade because it used an ordinary wireless set. It also got the Post Office out of the difficulty of deciding whether to relay advertisement programmes, of which it officially disapproved, because if these were not sent down the wires the wireless set could pick them up, albeit badly, out of the air.

Nothing was said in the Postmaster-General's opening statement about the mains system. But Sir Herbert Williams intervened. He was very kind to our system, he pointed out its superiority to the audio method and its greater area of application than the telephone. The Postmaster-General in his reply said he really thought that one day this idea of using the mains ought to be examined. We knew we ought to be very grateful for this.

In spite of a violent opposition from the Labour benches the Government decisions were upheld and the private rediffusion firms were, for the first time, given their heads. They feverishly set about concession hunting. Local authorities were bombarded by requests to be allowed to set up new wires for audio-frequency rediffusion services. Local authorities were reminded that the Postmaster-General had urged them to grant concessions. Delegations waited about in draughty ante-rooms, huge committees faced breathless enthusiasts, companies bid higher and higher against one another. But this was all to no purpose, only one new concession was granted during all this time out of hundreds of applications. Perhaps, proselytizing our mains system, we had something to do with this. We circularized all the principal municipalities and electricity undertakings pointing out that our scheme gave more programmes than the audio system

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and did so without having to put up new ugly overhead wires.

I wrote letters and articles in the technical and lay press attempting to put our case fairly but firmly. The electrical supply industry rallied to our cause. Important Government officials saw to it that our proposals should be sympathetically examined by the Post Office. We had a meeting with representatives of the Ministry of Transport and the Electricity Commissioners at which the Post Office presided. We were treated very nicely. What did we want? We only wanted to put our scheme into operation. What prevented it? A law made in 1882. Was the electricity industry in favour of our proposals? We hoped and believed so. The Post Office said the electricity undertakings would be consulted. This further consultation proved we had widespread support from this important industry. It looked as if at last a 'little Bill' would open the door to freedom from irrelevant obstruction. The wireless manufacturers gathered round and were friendly too. Better make the sets, they said, for wired wireless than only loudspeakers for audio-frequency. It felt like old times to be told how important one was.

Then war was declared.

'We are ready,' we said, 'let's go'.

'Alas!' replied the Government spokesman, 'it's now too late, other and more urgent work must be done, wireless broadcasting is proving quite satisfactory [*sic*]. What a pity', it was added, 'that you were not ready two or three years ago.'

It was a pity, but hardly our fault. A pity that everyone concerned blocked the development of a new idea. A pity that everyone considered their own and not the public's interests. A pity that now in war, when broadcasting could be so useful and helpful, that the wireless service is so atrocious. A pity that wires are not bringing clear undisturbed speech and pure pleasing music to shelters, camps, and homes. A pity that everything that is said over the air is heard by the enemy, a pity that nothing need have been. A pity that a good multi-programme service is not available at all times, 'hostile aircraft approaching the coast' or not. But as I said before about planning the wavelengths, 'the pity is 'tis true'.

CHAPTER XIII

SEEING BY WIRELESS

I CANNOT remember whether I first heard about television through the public press or confidentially in my capacity as Chief Engineer of the B.B.C. Nor can I remember when it was, 1926 or 1927 perhaps. I was naturally interested both as a technician and an official of the B.B.C. I asked A. G. D. West, who was then a member of my staff, if he would go and find out more about what was happening.

West reported that a Mr. J. L. Baird had shown him a demonstration in which the crude outlines of moving images had been instantaneously reproduced on a screen. West was enthusiastic. Much later he became Baird's right hand man and did some admirable work developing the Baird system.

Baird might perhaps agree that he has had an overdose of adulation by the lay press and too little recognition of his pioneering work by his fellow technicians. Neither he nor anyone else invented television; in any case, no one can invent a principle, protection is only given for a process of manufacture. What Baird did was to prove that what had hitherto been a theoretical idea was, thanks to the invention of the valve and the light cell, a practical possibility. For this alone, apart from the development of the system which bears his name, Baird deserves the thanks and praise of the technical world.

