

THIS THING CALLED BROADCASTING

A SIMPLE TALE OF AN IDEA, AN EXPERIMENT, A
MIGHTY INDUSTRY, A DAILY HABIT, AND A BA-
SIC INFLUENCE IN OUR MODERN CIVILIZATION

BY

ALFRED N. GOLDSMITH

AND

AUSTIN C. LESCARBOURA



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AUSTIN C. LESCARBOURA

What if the pioneers of the railroads had paused in their empire building long enough to tell the heroic story of their magic paths of steel? Or the conquistadors of steam navigation been able to recount their far-flung victories? Such records if they existed, would be invaluable. But there are no such contemporary narratives, and now the years have intervened.

The life span of radio, however, is still short. In a very few years it has reached the pinnacle which it took the railroads and the automobile and the telephone decades to achieve. Thus is possible the inside story of radio written by men who helped to make it. **THIS THING CALLED BROADCASTING** is a popularly written, non-technical account of the rise of radio from its earliest crude beginnings to its present status as one of the country's greatest industries, a development which has been extremely rapid and crowded with exciting incidents, a saga of an industry's triumph over adversity.

Dr. Alfred N. Goldsmith is Vice-President and General Engineer of the Radio Corporation of America, while Mr. Austin C. Lescarbours is a former managing editor of "Scientific American." Their book could not be written ten years from now. It represents a quarter century's experience in the radio field, and is unique in that it is a dramatic popularization of a scientific subject by men who are themselves in the forefront of radio's conquest of the American public.

THIS THING CALLED BROADCASTING tells the whole story of radio. Chapter headings include: The Cradle of Broadcasting, The Gold Rush of the Air, Staking the Wave Length Claim, Who Are the Broadcasters?, Building the Radio Program, The Announcer and His Role, Who Pays the Broadcast Bill?, The Broadcaster Spins His Network Web. Other chapters treat of radio's influence on politics, sport, the home, education, the church, the farmer, and business.



**PRECEDING AND FOLLOWING THE SPOTLIGHT OF PUBLIC INTEREST:
SETTING UP FOR BROADCASTING THE HOOVER INAUGURAL**

A public event involves days, sometimes weeks of preparation, testing, setting up equipment, that the public may hear the event without hitch. If radio apparatus breaks down, inaugurals are not repeated.

PREFACE

IN writing on that most romantic subject, radio, one is forever confronted with the problem of *what not to write* rather than what to write. The subject matter is so vast, so diversified, so controversial, that its treatment today becomes practically an expression of opinion and perhaps even a flight of fancy instead of an impartial chronicle of established facts.

Hence the authors hasten to make clear their position in saddling a new radio book on an indulgent public. If the following ideas and ideals are borne in mind by the alleged gentle reader in perusing the pages that follow, our efforts will be interpreted in their proper light.

First of all, the authors vigorously disclaim the title of radio historians. No attempt has been made herein to write radio history. The authors feel that no man can write history when history is still in the making. There is no finality about radio today. It is partly transient in form. So must be its literature.

By the same token, they have not attempted to decide the grave question of the paternity of radio broadcasting (or radio for short). "If you would argue with me, define your terms," states the old proverb which covers this point precisely. To answer the question of radio paternity, one must needs know what is meant by *radio*. If we refer to the impressing of the voice on a radio wave, Reginald A. Fessenden becomes the father of radio. If conceiving the possibility of propagating music and talks to an unseen and unknown audience means radio, then Lee De Forest becomes the proud father. If by radio is meant the institutionalized syndication of programs over wire networks to scattered radio stations, then the planning mind which managed Station WEAf is the father of radio. If by radio is meant the psychological and engineering change from purely experimental radio telephony to an organized service to the interested public, then Frank Conrad of Station KDKA is the

father. If the foresight to couple organized broadcasting with the quantity production of home radio sets, with all that this implies to the radio industry, be radio, then H. P. Davis, Vice-President of the Westinghouse organization, is the father.

All of which proves confusing. It becomes a question of definitions. Claims and counterclaims only serve to throw us off the scent. If we could but find the man who first consciously and entertainingly spoke to the whole public through a microphone, on a repetitive schedule basis, then we might hail the first broadcaster with little fear of contradiction.

Nor do your authors claim to have prepared a reference work on the technical progress of radio. An abundance of such literature already exists—in half a dozen languages, in hundreds of technical books, in a never-ceasing flow of periodicals, in thousands of patents, in the decisions of the courts, and in verdicts yet to be handed down by jurists.

From the standpoint of an analysis of broadcasting artistry, no attempt has been made to review all programs and presentations. Fully do we realize that the programs range from a talk on Kant as a Sunday feature or the delicately sponsored symphony orchestra down to a strident jazz ensemble—and even the blatant announcement extolling the flowing merits of a \$3.50 pair of shoes available at a local shop. To which the only comment can be: on their merits shall the radio dials be tuned.

Finally, the authors wish to register their patent disclaimer at this time. No attempt has been made to aid, embarrass, or discourage those gentlemen engaged in the arduous task of unravelling the patent tangles of this thing called radio. To do so would probably render the authors guilty of an attempt to steal the thunder of that most august body, the Supreme Court of the United States, which *finally* decides these ultra-complicated matters.

The authors at this time express their sincere thanks to all who have contributed to making this work possible. The entire press of the United States has provided thousands of clippings, which, duly arranged and indexed, have formed the groundwork for this review of radio progress. The various organizations mentioned throughout the text have contributed freely of their time

and efforts in supplying data and photographs. Philip Frank has been of no little assistance in the preparation and revision of the text. The entire work in manuscript form was read by Miss Bertha Brainard and Mr. Glenn W. Payne of the National Broadcasting Company, Mr. William S. Paley, President of the Columbia Broadcasting System, Mr. Martin P. Rice of the General Electric Company, and Mr. W. H. Easton of the Westinghouse Electric and Manufacturing Company, and many anecdotes and incidents contributed by them are the results of such kindly coöperation. The authors are therefore doubly grateful to these broadcast workers for their collaboration. And the public, through its keen interest in radio, has contributed the essential inspiration.

And so the following is just a human, innocent, more or less inspired review of the many ideas, events, and personalities that have gone into the creation of the greatest achievement of our modern civilization. The authors, realizing that many who have lived through the trying days of radio in the making are finding it increasingly difficult to recall the past through the dimming years, have hastened to gather together the fading threads of thought in order that they might be woven into the simple story that follows.

A. N. G.

A. C. L.

New York, June 1, 1930.

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THIS THING CALLED BROADCASTING

CHAPTER I

"THEY NEVER COME BACK"

IT was a torrid July evening in the year 1923, and a throng of some 90,000 persons wended its way towards Jersey City and descended, en masse, upon Mr. "Tex" Rickard's celebrated pine bowl at Mr. Boyle's equally celebrated Thirty Acres. They had come for the express purpose of seeing the comparatively aged ex-champion, Jess Willard, do battle with one Luis Angel Firpo, then at the height of his fistic career. And, despite the fact that the sporting writers of that time had been practically unanimous in declaring the Argentine to be what is technically known as a "copper-riveted cinch," the vast majority of the cash customers were fervently hoping against hope that old Jess would defy all the laws of precedent and "come back." For, deeply ingrained in our human nature is a quirk which prompts us to sympathize with all those great ones of years gone by who make an effort to recover some of their departed glory.

But it was not to be. For seven rounds, the Kansas giant fought desperately in a losing cause, but in the eighth Father Time and Mother Nature called a halt, and the brawny right arm of the Wild Bull of the Pampas was raised aloft in token of victory after Willard had been counted out, resting more or less comfortably on one knee. And as these same 90,000 filed slowly out of the huge amphitheatre, each man nudged his neighbor and, shaking his head sagaciously, said in a solemn voice, "They never come back."

In the world of sports this dictum has held true so often that it has become virtually axiomatic. If, for instance, the owner of the once mighty Man o' War should suddenly decide that he would like to see his super-horse under colors again, and should accordingly bring him out of retirement, the short-haired fraternity would immediately raise that mournful dirge, "They never come back," and proceed to back his opponent off the boards with

what Trader Horn would probably refer to as "scads of the coin of the realm;" and this in spite of the fact that the said opponent might be nothing more than a cheap, third-flight selling plater, just a jump or two ahead of the glue factory. And what is more, the judgment of these gentlemen would probably be vindicated. It is not entirely without reason that they have made a religion of that iconoclastic sentence, "They never come back."

But Life Is Different

But in every-day life, fortunately, things are quite different. The annals of commerce and industry are replete with the stories of men who, practically wiped out by an unfortunate or ill-considered venture, have started over again with the proverbial shoestring and have come back with a bang to amass a second and greater fortune. And somehow, those upon whom the effect of the word "capitalist" is analogous to that of a red flag upon a bull, are much less bitter against riches of this sort. Instinctively, all of us admire a man who possesses the indomitable courage necessary to fight his way out of the slough of despond. Such a man has actually done something which the great majority of us merely dream our lives away in the hope of doing, and he fully deserves the respect in which we hold him. To you, to me, and to countless millions of others he is the incarnation of the spirit of Hanley's great poem, "Invictus."

"In the fell clutch of circumstance
I have not winced nor cried aloud,
Beneath the bludgeonings of chance
My head is bloody but unbowed."

And it is this tendency of human nature to admire the man, the organization or the idea that doesn't know the meaning of the word "quit," that makes the story of the radio telephone one of universal and absorbing interest. *For the radio telephone, the basis of that art with which we are today familiar under the name of "broadcasting," is an invention that came back in a truly big way after a most inauspicious and even inglorious beginning.* Indeed, industry can offer no more romantic story than that of

the radio telephone, and as we unfold it the reader will find it surcharged with a veritable host of familiar human emotions. It is a story which runs the gamut of hope, tribulation, fear, defeat, despair, regeneration and ultimate triumph—in short, it is the story of life itself as most of us, in our dreams, imagine that it ought to be.

Words That Soured on the Tongue

We of the twentieth century are so familiar with the idea of voice communication that it is extremely difficult to appreciate the reactions of our immediate forefathers to it. And yet it is a fact that just two short years after the close of the Civil War, which thousands of persons now living can vividly remember, a prominent newspaper in the cultured and intellectual city of Boston published the following article:

“A man about 46 years of age, giving the name of Joshua Coppersmith, has been arrested in New York for attempting to extort funds from ignorant and superstitious people by exhibiting a device which, he says, will convey the human voice any distance over metallic wires so that it will be heard by the listener at the other end. He calls the instrument a ‘telephone’ which is obviously intended to imitate the word ‘telegraph’ and win the confidence of those who know of the success of the latter instrument without understanding the principles upon which it is based.

“Well informed people know that it is impossible to transmit the human voice over wires as may be done with the dots and dashes and signals of the Morse Code, and that, were it possible to do so, the thing would be of no practical value. The authorities who apprehended this criminal are to be congratulated and it is to be hoped that his punishment will be prompt and fitting, and that it may serve as an example to other conscienceless schemers who seek to enrich themselves at the expense of their fellow-creatures.”

Such, then, was the high regard in which our mid-Victorian ancestors held the telephone. Less than ten years later, in 1876, Fate and the Emperor of Brazil conspired to make the crude telephone of Alexander Graham Bell the reigning sensation of the Centennial Exposition at Philadelphia. Since the memory of

man runneth not to the contrary, people have used this invariable formula in dealing summarily with all new inventions: first, they have scoffed and called the innovation "fantastic," "impractical," and even "fraudulent;" after a practical, bonafide demonstration, they have marvelled, though still amazed and unbelieving; finally, they have come to accept, supinely and without question, the very thing which they vehemently declared impossible. And now, having concluded these profound reflections on the supreme fallibility of human nature, let us proceed, without further delay, to a consideration of the history of the radio telephone.

How Firm a Foundation

The idea of annihilating time and space, the two forces which have forever stood like bulwarks in the path of man's progress, had for centuries been gnawing at the vitals of scientists the world over. Not only scientists but philosophers and scholars as well. To this very day they remain the two words in the vocabulary of the world for which perhaps the least satisfactory definitions have been found. They are the two elements by which all our lives are circumscribed, try though we may to climb outside of the web of the clock and of the yardstick. So universal are the problems invoked by the grim aspects of time and space that the effort to free ourselves, to get on the outside of these shackles, has been the aim not of one country or one age, but of the entire world since the dawn of civilization. As a result, the development of radio, unlike the electric light which belongs largely to Edison and America, is the sole monopoly of no one nation. Italy, England, Denmark, America—all contributed important links in the chain of progress.

Although broadcasting is a young art, there is nothing new about its foundation, the radio telephone. As a matter of fact, this device dates back almost to the beginnings of radio itself. In the declining years of the last century, the youthful Italian, Guglielmo Marconi, startled the civilized world by hurling intelligible, coded messages hundreds of miles through the ether. This achievement, great though it was, served merely to whet man's insatiable curiosity to a keener edge and prompted him to

gird himself anew for his incessant battle with Time and Space. Almost immediately, scientists, inventors and engineers in research laboratories the world over addressed themselves to the problem of transmitting the vibrant, human voice as well as the impersonal dots and dashes of the Morse Code in the same manner. For it must be remembered that the spark transmitter developed by Signor Marconi was quite incapable of generating the continuous frequencies demanded for the sustained carrier-wave of radio telephony. The most vital technical problem of this branch of the budding radio art, therefore, had yet to be solved.

But to man's everlasting credit it can truthfully be said that he is the most persistent of all animals; seldom if ever does he start anything which he is unable ultimately to finish. And so, in the solution of this particular problem, his inherent doggedness and pertinacity stood him in good stead. Refusing to be discouraged by repeated failures, he kept at it until success finally crowned his efforts. In the year 1900, an English physicist, Duddell by name, discovered that an ordinary electric arc could be made to generate high-frequency energy. The arc actually sang in response to this phenomenon. The device which he evolved became known as the Duddell "Musical Arc."

Scientists everywhere were quick to appreciate the significance of Duddell's discovery: here at last was the key for which they had been frantically seeking these many years! Visioning the possibilities of the common electric arc as a generator of the continuous waves required for radio telephony as well as for radio telegraphy, they fell to work with renewed vigor, and in an incredibly short time, a Danish engineer, one Vladimir Poulsen, had harnessed Duddell's singing arc to a radio transmitting circuit and a microphone, thus evolving the first wireless telephone. As early as 1904, Poulsen was transmitting the human voice over appreciable distances, and many other systems, basically the same, were in existence including the very early system of Fessenden.

But alas for the roseate dreams of those who thought that all our wireless telephone troubles were at an end! It was soon apparent to the conscientious early workers in this field that something quite fundamental was missing and that their diffi-

culties, far from being over, were, in reality, just commencing. The actual truth of the matter was that the wireless telephone was still an essentially crude device, making use of a sputtering, flickering, inconstant and uncertain arc as the generator of the requisite high-frequency energy. And when we say "uncertain" arc, we mean just that. It had constantly to be nursed along, like a fractious horse or an unruly child, and regardless of how carefully the carbon electrodes were fed together as they were consumed during the course of operation, the arc itself proved untrustworthy. The indispensable high-frequency energy generated by this carbon arc was, to put it mildly, unstable, while the resultant carrier wave resembled nothing so much as a cart with loose and bumpy wheels.

Nor was this all: still more formidable difficulties were encountered by pioneer experimenters in their attempts to impress the delicate sound waves on the powerful transmitted waves, for there was no suitable means of coupling the sensitive carbon microphone, such as we use in connection with our telephones, with the powerful radio transmitter. The high-frequency current which, as we have previously pointed out, was so uncertain as to be practically hopeless, had to be modulated or controlled by the voice through some form of carbon microphone. This instrument, as anyone familiar with its design and construction knows, is little more than a mass of minute carbon granules, held between two carbon members. When too heavy a current is passed through it, the heat generated as a result of the imperfect contacts causes these tiny particles to fry or bake.

During the years 1908 and 1909, engineers of the Telefunken Company, a large German organization engaged in the manufacture of electrical equipment, conducted a series of experiments with a view to convincing the U. S. Signal Corps of the practicability of radio telephony in military communication. The distance these engineers sought to span was but a scant eighteen miles between Fort Hancock on Sandy Hook, and Fort Wood on Bedloes Island in New York Harbor. The Fort Wood receiving station lay almost at the very feet of that imposing bronze lady known as the Statue of Liberty, and the intervening space was cut by the lofty, wooded hills of Staten Island—two factors

which conspired to make communication between these points no simple matter.

The transmitter used by these engineers was a curiously crude piece of apparatus. It consisted of ten electric arcs, arranged in series and supplied by a 550-volt direct current. Each unit, looking for all the world like the pipe of an organ, was, in reality, a tall, cylindrical, copper tank filled with water, while directly beneath was a large carbon button, and between the cylinder and this carbon button an unsteady electric arc flickered and sputtered incessantly. The ten arcs were arranged in two banks of five each, each bank being controlled by a large upright handle which permitted all its five arcs to be "struck" at the same time. Once the arc had been "struck" by alternately touching and separating the carbon and copper members, the gap of the arc had to be adjusted very carefully so as to attain that elusive stability required for the production of reliable and uniform radio waves upon which telephone messages or music might be impressed.

Under these conditions, the balancing of the three circuits of the transmitter, as indicated by the comparatively passive state of the three separate ammeters employed for the purpose, was a fine trick if you could do it. No sooner would the practically stationary needle of one ammeter indicate that its particular circuit had been brought under control for the moment, than the wild antics of the needles of the other two ammeters would serve notice upon the engineers that their respective circuits had gone awry. And it was only on those rare occasions (determined, more often than not, by the unaccountable workings of the law of probability) when all three meters were in a state bordering upon innocuous desuetude, that the frenzied experimenters were ready to transmit.

Crude as was the transmitter, the transmission itself was even more so. Having temporarily subdued the unruly arcs, the engineers would stand before the long fibre horn and shout until they were almost blue in the face: "One, two, three, four, five. Fort Wood, Fort Wood, Fort Wood. How do you get us now? One, two, three, four, five." And when their voices had grown hoarse with the endless repetition of these phrases, they would wind up

a decrepit old cylinder-type phonograph and play, over and over again, the "Anvil Chorus" from Verdi's opera, "Il Trovatore." Such, in essence, was the radio broadcasting program of 1908 and 1909.

The microphone of those days was a flat cartridge with two contact buttons, and it was slipped into a holder at the small end of a grotesque-looking fibre or cardboard horn. Although each of the cartridges cost in the neighborhood of \$3.00, it had a remarkably short lease on life, its useful service being generally limited to a period of about five minutes. Then too, practically the entire output of the arc transmitter was passed through this cartridge microphone with the result that its carbon particles were baked into a solid mass by the heat developed. And so, while one engineer was busy shouting into the horn or playing a phonograph record into it, another stood by with a screw-driver, ready to tap the microphone holder and break up the rapidly packing carbon granules in order that the delicate sound waves might be impressed, as accurately as possible, upon the powerful outgoing radio waves.

Parasites of Science

But it was not enough that radio telephony should find itself confronted with an array of technical problems which seemed well-nigh insurmountable. If ever a device labored under an unlucky star, that device was the radio telephone. Instead of being permitted to develop naturally in the calm, sequestered atmosphere of the research laboratory, it was taken out into the cold, cruel world and exploited by unscrupulous stock promoters. Long before the honest and conscientious experimenters had a chance to develop the radio telephone into anything more than a mere toy, those gentlemen who live upon the gullibility of human nature had sunk their talons deep into this unfortunate device.

This new art attracted a peculiar type of person. Radio was like the automobile and motion picture industries, only more so. It was a mystery, a peculiar something with tremendous power. It was strong. It was magical. Somehow, somewhere there ought to be wealth in it. People did not know exactly how this new thing was to be used. They did not even know what it was. Only

it was too big to be overlooked. It must fit somewhere in the scheme of things, even though nobody knew where. And the mystery of the thing was infectious. It attracted psychologically, not logically. As moths are attracted by fire so were men attracted by radio, the kind of men who had nothing to lose and everything to gain. Freebooting pioneers in a world of staid monotony—radio held out to them what the uncharted seas held out to the imagination of Columbus and the golden galleons of Spain to Drake. Romance, mystery, and at the same time material gains and power. Gamblers were attracted. Here was a thing with which to fire the imagination of prospective inventors. Better than any bygone gold-mine or oil-well days. In a world over-monotonous, over-organized, filled with weighty trivialities came a bomb, promising everything, performing something, a magician whose tricks were not faked and were yet beyond the understanding. And that which is beyond the understanding, and yet experienced, must be taken on faith. Radio made all men mystics. It attracted the gamblers who played on the imaginations of men whose imaginations had for years been glued to a work-bench. From the chaos that was radio sprang the ever ready “take-a-chancer,” the smooth worker, the get-rich-quick man. Radio was the 20th century “med-show” and the gentle grafter was on hand to “take his lick” from a gullible public.

If the oily-tongued stock salesmen were to be believed, the story of the telephone was about to be duplicated on a truly grandiose scale: the radio telephone would soon displace the conventional wire telephone in every home throughout the land; almost in less time than it takes to tell, everyone would be carrying about with him a portable radio set which would enable him to communicate instantaneously with any other person; and, best of all, the disagreeable monthly telephone bill was assuredly headed for a place in the museum alongside the relics and curiosities of a bygone era. Shades of the estimable “Get-Rich-Quick” Wallingford and that nameless chap who, during the South Sea Bubble, sold the credulous citizenry of London town stock in a company which proposed to extract sunbeams from cucumbers!

Nor were these sharks without seeming evidence with which to back up their fantastic claims. For, although it is a comparatively

simple matter to separate a fool from his money, a little bait is generally required. And these gentlemen had "come-ons" galore.