It would be unwise to make any very positive forecasts about the future of television because there is so little past experience to go on. The brilliant future of vision broadcasting was implied in my dream described in the last chapter. The dream was meant to be prophetic, not fantastic.

British television is already well established. This is due, more than anything, to the B.B.C. which has put aside large sums of money to start the service. That it was able to do so is a justification of the principles on which our national broadcasting is founded. Without

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the B.B.C. it is doubtful if our television service would have led the world as it can justly claim to have done. An interested and authoritative American said to me when talking about television, 'This is the first time I have seen any use for your old B.B.C.' In America they were then waiting for the television hen to lay a financial egg or a financial egg to hatch out into a television chicken. It was no good, in the absence of a large number of viewers, asking American advertisers to pay for an expensive television programme; but the public would not take up 'viewing' without expensive television programmes to look at. Doubtless a retroactive process will, in time, build up an American commercial television service, but the financial risk in starting it is considerable. Our rich and centralized B.B.C. on the other hand can afford to test if consumer demand is large enough to justify continued transmissions.

I think, while on this subject, a personal digression may be justified. I believe an impression exists that I am, or was, an opponent of television. It would not make the slightest difference to television if I were, but, as it happens, I am not. I do not want to be classed as an opponent of any interest save my own. The impression that I do not want television to prosper was produced in the early days of its development when the financial interests behind Baird pressed the B.B.C. to broadcast low definition pictures on medium (that is to say, sound-broadcasting) wavelengths. The vital technical fact in television is that a clear detailed picture requires a very wide channel to contain it. One television station working on medium waves would occupy more air than all the broadcasting stations, all the ship stations and all the long wave stations, together, occupy to-day. It is only possible to find a sufficiently wide channel to contain a television transmission among the ultra short waves. It seemed to me to be as clear from the principles of physics as the example of the then existing pictures (pictures which would fit in the narrow channels provided by medium sound broadcasting wavelengths), that it was an insult to the public to put on such a poor service and encourage the idea that the broadcast pictures would improve. If they could be improved it would be impossible to transmit them through the narrow channels provided by medium wavelengths.

If they were not improved they were not worth transmitting. I therefore successfully opposed even the appearance of B.B.C. collaboration with the Baird interests. I said that directly the technicians could show a good picture the B.B.C. would be glad to try and broadcast it, but it would be impossible to do so on existing wavelengths. This may have been disappointing to the Baird financiers, but it protected the public. When I left the B.B.C., however, my policy was reversed and the crude pictures were broadcast. The public proved me right by taking practically no interest in the service in spite of a great publicity bally-hoo. The service was then stopped and a lot of money which had been trustingly subscribed was wasted. It was not until a great deal of research had been done behind the scenes that the production of good detailed pictures by television was made possible. These detailed pictures could not however be transmitted by the sound broadcasting stations, primarily because they did not offer wide enough wavelength channels and also because the sound broadcasting stations were occupied in broadcasting sound programmes. Obviously a public television service was desirable when the pictures were worth looking at, but the question was could they be transmitted? I thought not. I thought the ultra short waves essential to broadcast moving pictures would have much too small a penetration or 'range'.

I certainly made a big technical mistake in prophesying that television had a doubtful future because of fundamental technical difficulties in transmitting it. I saw that it was bound to be possible to produce good pictures in the laboratory, but I thought that the ultra short waves would be no good for transmitting the pictures. The facts proved otherwise, ultra short waves have a perfectly satisfactory range. That I made a wrong forecast about wave propagation theory and refused to give the B.B.C.'s backing to now provedly worthless pictures hardly makes me an opponent of television.

Now that ultra short waves have proved their usefulness I am sure that television, if economically feasible, has a great future. The main problem is how to provide entertainment which the public can pay for. Not only is the apparatus of television much more expensive than that used for sound broadcasting, but the eye demands more

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elaborate, and therefore costly, satisfactions than the ear. Television has in consequence not as yet shown financial profit. It owes its existence to subscriptions paid by sound broadcasting listeners and to speculative investment by the wireless manufacturers. There have been some quite authoritative suggestions that the service might well be sponsored by advertisers. Tut tut!