Not only did radio fire the imagination of the man on the street, it also vent its spleen on the able scientist. Nobody was immune from vague imaginings as to the future of this dynamic force. So noted a man as Nikola Tesla, father of the alternating current power system, made the statement that the day would come when anyone, anywhere, could speak to anyone else, anywhere, with the use of a portable radio set. Well now, if such an authority made a statement of such tremendous significance—! Immediately this opinion was pounced upon by the grafters and gamblers. It did not even need exaggeration. It could not be exaggerated. It was excellent sucker bait. Feed it to the public without distortion, quoting the source from which it came. They ate it up and bought any and all pieces of paper with fancy borders, seals and signatures, filled with imposing company names. Was it any wonder?

And there were still more come-ons for the unwary. Throughout this early period all radio experimenters kept the utmost secrecy. People were not allowed in laboratories. Equipment was stored in safes. What could not be stored was dismantled every night. Experimenters went so far as to embalm radio parts in wax so that their inner workings could not be seen and copied. If you pulled out the wax the parts would automatically break.

Everybody has his own world-beating invention. It must not be stolen from him. Nobody must see it or know how it works—so long as it does work. Naturally such secrecy led to the fabrication of wild stories and rash statements. They could not be disproved because the parts concerned were never seen in their entirety. Perfectly logical. And the public bought stock.

At one time, a group of men arranged a radio telephone demonstration between New York and Philadelphia. Of course, the trial was a huge success, from both a financial and scientific standpoint. Everything worked to perfection; the results were absolutely phenomenal. The ultra-sophisticated sons and daughters of Father Knickerbocker fell over one another in their efforts to gobble up all the stock in sight. Those who actually knew of the capabilities of the radio telephone of that day and age, however,



THE EARLY DAYS OF "BROADCASTING": WHEN LEE DE FOREST WAS
ON THE AIR

Madame Mazarin singing a selection from "Carmen" into the horn-like microphone of the De Forest transmitter in New York City, in 1909. Lady broadcasters ate candy in those days, while facing the microphone. To-day some smoke cigarettes, while facing the microphone, to soothe their nerves.



"SHO, SHO, I'SE REGUSTED": IN THE SPOTLIGHT'S GLARE

The progenitors of the world's most popular program. From left to right, Charles J. Correll the Andy, Freeman F. Gosden the Amos, Robert L. Ripley of "Believe It or Not" fame and President Aylesworth of NBC.



were rather skeptical. They began to investigate the activities of the gentlemen behind the enterprise, and finally succeeded in unearthing an unpaid bill for the lease of a telegraph line on a certain date. Needless to say, the cities were New York and Philadelphia, and the date corresponded exactly with that of the successful demonstration. “Here, boy, set up the pins in that other alley and let’s try again!”

Enter the Hero

Thus, the early radio telephone was beset with difficulties from all sides. Harassed as it was from within by titanic struggles to solve its technical and engineering problems, and from without by an army of stock promoters and their shady activities, the real wonder is that it survived at all. And indeed, we might have a different story to tell had not that electrical acrobat, the vacuum tube, made its appearance on the scene about this date. Timing its entrance as opportunely as that of your favorite “movie” hero, the vacuum tube snatched the radio telephone from the jaws of death; the stock promoters, like the angry blood-hounds in the picture, snarled in balked rage; and, strange to relate, the hero and the heroine have lived happily ever since.

We have called the vacuum tube an “electrical acrobat,” and that is precisely what it is. When, in 1906, Dr. Lee De Forest introduced the third element, or grid—that tiny lattice work between the glowing filament and the cylindrical plate of the original Fleming valve—electrical workers found themselves in possession of a truly wonderful mechanism. In the new three-element vacuum tube they had a generator capable of producing currents of any desired frequency; they had an electrical relay, or repeater, which could control a powerful current by means of a very weak one; and they had a magnifier, or amplifier, which could build up sounds to an astounding degree.

Now, while those who were engaged in exploiting the early radio telephone were making heroic but futile attempts to put the time-honored wire telephone out of business, that instrument itself was struggling with the knotty problem of extending its service over an increased area. Lacking modernized, highly developed re-

peater facilities, a span of some 1,200 miles from New York City to Council Bluffs, Iowa, was the absolute physical limit of the telephone company's long distance service. The weak, attenuated currents in the long telephone lines had to be bolstered up and reinforced at fairly frequent intervals, and even the Pupin "loading coils," which smoothed the way for the ever-feebleness of currents, were powerless to effect any further advance. They had been absolutely "ridden-out."

The Tentacles Reached Out and Grabbed

And so the telephone engineers looked upon the vacuum tube as manna straight from the celestial regions, for in it they saw the ideal repeater which they had long been seeking. Nor were they doomed to disappointment.

In 1915 the distance between New York and San Francisco, the distance the pioneers had sweated so to conquer, with mud roads chopped out of the forests, with ox carts and covered wagons, with hot treks across the burning deserts and icy windings through the mountains, fighting the Indians and overcoming the ruthlessness of nature, alone, starved, by turns freezing and burning—in 1915 this distance was spanned by telephone and the first trans-continental link inaugurated. And still science was not satisfied. She must put her arms around more space, and still more space, must embrace every last inch of distance. Land transmission was conquered. But how about the ocean waves? If the vacuum tube could do so much for the telephone, why not for the radio? And so, late in the same year, engineers attempted to telephone via radio from Arlington, Virginia, to the Eiffel Tower in Paris—three thousand miles over land and sea.

Again a measure of success crowned their efforts. But the farther they reached the more they wanted. Unable to bear the thought that there remained any distance they could not span, they renewed their labors, and before the final tests had been completed the human voice had been hurled as by an Olympian god more than seven thousand miles through space from Arlington to Pearl Harbor, Hawaii. Here, at last, in the vacuum tube, was the key which was destined to unlock the secrets of radio teleph-

ony: only engineering and technical refinements now remained to be consummated.

Came the World War, as they say so poetically in the “movie” titles. Now, we are told that there is no evil out of which some good does not come, and the late unpleasantness in Europe amply proved the truth of this statement. While it is quite true that the war brought misery, suffering, and death to countless millions, it is equally true that it was responsible for a large number of improvements and innovations which have since changed the course of our existence for the better. It was during the war, that, for the first time in the history of the world, the airplane assumed a major rôle in military operations. The aerial observer, it must be obvious, is in touch with a vast area and he is in possession of knowledge which is of inestimable value to his superior commander. But unless this knowledge is placed almost immediately at the disposal of those who are in a position to make the fullest and best use of it, it is of questionable worth, if indeed, of any value at all.

And thus it was that the imperative need of a rapid yet reliable means of flashing the reports of these aerial observers back to their supporting batteries, led to the intensive development of the radio telephone. When the United States entered the World War in 1917, the best available radio talent in the country was set to work on this problem without delay. The result was that shortly a practical radio telephone, in small as well as large units, was a thing of reality. Indeed, it has truly been said that, as a result of the exigencies of modern warfare, the radio art achieved ten years of progress in about as many months. Radio telephony emerged from the World War a thoroughly modernized and refined form of communication.

During the months that immediately followed the signing of the Armistice, hundreds of amateurs and experimenters throughout the United States and Canada engaged in radio. Broadly speaking, these people comprised two classes. First, there were those enthusiastic youngsters who looked upon radio as a toy and who got a tremendous thrill out of listening to an exchange of messages between ships at sea or talking, via the Morse Code, to their friends and acquaintances in neighboring towns; and second,

there was that very considerable and constantly increasing group of electrically-minded persons from all walks of life whose primary interest in radio was in the technique itself.

Dots and dashes comprised the great bulk of the air traffic of that time, although it is quite true that these experimenters did frequently transmit phonographic music and, on occasion, the sincere but necessarily crude musical efforts of amateur talent. Each of these early broadcasts was accompanied by a request that the listeners report back concerning the success (or lack of it) of the transmission. Nor did the requests go unheeded. The radio audience, pitifully small though it was, entered wholeheartedly into the demonstrations.

The Nation's Party Line

Back in those days it was known that conversations over the radio telephone might readily be intercepted by anyone equipped with suitable receiving apparatus. In spite of this, the radio telephone itself had not yet been considered as the potential basis of a nation-wide broadcasting system. As a matter of fact the efforts of experimenters, until that time, had been confined to developing a means of private, individual, point-to-point communication, and inventors had always cherished the fond hope that it would find its duly appointed niche in the field of civil and military operations.

About this time, however, the engineers of the Bell Telephone System, desiring to test the feasibility of combined wire and radio telephony, established a radio telephone link between Long Beach, in Southern California, and Avalon, on Catalina Island. If successful, this link was to be incorporated as a part of the usual telephone system, and the costly and troublesome submarine cable between the two points in question was to be dispensed with as soon as possible.

Upsetting the Applecart

A highly amusing yet somewhat pathetic story is told of an incident that took place over the Long Beach-Avalon link soon

after its opening, an incident which led to the sudden veering of the radio ship and the steering for an entirely different channel. A certain young gallant residing in Long Beach was engaged to a neighboring young lady. As is so often the case, the young lady had a younger brother—a younger brother possessed as so many are, by a mischievous elf, and a desire to embarrass any eligible male whose attentions to his sister appeared honorable. This younger brother unwittingly did more. His purpose was to protect his sister from her two-timing fiancé; his results, the partial disrupting of an infant industry. Could a younger brother do more?

One evening the young man in the case 'phoned the young lady. She felt none too well. At least that is what she said. Perhaps the man did not quite believe her. At any rate words led to words, as they are wont to do over the telephone. They did not call off the engagement. It was their first little misunderstanding. They both knew it would blow over. But while it lasted—it lasted. The young man hung up the receiver with a bang. He looked at his watch. It was still early. He would not let a girl spoil his evening. He looked in his pocket and found another coin. He deposited it in the slot and asked central for an Avalon number. She gave it to him. At the other end a feminine voice answered. Piqued by the memory of the voice that had been at the other end of the 'phone but a few moments before, the beautiful contrast of the present one warmed the cockles of his heart—if hearts have cockles. He thought to “get even” with his fiancée. He'd go out with someone else. Was his fiancée the only one? Certainly not. He would soothe his nerves by talking to a real girl friend. His fiancée? The devil with her. That felt good. That let out steam. He would say it again. *The devil with her!* Alas, the tragedies of youth. He said it once too often.

At that moment the younger brother, an ardent radio fan, was clapping the earphones to his head and telling his sister to turn off the phonograph. He heard a man's voice saying sweet nothings to a young idea with a soprano voice. His ears burned under the 'phones. The voice did sound familiar. It was—but what is the use?

Next morning across the breakfast table the brother, chivalrous to the extent of wanting to protect his sister, related the conversa-

tion he had heard the evening before. The young lady inquired of her boy friend. Was it true? Never mind how I know, was it true? After a third degree, during which the young man thought his dearly beloved to be a clairvoyant, he broke down. It was. I'm so sorry. I was angry. It will never happen again. A wonderful opening, thought the girl. No, it never will. Or it can, for all I care. Here is the ring. Now get out.

The young man might have been seen, hat pulled down, overcoat collar turned up, slouching along the pavements of Long Beach. How could she have known? But she did. Telephone . . . It was not a party line . . . Long Beach . . . Avalon. That was the new radio-telephone link. He investigated. Would it have been possible for an amateur radio fan to pick up the telephone conversation? It would. So that is the kind of service the telephone company gives! He'd make trouble for them. They couldn't get away with that kind of service.

Seemingly too many secret messages were 'phoned between these two points. Radio would never do as a telephone link. Blasted for the time being were the fond hopes of those who looked upon radio as a telephone service. Some new use must be found. Well, if radio messages could be picked up by any and all inquisitive listeners, why not turn that feature from a sin into a virtue? Thereafter radio was developed as the nation's party line.

To Be or Not To Be Private

But of outstanding importance were the experiments of one Frank Conrad, a radio engineer employed by the Westinghouse Electric and Manufacturing Company, who had an experimental radio-telephone transmitter installed in the garage of his home. It appears that the Westinghouse organization at the time was much interested in the development of radio telephone and telegraph transmitters, and as part of its engineering work had installed two stations during the war, one at Mr. Conrad's home, and the other near its plant at East Pittsburgh, separated by a distance of about five miles. The call letters of the stations were 2 WM and 2 WE. Mr. H. P. Davis, Vice-President of Westinghouse, was in charge of the company's war activities. Mr.

Conrad was then one of his assistants, and among other things was especially assigned to radio work.

The restrictions having been removed from radio stations at the close of the war, Mr. Conrad quite regularly operated his transmitter, sending out interesting programs of one kind and another, to such an extent that people with receiving sets became sufficiently interested to listen in. The program material available to him was largely phonograph records, although talks, baseball, and football scores were also transmitted. The station, whose call letters had been changed, was designated as 8 XK, and was known as one of the best amateur transmitters in the country.

Interest in broadcasting grew. The following year, 1920, saw the establishment of a new station, not operated by one person for his own entertainment, but by a huge organization as a commercial enterprise—the first commercial station on the air. From then on, radio assumed the aspect of commerce and industry.

“They never come back!” Well, radio is one of the few exceptions, perhaps the one that proves the rule. *It did come back*—completely back, and far surpassing the fondest dreams of the most sanguine and imaginative!

CHAPTER II

THE CRADLE OF BROADCASTING

HAD it not been for the merchandising sense of a department store, the radio telephone might still be struggling along as an interesting but certainly impractical experiment in individual or private communication.

Read the Ads

None other than H. P. Davis, Vice-President of the Westinghouse Electric and Manufacturing Company, and one generally accredited with having inaugurated the present broadcasting era, unselfishly directs attention to the origin of the thought of everyday broadcasting. According to Mr. Davis, an advertisement of a local department store in a Pittsburgh newspaper, early in 1920, called attention to a stock of radio receivers which could be used to receive the programs sent out by Frank Conrad from his experimental radio telephone station 8 XK. The advertisement gave rise to the thought that the efforts being made to develop radio telephony as a confidential means of communication were wrong, and that instead, its field was really one of wide publicity; in fact, the only means of instantaneous collective communication ever devised. For years radio experts had been casting about trying to find the proper niche for radio telephony in a world overflowing with innumerable interesting and useful things. They found that niche in a newspaper advertisement.

The decision to use radio for wholesale broadcasting resulted in the installation by Mr. Davis of a broadcasting station at East Pittsburgh. The decision was made early in 1920, but the equipment was not ready for operation until the Fall. In the meantime many significant conferences were held by members of the Westinghouse organization in order that their visions of service and opportunity might be realized to the fullest extent.

One of the earliest decisions reached by the conferees was the necessity of building public interest in broadcasting through the coöperation of the press. Fortunately, the *Pittsburgh Post* and *Pittsburgh Sun* vouchsafed such coöperation. The main objectives of broadcasting were also formulated, to the effect that all programs would be sent to the press for publication, the programs would be of such a nature as to be of interest to all people, no matter what their ages, occupations, or habits of life. Monotony would be avoided by introducing variety in music, speeches, and events presented; the features would be so timed as to appear at the same time on every program; the broadcasting to be continuous, every day, Sundays and holidays included.

Opening Night

KDKA wanted to open with a bang. The constitution of the United States helped it along by seeing to it that there was a presidential election that Fall. So the station opened election night with the returns, which were gathered in the offices of the *Pittsburgh Post*, telephoned to East Pittsburgh, and broadcast by KDKA to its audience. Harding won. And KDKA had had its opening night. The reviews were favorable; its audiences grew; the show is still running.

But that opening night the house was rather empty, and those who did listen were for the most part friends of people connected with the show, who heard the program on "Annie Oakleys" in the form of simple receiving outfits, which were manufactured by Westinghouse and distributed among friends and several of the company officers. A few amateurs also listened in. There being no loud speakers, the heads of all the listeners were wrapped in earphones.

They Build Themselves a House

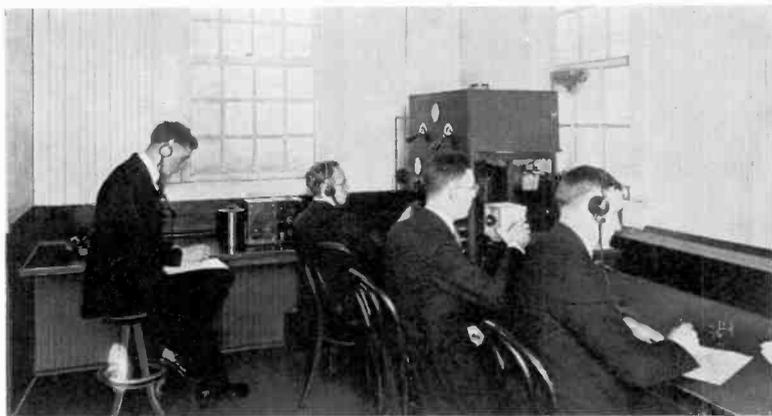
Following the November 2, 1920 opening, KDKA broadcast every evening from 8.30 to 9.30. For the first few months program material was drawn chiefly from phonograph records. It was soon realized, however, that no great interest or progress in broadcasting service was possible without greater variation of

diet. It so happened that the Westinghouse employees had several excellent musical organizations, among them a band. This was put on the air, and after a time the KDKA Little Symphony Orchestra was formed. Until it was decided to broadcast the band, all the transmitting was done in a very small room. The entire band would not fit in it, to say nothing of the tubas, horns and trombones. An auditorium was tried, and fidelity of sound lost due to room resonance. So it was decided to transmit from out-of-doors. A marked improvement resulted. But what when winter came round again? It was obvious that specially designed broadcasting rooms would have to be built. The construction and expense were the only factors yet to be met. As the warmer weather of the Spring of 1921 came on it was decided to broadcast in the open for the Summer anyway, on the roof of one of the plant buildings. A tent was erected for protection. The acoustics were excellent. With early Fall, however, came a windy night. A gust tore the tent away, and the first broadcast studio blew out into the night.

Delay would be disastrous. An indoor studio was necessary. Then why not a tent indoors? No sooner said than done. The tent was pitched on the floor of a high and spacious room on the top story. The effect was grand. But tents could not be universally used. Something else would some day have to be found. Why not today? Again the question was answered with action. Designs were prepared. Taking to heart the lesson of the tent, the new studio was entirely draped with burlap. All the elements of the tent studio were incorporated in the new one. Later monk's cloth was developed, and more recently walls, ceilings, and floors of studios have been built of relatively non-resonant material, eliminating to a large degree the need of drapes. And so KDKA continued indoors.

Their Increase Multiplied

In the meantime, during the summer just ended, two new stations came on the air. WBZ opened at Springfield, Mass., on September 27, 1921, while Newark and metropolitan New York celebrated the opening of WJZ on October 1, 1921. Columbus



OPENING NIGHT ON FIRST STATION: KDKA, NOV. 2, 1920

Broadcasting the Harding-Cox election returns. The first presentation of the world's first commercial radio station. Note the archaic equipment. On this foundation has the great modern industry been built.



INFANT KDKA MATURES: INTERIOR OF PIONEER WESTINGHOUSE STATION

KDKA of 1930, quite grown up since its infant days ten years before, showing short and long wave transmitting apparatus.



is said to have rolled in his grave that night, as he neared the end of another year since his discovery of America. He also smiled to think what this barren wilderness had come to. Then he heaved a sigh and went to sleep again. And on Armistice Day, 1921, KYW at Chicago, Ill., joined the group. These three pioneer broadcasting stations were owned and operated by Westinghouse.

When WJZ Was Born

Looking back through the long years of broadcasting, Dr. William H. Easton, who had charge of the WJZ programs, reminisces as follows:

"I recall the opening of WJZ very well. The program feature was the reading of bulletins on a World Series game which were secured from the Newark *Sunday Call*. A group of us sat in an office in Newark, where there was a piece of apparatus that represented a radio receiver and which nearly filled the room. If I am not mistaken, it took two men to keep the receiver working. There was one pair of earphones, and each of us listened, in turn, to the thin voice in the 'phone and were thrilled to think that it was coming from a distance of at least a half mile."

An odd piece of apparatus—a radio receiver—large, cumbersome, technical, formidable; a group listening to the reading of bulletins over the air—amazed, transfixed; two experts engaged in the serious task of tuning in the signals—enough knobs to turn to make us envy the four-handed monkey; a voice coming over the air, a whole half mile away: well, that sums up the way pioneer broadcasting looked to those who brought it into being.

Makes Jack a Dull Boy

By this time the suppressed impulses of a public, whose methods of life were growing ever more prosaic, were becoming crystallized. In the days before "big business," so-called, life had been relatively individual. People lived their own lives, worked out their own salvations. There was less need for coöperation; there was less interdependence among the factors of life. It was primarily

the era of the small, independent business and shop. The slogan was "Competition is the life of trade." People were secretive as to their advantages, hiding them from their competitors. The methods of the elder business men, now generally looked upon as unethical, were then in everyday use, though not always successfully. Business had little or no ethics. Everyone was a free lancer.

But with the rise of mass production and organized industry, former store owners became mere managers or foremen. Processes were broken down and specialized. People sat at benches all day, repeating thousands of times a day some one little operation. It was a strain on the human mind as well as on the body. Such a life demanded more than the ordinary entertainment in the off-hours to offset the devitalizing influences of the working day. Art must come to the rescue of industry. But how?