One of the most encouraging features about television is the enthusiastic way those responsible have introduced it. Gerald Cock, its spirited director, has shown real courage and initiative; Philip Dorte, combining a knowledge of wireless and film camera technique, has been of inestimable value on the operating side. Doubtless Cock would agree that programmes have not always come up to his expectations, but obviously these expectations are large and imaginative.

Television programmes are going to be difficult to provide. It must be remembered that, as in the early days of sound broadcasting, a lot of people got interested in the television service because it was miraculous, not because it was intrinsically interesting. But in television, as in sound broadcasting, the programme and only the programme will maintain an enduring interest. Sound broadcasting is enjoyed as an accompaniment to home life; one can knit, play bridge, work out problems, day dream and 'moon' about without concentrating too much on the music. Sound broadcasting only dominates other interests when it gives news, views, and information. But television always requires undistracted attention, it demands therefore a programme worth concentrating on. I do not say it cannot be done, I do say it is more difficult to do it. In time I hope the organization of the television service will follow the lines I have proposed for sound broadcasting. It, too, should be set up in independent regional centres; it, too, when consumer demand is proved by wireless distribution, should be sent through wires to the homes of the viewers.

I think that television will never completely oust sound broadcasting, and that it will supplement rather than rival the films. I believe that its functions will be chiefly reportorial, it will bring dramatic events and interesting sights immediately and vividly to the home screen. The elaborate film drama, part reality, part fake, and all pains-

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taking repetition, which takes months or years to prepare and demands even hundreds of thousands of pounds spent on it, will always be part of a cinema technique. Music loses rather than gains by fidgety close-ups and sudden perspectives; it can be better enjoyed by itself and for itself. But the potentials of television for education, for defeating distance, and bringing events literally home to us are immeasurable.

CHAPTER XIV

RETROSPECT AND PROSPECT

I SET out to write the tale of my own life with my own hand. This is what I have done, literally. My own hand, holding my own pen, has written half a million words. But Dorothy Carrington has made me discard four hundred and twenty thousand of them. We both hope the residue is clear. If it is, as I said in my very sincere dedication, it will be largely due to the enormous pains that Dorothy Carrington has taken in 'just making suggestions'.

I have found it difficult to write concisely and constructively about broadcasting. The subject is inevitably tied up with the 'big issues'. One is consequently tempted to run off into circumlocutory diatribes about politics, sociology, and art, in which abstract nouns stand out like castellations on a Victorian mansion. Then so much of the story of broadcasting is bound up with the nature and limitations of its mechanism. It has therefore been essential at least to indicate 'how it works' and what are the basic technical factors which make it work so inadequately. As there was no intention to make the book even a 'popular science' affair, I have had to try to bring out the essential technical factors without going into detail. Many paragraphs have perished on this account. I thought the clearest way to write the book was as a story of my working life because my life has been so bound up with the development of broadcasting.

In my youth stories had a moral. Nowadays, not to be old fashioned, they may have a conclusion and some even a point. There ought therefore to be some conclusion to my personal story. I hope it is not thought that I wrote the book under the implied title 'Unfair to Eckersley' or 'Pity the Poor Ideologue'. If I have suffered any tyranny it has been the tyranny of my own ideas which never cease nagging until they get put into practice. I have chosen to think that ideas are more important than organizations, and, if that has been, as some might

think, my mistake, it has nevertheless been my inspiration. If then a conclusion to my story is necessary it might be concisely expressed by a quotation from the book; 'he had ideas, we blocked them'. But the important conclusion is about the ideas, whether they are any good, and what blocked them, and why.

All these ideas, which I have explained in the book, have grown out of an unwavering conviction that broadcasting is a profoundly important development of modern technology. Broadcasting has the unique power to bring every living person into contact with lively minds and dramatic and portentous events. It can stimulate mass interest as much by suggestion as by direct statement. It has the power to amuse, distract and educate. It brings the listener the exciting pleasure of hearing well-performed music of every kind and gives the ex-patriate the bitter sweets of nostalgia. It is at once a facile amusement, a university, a talking newspaper, a concert hall and a theatre. These are the handsome mosaic pieces of broadcasting, but they clash or harmonize according to the way they are fitted together. Paints by themselves have lovely colours; they can be used to make a daub or a picture. Much broadcasting has been no more than a messy palette.

My belief in the soundness of the principles upon which our B.B.C. is founded follows inevitably from my conviction that broadcasting is essentially a cultural and certainly a sociological force. It seems so obvious that anything which has so great an influence on the mass mind should be handled, at least in part, by an organization which is freed from the profit motive. In theory the B.B.C. is so constituted. But it has fitted itself into a mercantile background. It has been 'a pillar of the State' and 'of the world, worldly'. It might have done more to reveal the existence of another side to life, in which art and intellect are more important than behaviourism. This could be shown to be an exciting and amusing side to life, just as amusing as playing golf or bridge. But this is not a job for the bureaucrat, the administrator, the organizer or for those who believe in authoritarian methods. The B.B.C. was a child of bureaucracy. The limitations of the technique of wireless broadcasting made this parentage inevitable.

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It was only natural, indeed it was right, that, during its infancy, the Broadcasting Company, as it then was, should try above everything to please its nurses and tutors who were appointed by government and business. But when the B.B.C. grew up one hoped to see it launched on a career. It remained however a home child, sulky and self-important, doted on by its parents.

I cannot believe that there is anything inherent in the B.B.C.'s constitution which necessarily makes it subservient to administrative values. But obviously the circumstances of its foundations may have led it into bad habits. If it could now be taken out of the hands of administrators and directed by a quite different type of person, I believe that the excellent opportunities which its constitution provides might be used intelligently. I have said again and again that the B.B.C. fails to give its programmes a cultural background, admirable as certain of the things it broadcasts may be. A welcome change in the whole spirit in which broadcasting is done would, I have suggested, follow naturally from the appointment of a new directorate which was formed from those who had essentially a cultural outlook.

Such a directorate would perhaps agree with my suggestions that everything should be done to free the people who make the programmes from the drag of bureaucratic supervision. To this end, according to the ideas I have already set out in some detail, programmes would be made at several different 'Regional' headquarters. These headquarters would be completely equipped with studios, orchestras, as well as their own repertory players, choirs and so forth. They would, in fact, be sub-B.B.C.s federated to, but not supervised in detail by, a central B.B.C. These Regional programmes would represent the taste, culture, and custom of the Regions they served and would also be original and experimental interpretations of a broad cultural policy. The programme directors would be 'serviced', as it were, by administrative experts instead of being ruled by restrictions. Administrative dominance would only be exercised in the interests of order and a wide overruling cultural policy.

But these ideas, and all that they imply, will be resisted, particularly by the B.B.C. itself. Resistance comes automatically from those who

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believe that broadcasting ought to be authoritarian rather than educative. I use the word educative in its basic meaning of leading and showing. Broadcasting in Britain has, I think, become authoritarian because the people in the B.B.C. know best how to make it that way. They are 'job-minded'; they have learned how to keep a job by making the job the kind they can keep. Few of them would know how to do the job anyone with a cultural outlook would want them to do, and so they resist any idea of doing it.

I consider that the B.B.C. should be a national stronghold of artistic and intellectual standards; those who direct the Corporation think it should be a bulwark against what they would regard as the sloppy and ill-disciplined attitudes of artists and highbrows. If this leaves an impression that I want a B.B.C. which is self-consciously unorthodox, and terribly serious about its non-conformity, then I have expressed myself badly. I take the word cultural to mean what the *Oxford Dictionary* says it means, namely 'the refinement of mind, taste and manners'. Refinement of mind implies that the mind examines and does not accept, refinement of taste is an ability to distinguish beauty in its varied forms, refinement of manners is expressed by a willingness to help others by showing, sharing and sympathizing. Nor do these refinements mean squeezing out gaiety; on the contrary robust humour is one of the amenities of refinement. The pundits of the B.B.C. may perhaps agree with these generalizations, but, if so, they have made no obvious attempts to put them into practice. On the contrary the B.B.C. remains a vested interest in conformity and stagnation. And very pleased with itself too.