Art and science had been at loggerheads for centuries. It was said they could not be reconciled. One dealt with material qualities, the other with spiritual and human qualities. When the radio first made its appearance the finest artists refused to perform before the microphone. Sing through a machine?—ridiculous! They seemed to have forgotten that radio is itself no art, but only the means for conveying art to multitudes. They might as well have said that music could never be made to issue from a scientific machine composed of strings of varying thicknesses and tautness, hit by felt hammers, and the sound amplified by a wooden box. Yet no one will deny the art latent in a piano. Or that art could be produced by drawing horse-hair over cat-gut. Yet such is the case with the violin. Not that these instruments are themselves art. They are the tools of art, the loom on which the patterns of art are woven. Just so, radio is the means by which art is disseminated. The urgent need for entertainment finally broke through the prejudice of the ancient art-science war. The public began to realize that science need not confine itself to materialistic uses just because it dealt with materials. It could be used for things other than steam shovels and locomotives. It could, if harnessed to art, be used for spiritual uplift. People became reconciled to science as an aid to art, and in their day of need turned with uplifted faces and outstretched arms to radio as

the source of romance and entertainment so sorely lacking in lives dedicated to the accumulation of gold and regulated by the time clock and the whistle.

The world was ripe for radio. The first year of KDKA's operation and the early presentations of the other three stations, especially WJZ, gave the world to understand the value of radio in their daily lives.

Jersey Attracts the Main-stem

Let us shift scenery and come to the pioneer stations in the New York metropolitan area. At about the time the Westinghouse Station WJZ went on the air from the huge meter factory building in Newark, N. J., the then youthful Radio Corporation of America also decided to engage in broadcasting on its own account. Accordingly, Station WDY was installed in the factory building at Aldene, N. J., within ready reach of Old Gotham. It was left to Major J. Andrew White, then editor of *Wireless Age*, a magazine published by a subsidiary of the Radio Corporation of America, to provide the necessary talent for the insatiable maw of the microphone. That Major White, later to become the guiding spirit in the formation of the Columbia Broadcasting System, performed nobly is evidenced by studying the programs of the day, which were replete with professional as well as amateur talent, since he enjoyed many contacts along the Gay White Way. In fact, even at this early stage of the broadcasting art, professional talent was proving its worth over amateur talent. The WDY station continued for some time until the Radio Corporation of America took over the sale of broadcasting receivers and tubes, when the RCA efforts were combined with those of Westinghouse in the operation of an enlarged and more powerful WJZ station.

Without detracting in the least from the splendid contributions of studio directors, station managers, and technical staffs, let us note that professional and amateur talent gave freely of their substance during the pioneer days of broadcasting, and continued so to do for several years, until it became patent that broadcasting could and should pay for its program material. Many of

the early volunteers have since been more than amply repaid by becoming radio favorites at attractive salaries. But in the beginning, it was their enthusiastic and unselfish service to the young and uncertain cause that paved the way for the permanency of the struggling broadcasting institution.

WJZ, the Beautiful Cloakroom Model

Returning to Station WJZ, we find much of the romance of early broadcasting centering in a cloakroom off the main office of the Westinghouse meter factory. When word came from Pittsburgh, ordering the installation of a radio telephone for mass communication, the problems were placed in the hands of a mechanical engineer and efficiency expert, Charles B. Popenoe, who was later to become Treasurer of the National Broadcasting Company, until the time of his death in 1928. Long on ideas but short on funds, it remained for "Pope," as he was affectionately known, to squeeze out the necessary space for the WJZ studio. A cloakroom proved the best solution, whereupon the coats were crowded up a bit and a space about ten feet wide by perhaps eighteen feet long, became available. This was the original WJZ studio. The transmitting equipment was installed in a shack on the roof, with the necessary lines and signaling system between transmitter and studio.

The bare atmosphere of the cloakroom was soon altered by means of old rugs draped on walls as well as laid on the floor. An antiquated table, with desk type telephone, served to talk with the operator upstairs. A convenient switch enabled the announcer to cut the studio in or out—but more about this later. The microphone was changed in type from week to week, so that no one description will do. At first, it was in the form of a tomato can, suspended from a light stand which might have been intended originally for a music stand. Later came the dish-pan microphone, in the form of a cone operating an electromagnetic unit and known as the "phonotron." And as likely as not there were other variations, for there were microphone troubles aplenty in the pioneer days. Close to the "mike," linked to it by means of a braided copper-covered cable, was the speech amplifier, con-

sisting of a rubber-wheeled truck containing a veritable radio store of batteries, vacuum tubes, switches and whatnots. A grand piano which had obviously seen better days, together with one or two phonographs of the period, completed the studio.

To this erstwhile cloakroom, then, came the radio artists of the day, professional and amateur. Noted singers were induced to appear before the tomato-can or dish-pan microphone. On such occasions, the artist would be met in style befitting his or her rank. When a noted Russian soprano came to the studio, for instance, the staff rushed out to a nearby florist and rented a couple of palms for the occasion. The gallant "ACN," otherwise known as Thomas Cowan, the chief announcer, would don a full dress suit for the event, completing the picture.

Radio Surprise Parties and the Switch

A few paragraphs back we read about the convenient switch installed in the cloakroom studio, whereby the announcer could cut the studio in or out.

In the early days, the broadcasting stations, hungry for microphone fodder, dared not insist on having subjects submitted to them in advance for approval or censorship. Instead, many speakers came before the microphone with only a few scribbled notes, and proceeded to give purely extemporaneous talks. Many a Red or Pink or other person with allegedly off-color views frequently warmed up to his subject rapidly when facing the microphone, vehemently unloading his mind and saying many naughty things to the silent mike in a manner which he would not dare use before a live and perhaps a hostile audience. He cared not for the hostility of those out yonder. He was safe in the studio.

And so the little switch came into play. Time and again, the one with the explosive message would be cut off the air, quite without ceremony and without notification. The announcer would stealthily maneuver to within reach of the switch, then throw the infamous speaker off the air. The orator, unaware of the fact, would continue to wax eloquent, growing more and more bitter in his denunciation of the nation, the public, the institutions and everything in general, perhaps even including his host, the owner

of the broadcasting station, especially since the silence of his audience—the studio staff and the microphone—presumably approved all he had to say.

Meanwhile, the operator in the shack on the roof, provided with a separate microphone as well as a phonograph for just such emergencies, broke in with the announcement of a musical program and played a phonograph record or two. Listeners-in again enjoyed the program while downstairs, the speaker hurled fiery epithets into the inoffensive "mike." That his voice never got beyond the four walls of the studio was quite unknown to him at the time. Those in the studio managed not to smile at the roaring one who thought he was arousing a nation to action. Only in checking up with listeners-in on the outside, days later, did the fact dawn on the speaker that his speech was barred from the air by the over-polite station management.

Announcers Are Anonymous

At the time, it was the thought of the Westinghouse organization that the announcers were purely human automata, intended solely to announce the call letters of the station, the wave length, and the program features. In accordance with such a policy, it was obviously unnecessary for the public to become familiar with the actual names of the announcers, for what difference did it make? And so the WJZ announcers became known as "ACN," "OMN," "AWN" and so on. The cryptic letters stood for, firstly, the designation of "A" for an announcer, or "O" for an operator: secondly, the middle initial identified the man; thirdly, the "N" stood for Newark, as distinguished from other Westinghouse broadcasting stations. What a contrast with today, when announcers use their own names, inject their personalities strongly into the programs, and, indeed, often dominate the presentation to the exclusion of all other individuals.

The matter of anonymity in broadcasting has more or less followed in the footsteps of motion pictures. In the early days of the movies, certain producers endeavored to deal simply with human automata and not with personalities. Thus Mary Pickford playing in Biograph productions, was simply "the little blond

girl." Try as it would, the public at large could not learn the identity of this attractive screen star. Eventually, however, the competition among producers for stars made it necessary to give names to their chief attractions, and the Biograph organization, holding out to the last, was seriously handicapped and, eventually, dropped out of the race. In broadcasting, the unknown announcer, with the voice reaching millions of listeners, had to become identified. Today, the public has its announcer stars just as it has its picture stars.

Cats Compete with Chorine

Of small dimensions, the WJZ studio became unbearably warm in the summer days of 1922, so much so that its window, facing on a fire escape, was kept open. No elaborate air-conditioning system, providing ample cooled air strained free of any possible external sounds, was available in those days, such as we now have in the National Broadcasting Company and the Columbia System studios. Broadcasters then took chances with a world of noise.

It was a particularly warm evening. One of the authors was in the studio at the time, waiting for his cue to go on the air. A soprano was doing her utmost before the microphone. Suddenly, without warning, there was the most uncanny howling and screeching and spitting. We turned hurriedly to the window, where two fat Tom cats were competing with science and art. An instant later, the cats dashed into the studio and completed their duet before the microphone. They stole the show. The soprano's efforts were momentarily upset. Pandemonium reigned. And finally, the calm "ACN," in a businesslike manner, announced the next piece without word of explanation.

Sixteen telephone calls were received within the next fifteen minutes. Five hundred letters flowed in during the next day or two. Newspapers pestered for information regarding the unearthly noises that had emanated from WJZ. All of which was explained at length to the interested public, and two Tom cats scored a permanent place in broadcasting history.

And the Walls Were Paneled

The end of the cloakroom studio was rather dramatic. Some smoker set the curtains on fire, and the soloist and her accompanist were rescued with considerable difficulty. And so a large room was prepared as a studio on the ground floor of the same building some time in 1922. The walls were handsomely paneled, with special sound-proof material in place of the erstwhile rugs. Instead of one phonograph, several phonographs adorned the new studio, for their manufacturers were anxious to have them go on the air with a view to desirable publicity. An excellent automatic piano was installed, as well as a small pipe organ. The speech amplifier now became a phonograph cabinet, still on wheels but with the apparatus very much condensed and concealed. The crystal detector set was relegated to a small booth off the studio, where the announcer could disappear and listen in without upsetting æsthetic minds. A colored gentleman, Alvin Clarke, who is still attached to the NBC personnel in a similar indispensable capacity at 711 Fifth Avenue, New York, was added as impressive scenery for the purpose of welcoming guests, taking their hats and coats, bringing glasses of water, and discharging other similar tasks. A double set of doors marked the entrance to the studio, with conspicuous white lights to indicate that the studio was not on the air at the moment, or red lights to indicate that the studio was on the air and that SILENCE must be observed.

It was a vast improvement, this move from the cloakroom down to the new studio on the ground floor of the meter factory in Newark. Papers commented on the evident permanency of broadcasting. Visitors were astounded at the elaborate appointments. The announcers climbed into "tuxs" at the slightest provocation, due to the elevating influence of the new studio.

Lung Power Paralyzes Microphone

During the actual broadcasting the announcer usually wore a pair of head-phones connected to a crystal detector receiving set. In this manner, he could judge how the program feature was

going out over the air. The microphone was generally placed and replaced several times during the broadcast, so as to pick up the voice or music under the best possible conditions. In those days, no control room operator was at hand to watch a volume indicator and to make the necessary allowances for *fortissimo* or *pianissimo* passages.