Consistent with my conviction that broadcasting should give the public all forms of amusement and believing that amusement has many forms, I have tried to put over the idea that the technical method by which programmes are distributed should be changed. This essential change gives facilities for broadcasting a large number of programmes simultaneously. It can be claimed that it overcomes all the difficulties which prevent broadcasting having a wider scope.

But this idea is resisted on all sides. The B.B.C.'s indifference or opposition indicates that it quite likes the present technical limitations,

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presumably because they are a good excuse to prevent the public getting what is considered bad for it. The B.B.C. seems to think that the cornucopia of plenty is a horrible example of laxity; the dry ersatz of carefully prepared material is much better for the listener.

There are others who oppose the idea of having wire instead of wireless broadcasting. It is indeed refreshing to meet the straightforward issue between the wireless trade and the wire broadcasting interests. The wireless trade opposes the idea because it is afraid of losing its profits. Simply that and nothing more. When I was in the B.B.C. I was innocent enough to believe that if any scheme were provedly valuable it would automatically be put into public service. Since I have been 'in trade' I have realized that such matters are decided in a 'free for all' (except the public), in which by no means the best man wins. In opposing wire broadcasting the wireless trade is acting perfectly logically, it is protecting itself by trying to down a rival.

'The Trade' has done excellent work in its own sphere. It has used mass production methods to cheapen receivers so that they shall be within the purchasing power of the majority. But mass produced things seem to me to be like the beer a miserly employer gave his workmen.

'If it were any worse we couldn't have drunk it, if it'd been any better we wouldn't have been given it.'

The workmen got the beer, medium poor stuff that it was; listeners get receivers which, although their voices grate on a sensitive ear, do pick up the programmes and give a lot of pleasure. Mass production judges just what minimum standard the public will accept; any manufacturer pursuing an idealistic policy in a hard, material, competitive system, would soon go to the wall.

The point about wire broadcasting, so far as its technique is concerned, is that while the receivers would still have to be mass produced they would be much simpler, and would give a much better service than wireless receivers, both in quantity and quality. The wireless trade, however, only sees that the cheapness and simplicity of the apparatus of wire broadcasting would make it less profitable to the manufacturer. The distributor of wireless sets is even more apprehen-

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sive because, under the new scheme, there would be fewer wireless sets to distribute. This is all perfectly logical; it is the inevitable outcome of the system by which we live and which the majority supports. Thirteen words of comfort: 'The profits under wire broadcasting would not be abolished, they would be diverted'.

The attitude of the Post Office to the use of wires in broadcasting has hardly been consistent, and its inconsistency has thwarted a sane development. First the Post Office said that rediffusion had no future and then seemed anxious to prove the statement by making hampering rules to prevent rediffusion having even a present. When, in spite of these hampering rules, private enterprise proved a public demand, the Post Office then tried to take over the service for itself. The officials said at the outset that it was inconceivable that even a quasi-state enterprise like the B.B.C. should be allowed to compete with private enterprise, and then behaved worse, even, than a commercial company in trying to down our mains wired wireless system. Thwarted by circumstances from getting complete control over all rediffusion the Post Office decided to use its own telephone wires, in competition with other privately owned rediffusion systems, in a way which neglected most of the fundamental values of wired reception. This adaptation was not inspired by technical but rather by bureaucratic issues. The Post Office method uses an ordinary wireless set with all its inherent distortions. This frees the Post Office from any criticisms for competing with the powerful wireless trade. It also evades the issue of deciding whether to relay advertising programmes of which the Post Office officially disapproves. But it hardly uses rediffusion in the best way and therefore in the best interests of the listener. 'I mean ter say', as George Robey used to remark. Whether the Post Office can be described as a 'vested interest' or not, its actions have blocked progress in wire broadcasting as effectively as any monied private company with an axe to grind.

I am so afraid that my reiteration of the word 'cultural' to define an ideal may leave the impression that I am an incorrigible highbrow who wants to take all the fun out of broadcasting. I have defined the word 'cultural' so many times, and so often stressed the fact that a

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cultural policy recognizes the listener's right to be amused that there should be no excuse to think I want to make broadcasting dull. As further proof to the contrary there is my strong advocacy of commercial broadcasting, not only as a check on a too detached and authoritarian B.B.C. but also as a source of lighter entertainment programmes. I do not think for a moment that commercial broadcasting should replace the B.B.C., I do suggest it would most usefully accompany it. Nor do I think that any existing British wavelengths should be used for the advertising system; I am much too keen on the potentials of the Regional scheme to see them sacrificed. My idea is that we should go on using foreign stations for advertising programmes until the wires offer us enough channels to introduce the commercial in parallel with the B.B.C. service. But the B.B.C., the Government, and the Press oppose any idea of encouraging publicity wireless services, whether from abroad or by the use of our own wires.

The B.B.C. opposes commercial broadcasting because it sees in it a threat to monopoly. It is argued that any commercial service would undermine the Corporation's policy. Good! So long as that policy is boring, timid, and haughty. One could hope that the B.B.C. would realize that listeners can be amused in all sorts of different ways and that therefore it would welcome the existence of an organization that was well fitted to take the responsibility for one. I can think of nothing more exciting than running a B.B.C. service in friendly rivalry with commercial broadcasting. It would be an opportunity to show what could be done by an organization which did not have to concentrate on profit making. The B.B.C. could show listeners that it is more fun exploring new country than in lazing about in well-known and safe surroundings. But the B.B.C. wants everything its own way and its own way is to possess power, not to justify it.

The newspapers oppose commercial broadcasting. This is a straightforward commercial opposition like the wireless trade's opposition to wire broadcasting. The newspapers live by advertising and they resent anyone else poaching on what they feel is their own preserve. But newspapers seem to get published in America, which is the home of advertising broadcasting, as well as in Australia, Canada, France

and Belgium where commercial wireless is, or has been, more or less strongly established. Perhaps it is not the existence of the profit the newspaper people worry about but the amount.

When one sees the whole picture it is really rather comical. The newspapers justify the principle by which they exist by pointing out that they are free to publish what they will. Hence the term 'free Press'. I do not see why commercial broadcasting is not justified in exactly the same terms; it is also free to publish what it will and so become a means to put important issues before the public from all points of view. I expect any logical supporter of the newspapers would see this point, but it would not make any difference to the commercial issue. The newspapers remain another vested interest opposing this expansion of the broadcasting service.

So these proposals, a more independent B.B.C., the substitution of wire for wireless broadcasting, and the institution of a commercial in parallel with a monopoly system of broadcasting, all of which seem to me to be designed only for the benefit of the listener, have been and are opposed by powerful organizations. These organizations are able to use vast money and propaganda resources to make their oppositions effective. Between them, the Press, the B.B.C. and the wireless trade, not to mention smaller hangers on, can marshal millions upon millions of money. They also control all publication save books and a few independent periodicals.

But so far I have only written about interests which oppose changes in the present system of broadcasting. Some of these same interests, and some others, are basically opposed to broadcasting whatever form it takes.

Again we find the Press on the side of the opposition. Both the Press and broadcasting deal with news. To the Press 'news' is the commodity on which its existence depends. The greater the circulation of a newspaper the more it charges for advertisement and the greater its profits. The evening newspapers, particularly, increase their circulations by coming out with reports of events almost before they happen. It is the ambition of the evening newspapers to be 'first with the news'. If the broadcasting organization could get the

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news at the same moment that it arrived in the newspaper offices it would 'beat them to it'. The public would know what won the three-thirty or who had murdered who — if not why — before the presses had even started to revolve.

Up to the outbreak of war the B.B.C. agreed with the newspaper proprietors not to publish any news before six o'clock in the evening and to take all the news it did publish from the big agencies. But there is an uneasy feeling in Fleet Street that broadcasting, if liberalized and rich and free, might become a dangerous competitor to the newspaper business.

The entertainment industry is another vested interest which looks askance at the growing influence of broadcasting. Anything which tends to keep people in their homes diminishes catering, entrance fees, and box office profits. Moreover since broadcasting enables people to join in events they would otherwise pay to see it is in direct competition with the entrepreneur.