We recall, too, how easy it was to paralyze the undefended microphone. The occasion was the initial appearance of a great operatic singer, Madame Johanna Gadski, in the ground floor studio of WJZ. It was a gala affair. Various officials of the Westinghouse organization were garbed in evening clothes to welcome the prominent one to the studio, and the announcers and operators were in their formal attire. Well, Madame Gadski, renowned for her powerful voice, sang a number of selections. Evidently she believed that the louder she sang the more homes were permeated with her voice. We did not see the radio operator who presided at the controls up on the roof of the factory building, but as likely as not he was frantic, trying to keep circuit breakers and fuses from blowing out. Suffice it to state that the amiable "ACN," rushing back and forth from his crystal set monitor booth to the microphone, kept moving the "mike" away from the singer until he had it as far away as the liberal studio dimensions would permit. What a contrast with today, when the monitor operator, seated in an adjoining booth and gazing into the studio through a double plate glass window, could regulate the pick-up of the microphone and signal the announcer for any necessary change of position. But of course there had to be a beginning, as in everything else.

Bread for a Starving Microphone

The problem of those early days was to keep up a steady flow of programs, even though WJZ was broadcasting only a few hours each day. While the earliest programs from WJZ in December of 1921 were from 8.20 P.M. until 9.25 P.M., by February of 1922 the hours were increased by the addition of an occasional afternoon program as well. General news, children's hours, weather forecasts, marine news, official Arlington time signals

and no end of talks, together with a fair sprinkling of musical offerings, made up the programs.

As for the original staff at WJZ, Thomas Cowan was the announcer and personal contact man with the artists, and Charles B. Popenoe was, so to speak, General Manager, but the chief credit for operations at WJZ must go to Harry E. Miller, who was at that time assistant superintendent of the Newark works. Popenoe and Cowan and the operators worked under his general direction.

Dr. William H. Easton was in charge of the station, and had final authority as to what should and what should not be done. Doc, as he is familiarly known, made good use of his many editorial connections arising from his work as Editorial Representative of Westinghouse, by inviting no end of editors and writers to go before the WJZ "mike." Meanwhile, Major J. Andrew White was equally busy securing program material for WDY, but he tended more towards the Broadway atmosphere of theatrical offerings.

Those were the happy days of trying to please everyone. Popenoe could generally be found in his office, early in the morning, groaning under a veritable avalanche of fan mail. There would be letters from various church organizations, complaining about the Sunday program because of the introduction of music thought to be too popular and out of keeping with the Sabbath spirit. School teachers would write in asking for programs of definite aid to their business. And so on.

All the while, of course, the program material was purely of the voluntary order. Such professional talent as could be coaxed before the microphone came largely because of curiosity and perhaps for the publicity that might accrue from facing the microphone. Certainly there were no fees of \$1,200 for three or four vocal selections, such as are being paid to some of our shining broadcast performers today.

When there was nothing else to feed the insatiable appetite of the microphone, which gazed coldly at the studio manager frantically seeking something to fill in time, the announcers would turn to reading magazine articles, poems or even newspaper clippings over the air. Almost anything would do. And then the

automatic pianos and phonographs did yeoman duty, always ready to fill in whatever time might be left blank through the failure of the talent to turn up.

And There Were Others

The while WJZ was pioneering in the New York metropolitan area, other broadcasters were getting under way. Among them was WOR, the radio station of L. Bamberger & Company, "One of America's Great Stores, located at Newark, N. J." This station began with a small transmitter of 10 watts, in a modest sort of way, but, due to the right spirit and a determination to serve the public in those days in a purely unselfish manner, it grew rapidly in power and popularity.

The early broadcasters were limited as to wave lengths, and therefore had to share time on the air, which they did more or less gracefully. According to Dr. Easton, who had charge of WJZ and was the final authority, only once did he have to exercise that final authority and it came about in this way:

"It was in the winter of 1923," states Dr. Easton. "We were then sharing the 360-meter wave with Station WHN, and by a 'gentlemen's' agreement, we ran until 11 P.M., after which they came on. This worked well until we made arrangements to broadcast a week of Wagnerian opera from the Manhattan Opera House. These operas are, of course, very long. We continued until about 11.20 P.M., but under the circumstances, I presumed that WHN would stand by graciously. However, they were very much aggrieved and called me up the next morning and bawled me out properly. Inasmuch as they were right, I gave orders to shut Station WJZ down promptly at 11 P.M. that night.

"The opera presented that night was 'Die Walkure.' For the first time, lovers of Wagner all over this part of the country were getting their favorite opera without expense or effort. All went well until the chords preluding Wotan's farewell were heard. Wagner lovers had settled themselves down to hear the most magnificent music ever written, when bang! went the switch and a voice announced, 'This is Station WHN; Mr. Schnegleschnitz

will now entertain you with 'Kitten on the Keys.' This was probably the greatest musical shock in all history.

"The expected happened, and I spent the next day with my ear glued to the telephone. However, my reply was the same to all: 'Don't talk to me. Talk to WHN.' Apparently they did so, most effectively and emphatically, for a meek voice informed me during the afternoon that WHN would be pleased to stand by until we finished the rest of the operas."

There were many others who took part in the pioneer broadcasting efforts. WWJ, for instance, the radio station of the *Detroit News*, was on the air soon after the inauguration of regular broadcasting by KDKA. Operated by an organization fully conversant with the news interests of the public at large, and willing to provide a high grade of professional entertainment through the medium of its own orchestra, WWJ made broadcasting history. It encouraged other large newspapers to engage in broadcasting as an additional service to their respective publics, including the *Atlanta Journal*, *Kansas City Star*, *Dallas News*, *Chicago Tribune*, *Detroit Free Press*, and *Chicago Daily News*.

The example set by L. Bamberger & Company was followed by other large department stores, including Wanamaker in New York and Philadelphia; Gimbel Brothers at first in Philadelphia, later in New York; Strawbridge & Clothier of Philadelphia; the Shepherd Stores in Boston and Providence, and others.

Meanwhile the General Electric Company became keenly interested in broadcasting. Being a progressive organization, it was not satisfied to let others do all the pioneering, and so entered the field.

GE—The Initials of a Friend

It was late in 1921 that GE engineers decided upon the installation and operation of a broadcast transmitter in order to study the problems of mass communication. A radio license was secured and the letters WGY assigned to the 1,500-watt transmitter that resembled a laboratory workbench with its disorderly accumulation of tubes and wires. Two 150-foot towers were placed on the roof of one of the factory buildings at Schenectady to support the antenna.

On the evening of February 20, 1922, WGY, today one of the ten oldest stations in the country, went on the air with its first test concert. On February 22, a regular program schedule was inaugurated. Martin P. Rice, manager of the publicity department of the General Electric Company, was selected as manager of broadcasting, and under his administration WGY gained popularity and influence in the territory it covered. In fact, this popularity was so great that in 1928, when it appeared that the Schenectady station would lose its exclusive channel under a new zoning system inaugurated by the Federal Radio Commission, municipal officials, boards of trade, church organizations and fraternal societies in cities within a 150-mile radius of the station, came to the support of WGY and convincingly demonstrated that "convenience and necessity" would be served by WGY on its customary channel.

Under the guiding hand of Mr. Rice, who determined program policy during those days when there were no precedents to follow, WGY assumed an outstanding position among broadcasters. The station became the great radio transmitter laboratory of the country, and listeners were often encouraged to participate as laboratory assistants when some alteration was made in the transmitter equipment, and widespread reports were desired on the comparative quality and volume of signals.

During the early days of WGY, when the air lanes were relatively free from traffic, the signal of the Schenectady station reached out under favorable atmospheric conditions to the Pacific Coast, to Alaska, and to England. This station, using more power than the average transmitter then on the air, and utilizing the developments produced by a large staff of engineers, played an important part in promoting interest in radio.

Later, WGY was connected to New York by a pair of telegraph lines, adapted to broadcasting purposes since no telephone wires were available then for the purpose, and through these wires it was possible to tap the program supply of WJZ, and later through WJZ to reach on to WRC at Washington. In 1925, Syracuse and Rochester, and in 1926, Buffalo, were all connected to WGY by telegraph lines and programs originating in those cities were broadcast by WGY to its listeners.

In artistry of its programs, quite as well as in technical developments, WGY has maintained a place among the foremost broadcasters. As far back as August, 1922, a small group of Schenectady players, some of them formerly on the professional stage, presented Eugene Walter's play, "The Wolf," and this experiment laid the foundation for the splendid performances of the WGY Players which followed for several years thereafter. Orchestral music of the highest type, organ music, the use of the ingenious pallophotophone or photographically recorded speeches, and other innovations marked the program offerings of WGY.

In 1924 the General Electric Company completed the construction of a great transmitter laboratory on a 54-acre plot six miles south of Schenectady. At this plant a large staff of engineers was put to work on the problem of improving transmission quality and reliability, testing theories of static, fading, antenna design and radio wave propagation on high and low wave lengths. The development of high-power transmitters, short-wave transmitters, television transmitters and other milestones in technical radio progress have borne the GE trademark.

Two years after WGY took its place on the air, KGO, the second GE transmitter, made its bow at Oakland, Calif. Since the opening program, January 9, 1924, KGO has been one of the most important and progressive stations on the Pacific coast, and its programs have served a great territory extending through western Canada and, under favorable conditions, all of Alaska.

The third GE radio station, KOA, went on the air at Denver, Colo., on December 15, 1924. The station has continued to give entertainment and information to the entire state of Colorado as well as to adjacent states where powerful transmitters are not numerous and where, consequently, an effective station is appreciated.

Essentially an electrical manufacturing company, the General Electric organization has been liberal in its attentions to radio technique. Indeed, since 1914 it is estimated that GE has spent over \$20,000,000 in radio research alone, and its research laboratories have played a prominent part in the development of vacuum tubes, receiving circuits, transmitters, short-wave radio, television and other phases of the radio science.

Telephone Engineers Try Their Hand

Of real significance, as determined by future events, was the inauguration of a series of broadcasting experiments by the American Telephone & Telegraph Company, with the establishment of Station WBNY on the roof of its 24-story building on Walker Street, in New York City. However, the results were poor from this location, and soon the transmitter was moved a short distance away to the Western Electric building on West Street, overlooking the Hudson River. It became known at about this time as WEAJ. Purely an experimental development, the excellent quality of the transmission from WEAJ soon caused the public to tune to that station's offerings.

Eavesdropping

During 1922, the American Telephone & Telegraph Company, still believing in the radio telephone as a possible means of private communication, conducted a series of experiments with radio links and the trans-continental telephone system. Telephonic communication was established between the steamship *Gloucester*, cruising off Deal Beach, N. J., and Catalina Island, situated some thirty miles off the California mainland. The telephonic communication in this case passed from the *Gloucester* to Deal Beach, N. J., via radio telephone; from Deal Beach to New York, via telephone line; from New York to San Francisco, via the trans-continental telephone line; from San Francisco to Los Angeles, via telephone line; from Los Angeles to Long Beach, via telephone line; and from Long Beach by radio to Pebbly Beach, on Catalina Island; and from Pebbly Beach to the Avalon Exchange. From ocean to ocean via radio, telephone line, radio again and telephone line, through all the various circuits, amplifiers, repeaters, transmitters and receivers, without appreciable distortion!