I have left any reference to what is perhaps the most subtle but nevertheless the most powerful interest opposing the growth of broadcasting to the last. Exaggerated as it may seem to some, I cannot help feeling that 'the government', of whatever political character, is opposed to the existence of what it might describe as a 'too free' broadcasting organization. I have heard people who were politically opposed to the Government then in power, cursing the B.B.C. for its lack of independence. Such people have naively added:

'Wait until *we* get into power! We'll show 'em how to use broadcasting.'

This gives point to my argument. I feel that 'the clever ones' have no intention of letting the B.B.C. get out of Government control; they have no belief that broadcasting ought to be the rostrum of democracy. Instead they want it to express, if not direct arguments in favour of their policies, at least the more general aims of their dialectic. The B.B.C. must, for these ends, be made to appear as independent as possible while remaining in fact subservient. One of the best forms of propaganda is to get an apparently free agent to say what is wanted. The B.B.C. is wonderfully authoritative in this sense;

it is so nice, so suave, so comforting, that no one could imagine it could tell a lie. Nor does it; it tells the truth, but not the whole truth and nothing but the truth so help me God! If it did . . . well! it might not be doing broadcasting 'to the satisfaction of the Post-master-General'.

The Government has always upheld the B.B.C. in its attitudes and policy. There have been criticisms in Parliament about its internal administration, but never any serious attacks on its external behaviour. On the contrary this has been praised as an example of lofty idealism. Here and there a political opposition had protested against what it described as some flagrantly unfair 'talk', but one felt that the protest would never have been pressed home had it implied a real change was needed in the broadcasting system. When commercial broadcasting started all the Government forces were turned against it. Why? Because the Government is opposed to the public getting some innocent amusement? No! Things are not as bad as that. Surely the real reason was that the Government was anxious to preserve the power of the B.B.C. But perhaps I am 'playing Red Indians'; the reader must decide if my game has any serious foundation.

I realize that in underlining again and again the fact that broadcasting has been blocked or its progress diverted by the pull of vested interests I am baiting my own trap. Those who oppose my suggestions may say that they are not impartial because, if they were adopted, they would advance my own commercial interests. How true. I should perhaps profit if commercial broadcasting were recognized and encouraged. I certainly should if the mains wired wireless system were put into service (always assuming that there are going to be such things as profits in the future). But I should profit by past investments in enthusiasms as well as money. I can genuinely say enthusiasm has been my chief inspiration and that it has not helped a 'career'. I do not want to pose as a noble idealist, but I can claim to have given up a great deal for the sake of my ideas. I have done so because I am much happier working on new things than in maintaining the old ones. If I had stayed in the B.B.C. I might now be much honoured and well secured; if I had accepted offers made to me when

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I left the B.B.C. I should have been rich but ashamed. If I had stuck to organizations I founded I should be both well off and proud. But I have chosen, not nobly but automatically, to be a pioneer because I am incapable of being enthusiastic about schemes I feel to be as out of date as their sponsors.

But, as I said before, my own personal story is of little importance compared with that which I have told and summarized about broadcasting. It is indeed a dreary story. It is a story of things being 'handled' in terms of surface issues rather than fundamentals. Invention, beneficial to the public but threatening a profit, is side-tracked and neglected. Ideas and enthusiasms are frowned upon if they challenge authority or if they imply a revision of organization. Authority conserves, regulates, disparages, turns down; if it is not openly on the side of the big bank balances it certainly seems to respect them.

But for this dreary hanging back on the part of public servants, but for the overruling dictatorship of the profit motive, the listener this moment could be listening to his loudspeaker, soothed, stimulated, interested or amused as he wished. The sounds would exactly resemble their original, no portentous boom, raucous scratch or snarling insistence would mar enjoyment. Things the listener had thought about dimly would be brought into sharp and amazing focus, ambitions he had dreamed of vaguely would be seen to be realizable, the day to day drag of work might suddenly become interesting by contact with lively minds.

Instead, the broadcasting factory methodically snips off bits of dry material and drops them into the programme channels to be 'passed to you'. It should be otherwise. It could be otherwise. But it never will be otherwise so long as the same dreary inlook governs our public lives and our public services, the B.B.C. as well as everything else.