Shortly thereafter, a series of interesting radio telephone experiments took place between the Deal Beach station and the steamship *America*. Various persons, speaking from their offices or homes, addressed the Captain and passengers aboard the *America* until she was several hundred miles out to sea. Although the mes-

sages were necessarily of a private nature, the public was permitted to listen in, for the incoming messages, from the *America*, quite as well as the outgoing messages, were broadcast by the Deal Beach station. What a contrast with today, when the long-wave and the short-wave radio telephone conversations across the Atlantic, connecting the Bell System with various telephone systems in Great Britain, Europe, and Latin America, are virtually secret.

Steering the Sucker to Newark

Located in Newark, some nine miles out of New York City, the studio director of WJZ had quite a problem coaxing real talent before his microphone. In fact, even the mediocre speaker or musician had to be prevailed upon by every possible means to go to the WJZ studio. The carfare was paid to Newark, via the Hudson Tubes. The speaker or musician was met at the tube terminal, and whisked to the Robert Treat Hotel nearby for a delightful dinner. Then a taxi transported the party to the studio, where an ovation took place. Following the broadcast, said speaker or musician was taken back by taxi to the tube terminal in Newark. A day later, many letters were received by the speaker or musician from ardent admirers who had heard the broadcast. There were telephone calls, too, if the 'phone number perchance could be found by an adoring public. There might even be proposals of marriage and other pleasant expressions of appreciation.

Let us turn the hands of time. Here we are, about seven years later. A speaker with a message wishes to broadcast through one of our large stations. He rides in a Fifth Avenue bus to the NBC building at 711 Fifth Avenue, for his arrival is not a matter of supreme concern. He enters the building. He takes the elevator to the twelfth floor. There he faces a charming lady in quasi-evening clothes, seated behind a Chinese lacquered desk. "Oh, yes, you wish to broadcast. Really. Well, I'll have one of our men from the program department speak to you. Please have a seat." Somewhat later, the representative from the program department reaches our patient speaker with a message to deliver. "I see," says this worthy gentleman to the ambitious speaker. "That talk you have outlined is interesting. We could not handle

it as a sustaining feature. It would have to be a sponsored feature. Let me see, I believe we could put you on about seven weeks from now, between 11.10 and 11.20 o'clock, on a Tuesday morning. The cost would be \$200.00, over just our local station. Here is a rate card. You will see just how to figure up the additional charges for the network stations."

Bringing the "Mike" to the Talent

At any rate, it was different in the beginning. Soon the WJZ staff conceived the notion that if Mahomet would not come to the mountain they would bring the mountain to Mahomet, to reverse an ancient fable. Remote control became the taxi, dispatched to New York for talent. Thus, in 1922 and early 1923, a studio was established in the Waldorf-Astoria Hotel, at 34th Street and Fifth Avenue, which greatly simplified the program problem. A telegraph line had to be employed to connect the remote microphone with the distant transmitter at Newark, and, due to the poor characteristics of a line ordinarily intended for dots and dashes, the tonal quality was greatly impaired. But even so; it furnished a greater supply of program material, which was the crying need. Station WOR of Newark followed suit and established a studio in New York City.

Still in search of good program features, which might be had for the asking, the WJZ staff began carrying its microphones to hotels, churches, theatres, restaurants and other places, and thereby secured an ample supply of professional material. The remote control program came into its own.

One Big Happy Family

This thing called broadcasting had taken hold, even though the Westinghouse organization, which had begun the whole thing, sometimes wondered whether there was any way of escaping the steadily increasing burden of cost. The Radio Corporation of America was participating in the cost of operating WJZ in Newark, and the cost, indirectly, was being met by the sale of Westinghouse and General Electric radio products through RCA.

Broadcasting was here to stay. The next step was to make the most of the situation.

And so on May 15, 1923, the Radio Broadcast Central was inaugurated by the Radio Corporation of America. Located in Æolian Hall, in the very heart of the great city of New York, nationally recognized as the center of music, drama, education, sport, religion, finance, and great undertakings. Radio Broadcast Central derived its name from the fact that it included two complete broadcast stations in one, namely, WJY, operating on 405 meters, and WJZ, of Westinghouse fame, operating on 455 meters. Two studios, two amplifying systems, two transmitters and two aerials, located side by side, provided many technical problems, but these were solved in due course. And so a double-voiced station went on the air, with two channels for two simultaneous programs. The original intention was to provide two classes of appeal, the classical through the WJZ channel, and jazz through the WJY channel. The decorations of the respective studios were suggestive of the difference of appeal.

The studios were located on the sixth floor of the lofty Æolian Hall, as were the control rooms. The transmitters and accompanying equipment were placed in an annex on the roof, below the antennæ supported on steel towers 115 feet high, with cross arms 36 feet wide. In addition to the two studios, wires radiated from the control room to various hotels, restaurants and other points in the city for gathering outside programs.

"The work of the engineers at Broadcast Central is not completed," stated one of the authors in his address to the broadcast audience tuned in to the inaugural ceremonies of the new broadcasting station. "It never will be completed. Not only must the standard of the station be maintained constantly, but it must be continually improved. It is the plan of the Radio Corporation of America through continued research and experiment to make the stations at Broadcast Central ever better and more effective. Radio broadcasting as shown in the present stations here, is a splendid achievement, yet it is only the beginning of a great and never-ending development. It is the encouraging and worthy task of our radio engineers to carry this work forward and, as

public servants, to brighten every home which radio listeners have made a part of the great American radio theatre. We engineers pledge you the best that is in us to carry out this task."

Truer words were never spoken, as subsequent developments proved.

CHAPTER III

“THE GOLD RUSH OF THE AIR”

1920. One station.

1922. 600 stations!

1924. 1,400 stations!!

Where do they all come from? Who cares? KDKA started the procession. It was the first conductor. “My name is Westinghouse and I’m the leader of the band. Although we’re few in number we’re the best band in the land.” But who said few in number? WDY, WBZ, and WJZ followed. The big parade has begun. It marches down the street of the country. Jump in, the ranks are wide open. Who’s going to hop on the band wagon? First come get the best seats. Keep in step. Watch your pushing. Crowd in. Plenty of room up forward. Let’s get going. Faster. More of us. Hurry!!

“I’m going to open a station.”

“No, I am.”

“But I have a phonograph.”

“Then you open the station.”

“Well, you open one too. You can crank my phonograph.”

“And you can lend me your records.”

Chorus: “We’ll all get a license tomorrow.”

Why go on the air? Well, why not? The big boys are doing it. And not for nothing. There must be something in it. Get in on the ground floor. Hey, there! Get off the air. Listen to me. No, Me! NO, ME!! Everybody this way! Step right up and get your license. Come one, come all. A prize of value in each and every station. What is the prize? Who knows? Who cares? Take a chance,—Steve Brody did.

What Fools Men Are

Listening to an hour of symphony music broadcast over a nation-wide network, we lean backward comfortably as the waves

of harmony sweep over us, and smile. We feel very contented, very satisfied. But who were these fools who dared rush in where angels fear to tread? What were they after? Did they ever hope to get it? Someone suggests their similarity to the great horde of men who trekked through the deserts in '49 in search of gold. Many of them did not know anything about gold mining either. But they prayed to the Goddess Luck. Stories of fabulous wealth. Ignorant of the science of geology, they did not believe it existed. They did not want geology to exist, those who knew nothing about it. They could swing a pick. That was enough.

The similarity is worth noting. Two generations since those days. There was need for another such chance. Some of the '49ers found strikes and grew fabulously rich, with breath-taking suddenness. Some lost what they had on the wayside. Some died. And since then things had settled. The rich were rich, the poor were poor. Was there no chance for change? Once again luck beckoned. Poor might be made rich. The order of things could be changed.

Only this time it was not gold. That was the difference. Nobody knew exactly what it was. Even the '49ers had something more substantial to look for. Their driving force was gold,—glittering, yellow, heavy gold. The driving force of the radio rush was the Great God Ego. Little persons tortured with big egos. The broadcast transmitter, acting as a bellows, could inflate that ego to fabulous proportions. Just put your mouth to the tube of the bellows, the microphone. The bellows would do the rest. Here was the person to whom nobody would listen, the man small in ideas. Before the "mike" he hoped nobody would see how small he was. But millions would listen to his words.

Must he make them important words since they would be heard by so many ears? No, the words and himself would be made important by the very fact of being heard by so many ears. No wonder broadcasting became popular. The suppressed desires of thousands of order takers, people who were spoken to but never answered back, came suddenly to the surface. Here was the chance to impress themselves, their ideas, their personalities, on the world, a world that had always let their words go unheeded. By being spoken through this peculiar device, the microphone,

those same words would receive attention. The Æsop fable of the frog blowing himself up to the size of a bull was repeated. This time human beings took the place of frogs. Bolstered by the microphone they blew and blew and blew. The fable ends with the ever-expanding frog bursting into pieces. So did most of the thousands of early broadcasters, as we learn by studying the statistics of radio broadcasters who were but are no more.

Free-for-all

Organizations and individuals, in addition to the Westinghouse Company, were not slow to grasp the broadcasting idea and enter the field. By the end of 1922, close on to 600 broadcasting stations were in regular operation, covering almost every section of the country. Wyoming was the last State to have a broadcasting station. California led in number of stations, with Ohio second, and New York third.

For the most part, the broadcasting stations were then owned and operated by concerns interested in the production and sale of radio apparatus. Obviously, broadcasting was the very foundation upon which the bulk of the radio business rested. Should broadcasting stop overnight, the radio industry in large measure would cease, for there would be little interest in listening to the dot-dash messages of commercial and amateur stations. The situation would be not much different from that facing the automobile industry, should all the roads in the country be permitted to revert to dusty and bumpy country lanes. The radio companies, therefore, went into broadcasting for the sake of their business. With them the situation was just the reverse of that of the phonograph industry, which made its profits on the sale of records rather than from the sale of the phonograph itself. In radio, the profit was made on the receiving apparatus, while the broadcasting service or program had to be given away.

Other interests found it to their benefit—or at least so they thought—to engage in broadcasting. Colleges, universities, and schools installed broadcasting stations and gave regular programs for the entertainment and enlightenment of the public.

The Palmer School of Chiropractics sought to popularize, and



AN HOUR'S PROGRAM: AND HUNDREDS OF HOURS' PREPARATION

Operating Engineer George McElrath testing the many "mikes" to be used in broadcasting the Hoover inaugural. Nothing must go wrong.



at the same time dignify, that new healing profession by opening a broadcasting station, WOC, at Davenport, Ia. It was a powerful station, and during the years that "DX," or long-distance, fans tried for ever greater distances of reception and record numbers of stations, WOC served as cause for boasting. Sufficiently powerful to be well known in the East, yet sufficiently far away to give the radio amateur a thrill, WOC soon became a national favorite. And the cause of chiropractics was sponsored.