I see the B.B.C. like 'the Lady' in *Comus*. As the spirit says of her:

Your nerves are all chained up in alabaster
And you a statue or, as Daphne was
Root bound . . .
In stony fetters fixed and motionless.

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Our decent feelings resist with her the rape of vested interests and pay some tribute to an immobile virginity when it protects her from greedy embraces. But there is some impatience with such persistent purity. Let the mincing miss get a husband and then perhaps,

Two blissful twins are to be born,
Youth and Joy . . .

Surely youth and joy might be the outcome if our broadcasting organization put off its frozen official pose and gave up the governessy stiffness of its day to day performance.

But to leave poetic hyperbole and come back to the plain issue, broadcasting will never be able to take its rightful place in community life, never become that witty and informed friend it might be, until the vested interests, which hold it down, are either reconciled to its expansion or dragooned into obedience.

The problem of how this is to be done is a problem of politics. This is not a political book, nor am I an expert on the subject of politics. I must, like any citizen, take an interest in politics but if one takes a too expressive interest one gets called names ending in 'ist'. This is no time for a technician to carry political labels.

I listen to those who have their solutions pat, but a training in the scientific method often leaves me sceptical. There are some who would nationalize everything and so, as they allege, get rid of the profit motive altogether. But I understand that many forms of nationalization imply that schemes are judged by committees. The history of committee judgment is not very encouraging. A committee of his alleged peers derided Pasteur. Gallileo was persecuted for saying what any schoolboy would fail in his examinations for not knowing. Huxley suffered bitter hatred for his championship of the theory of the Evolution of Species which is now being justified by 'scientific' churchmen. Oliver Heaviside, who carried on the work of Faraday, Maxwell and Hertz with comparable brilliance, was so disgusted by the attitude of the 'experts' of the British Post Office that he became a recluse. Heaviside's work will always live but unfortunately the Post Office attitude continues to exist. Even I have had technical ideas

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which, while they have been merely improvements of method, have been good enough to have been turned down by committees and afterwards put into service.

There are some who think that the best way out of these difficulties is to get rid of State interference and let the vested interests fight it out. 'Go back,' say such people, 'to the good old days of *laissez-faire* when an idea got taken up by someone and there was always a market if the idea were any use'. The trouble about *laissez faire* methods is that they let such nasty things get made. Besides that is not the way of progress.

Both of these solutions, nationalization and private competition, seem to me to have their difficulties. Indeed I doubt which is the worse, 'the inverted Micawbers waiting for something to turn down', who represent bureaucratic committees, or predatory financiers waiting for something to turn up who typify private initiative. My loyalty as a technician is waiting to be freely given to a system which is as keen to try out ideas as I am, which frees invention, of ideas as well as processes, both from the down dragging judgments of office committees and from the irresponsibilities of the profit motive. I am however an expert in one field and I respect the expertism of others in theirs; it is for the political thinkers to find, if they have not found, a solution.

The problem facing the politicians is clear. It is a problem which applies universally, not only to broadcasting. It is the problem of how to let ideas grow naturally without being pulled out of shape by vested interests. It is a problem of how to prevent large organizations profiting by continuing to exploit methods and schemes which are out of date. It is the problem of how to make public service organizations enthusiastic and forward looking so that their fear of making a mistake is overshadowed by their desire to try out new schemes and get things done. It is the problem of how to reconcile the rights of the many with the interests of a few. It is the problem of how to remove economic fear from the minds of the majority and yet reward the intelligent and the enthusiastic who have done something exceptional for the community. It is a problem made more acute by scientific invention that has both narrowed the world and revealed its plenty.

Twice in my lifetime we have been promised a new world if only

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we struggle on to victory. Last time the promise did not materialize, indeed we went backwards rather than forwards. Even now the promises are only of a vague new world, but they may be more fruitful. If so perhaps it is not too extravagant to hope that the plenty which science can give us may be made available for our use and the products of human ingenuity enjoyed by human beings. If such things should happen broadcasting could redeem a dreary past and join in the work of building a new and saner world.