Newspapers, as already mentioned, also felt the urge to broadcast, and did some commendable work from the very beginning. Although for a time it was erroneously believed by some newspaper publishers that broadcasting would hurt the sale of newspapers, it was soon evident that broadcasting, even if it included news bulletins, could do nothing more than stimulate increased interest in newspapers, particularly in those engaged in broadcasting.

Department stores came early into the broadcasting field, and in the main have done a consistently good job even to the present day, when a number of them are identified, as well, with the network systems. Theirs has not been the rôle originally expected of them, namely, to disseminate the latest bargain counter news or to rhapsodize over the merits of their latest gowns or furniture or kitchen ware. Far from such being the sad case, the department stores from the first, probably because of their intimate contact with the public and its diversified interests, provided uniformly high-grade programs of entertainment and enlightenment, with their own good will publicity gracefully entwined in the offerings.

Then there were the broadcasters of purely experimental interest, including, to the astonishment of some, the American Telephone & Telegraph Company with its WEAf station in New York. These broadcasters were interested primarily in radio telephone technique, and made use of the listeners-in as laboratory collaborators. Out of the WEAf experiments of the telephone engineers grew the network idea and the largest customers for the long-distance lines of the Bell System. Aside from its technical studies, the original plan of the telephone organization was to provide radio channels, through which anyone with whom it made

a contract could send out his own program, just as the long-distance telephone lines would be leased by newspapers, banks and other concerns. There were many requests for such toll broadcasting on the part of those unable or unwilling to establish their own broadcasting stations. This toll broadcasting idea struck the telephone organization as an ideal way of providing a place on the air for broadcasting aspirants, instead of encouraging the establishment of hundreds upon hundreds of additional transmitters to cause hopeless congestion in the air.

And then there were the individuals anxious to become public benefactors in the form of broadcasters. Many were granted radio licenses, so that they might instal their home-made low-power transmitters with relatively crude modulation or tone quality. Hundreds of these small stations came on the air during the first year or two of broadcasting. Those that have survived have, in many instances, become worthy broadcasters.

A Fool There Was

The story is told of a young man who approached the Federal Radio Inspector for a license at a time when the air was overcrowded with broadcasters frantically endeavoring to make themselves heard above the din of the modern Tower of Babel.

Said the young man to the inspector: "I want a license to broadcast."

Said the inspector to the young man: "Do you know the cost of going into broadcasting these days, with the elaborate studios, microphones, amplifiers, transmitters and so on? Why, it costs at least \$50,000 to instal a station worthy of a place on the air!"

"Oh, that's all right," said the young man. "I have the \$50,000 and then some. All I want is a license so I can go ahead. I have the site bought on the Palisades, opposite the heart of New York City, so as to blanket the New Yorkers."

The great expense of operating a station dampened the young man's enthusiasm not a bit.

The inspector, still hoping to discourage his petitioner, asked, "But what will you do for programs? You see, it's one thing to

have a broadcasting station, and quite another to have something to broadcast so that listeners-in will be satisfied."

Whereupon the young man solved the growing mystery. "You see, Inspector, it's this way: I have a girl friend who has a marvelous voice. She is dying to go on the air. I'd do anything for her. So I want to put up this station so she may go on the air every day if she likes."

The inspector was weak at the knees. There seemed to be no discouraging this young man.

Ah! Another idea. "Why not have the young lady broadcast through existing stations, instead of putting all that investment into a station just for such a purpose?"

And the young man came back: "Well, she has tried the various broadcasting stations, but not one of them recognizes real singing!"

Fortunately, the youthful swain never constructed the station, although at the time it was not in the power of the inspector to refuse a license to any American citizen of good standing. And the story may be considered typical of many other would-be broadcasters. In most instances, however, it was the enormous cost of a fair-sized broadcasting station that discouraged them.

No Entrance Examinations

Of course to be a broadcaster was relatively simple. Unfortunately, the term applied to anyone from the owner of the neighborhood radio shop with its 5-watt transmitter, housed in a cabinet and resembling an ordinary receiver, to the 500-watt transmitter representing an investment of tens of thousands of dollars. It applied to the individual with little or nothing to proclaim to the world, as well as to the university with an excellent extension program of education to be made available to listeners-in anxious to extend their knowledge.

It was literally a fever, this matter of wanting to broadcast. Many afflicted with the fever rushed into broadcasting, investing whatever money they could command. And with broadcasting facilities finally available to them, they were virtually paralyzed when they faced their own microphones, only to find that they

had nothing to say after all. And those few ideas they could muster were soon worn threadbare in the face of the insatiable and ever more fastidious appetite of the microphone.

Fool's Gold

Many would-be broadcasters, thinking that there was gold in the broadcast hills, sought to get on the air long before the sponsored program had been worked out on a practical economic basis. Perhaps the fact that broadcasters received a license from the Government led many to believe that they had a sort of franchise automatically entitling them to make a fortune. The official document, with its big seal, might have seemed like an early street railway franchise—an open road to Easy Street.

Those who did get into broadcasting soon learned that it was an expensive game. To maintain a fair broadcasting service with a 500-watt transmitter, for instance, may cost in the neighborhood of \$30,000 to \$50,000 a year. Even the early stations, operating chiefly with automatic piano and phonograph records, together with local speakers and amateur talent, had considerable and unexpected expenses which had to be met.

But where was the gold? Nothing but shiny, spurious gold was forthcoming—the sort of fool's gold which has long been a joke among hard-boiled miners. The question of revenue came up over and over again, and still no answer was forthcoming. Many broadcasters, finding their expenses mounting with no income in sight, continued to broadcast in sheer desperation. Even the large broadcasters, after a while, became not a little discouraged, but did not dare abandon broadcasting in the face of the vast followings they had built up and the interest they had aroused. Storm as their Board of Directors would at the rising costs, they were committed to continue for fear of turning public good will into public disfavor. These early broadcasters had a lion by the tail—and they kept on running.

In the beginning, certain organizations, led by the Westinghouse Company, had found it worth their while to broadcast if for no other reason than to create radio business. However, a time came when the radio business was engaged in by many who reaped

the profits without contributing to broadcast costs. No longer did the original broadcasters, now sharing to a smaller proportionate extent in the radio business of their own creation, appear so willing to hold the bag for the opportunists rushing into the field for an easy killing.

Many ways of raising the necessary money for broadcasting were suggested. Some favored the idea of taxing all radio manufacturers and distributors a part of their yearly earnings to support the very foundation of their business. Others suggested that the Government should issue licenses to all the radio set owners, the fees collected to be turned over to the broadcasters to defray their expenses. But no one thought of sponsored programs, for the idea was yet to be born out of the process of elimination.

Thumbs Down!

If the spectators in the Roman arenas could signify their will in the matter of having the gladiator dispose of his victim or not, so could the broadcast listeners decide for or against the existence of the broadcasters. A mere flip of the tuning-dials—and thumbs up or thumbs down for the broadcaster in question. Only by the quality of his program offerings could any broadcaster survive for long, since the audience which he commanded was, in the final analysis, his sole excuse for existence. Many of the broadcasters soon ran themselves out of business by losing their audiences in short order.

And yet, from something like 600 broadcasters in 1922, the number rose to the high water mark of 1,400 in 1924. The air became polluted. There were shrieks and groans, cross talks, muddled and garbled music and announcements, as the result of over-crowded conditions. The Government officials, with no alternative other than to continue to issue licenses, were growing desperate. This situation could not continue. And so in 1924, Secretary Hoover of the Department of Commerce took it upon himself to stop issuing licenses. The book was declared filled and shut with a bang. Many applicants were left on line, waiting, with no present prospects of joining the radio madhouse.

And Still They Came

Not to be discouraged, the would-be broadcasters tried by every means to get on the air. For instance: a radio amateur, who had made quite a mark with his dot-dash activities, simply had to broadcast by 1924. Accordingly, he rented quarters in an office building, furnished a studio with beautiful rugs, draperies, and such, bought the necessary radio equipment, and then went to the radio inspector. He was informed that no more licenses would be issued. It was now a case of waiting for someone to die. The would-be broadcaster would not take "No" for an answer. He sought by every possible means to get on the air. Finally, he was advised by the Federal Radio Inspector to go buy the license of some chap willing to sell out. And this he did: for the sum of \$12,000, he purchased the license and outfit of a small 10-watt station operated by a radio dealer in another town. The size or rating meant little. In due course a transmitter of 500 watts was on the air, by virtue of having bought the place of another broadcaster.

The Tide Recedes

And still no revenue in sight. To hold the audience, which had long since become highly sophisticated and was no longer thrilled by hearing a few alleged musical sounds or distant announcements come over the air, preferring to get its thrills out of a concert by Mary Garden or the Philadelphia Symphony, was becoming increasingly difficult. Professional talent was coming into the broadcast picture. No longer satisfied to accept the candy stick of free publicity, professional talent was actually asking for real money. Those broadcasters in position to present real talent were gaining all the listeners-in. The smaller broadcasters, still trying to get through with plain talks, phonograph records, and automatic piano music, together with dubious amateur talent, were soon broadcasting for the benefit of the four walls of their studios.

"Thumbs down!" ruled the public. Automatically, the tide began to recede. Monthly, more and more broadcasters silently dropped out of hearing. Down, down, and down went the total number, until there was even some fear expressed that perhaps

broadcasting was on the way out. But fortunately, the public signified "thumbs up" for a number of worthy broadcasters, who remained in the game.

It was late in 1924 that a ray of sunlight came into broadcasting, as the sponsored program made its bow, offering the present solution of the economic problem. Fortunately, the broadcasting roster was pretty well pruned by then, and many that remained in the picture were capable of growing up to robust manhood.

CHAPTER IV

STAKING THE WAVE LENGTH CLAIM

THE rapid growth in the number of broadcasters was both good and bad—good because it stimulated interest and assured something to listen to no matter where the receiver might be installed, bad because too many stations caused pandemonium. To make matters worse the Government officials were very slow in passing suitable radio laws, with the result that for the first year of broadcasting, all transmitters were compelled to operate on one and the same wave length, namely, 360 meters, just as though it were the only wave length available. This gave rise to no end of interference between nearby transmitters, just as in the case of a free-for-all discussion in the absence of the usual parliamentary rules of conduct. Fortunately, the early transmitters were of relatively low power, many of them only 10 to 50 watts, thereby limiting interference to local areas. It would have been quite feasible to place such stations every 500 miles, operating on the same wave length, or frequency, without undue interference. It was the modest power employed that saved the situation at that time, although it was a serious later limitation.

Uncle Sam Recognizes Talent

During the fall of 1922 the Department of Commerce, which has always exercised supervision over radio matters, at least until the formation of the Federal Radio Commission, introduced a special Class B designation for those broadcasting stations of great power (based on early broadcasting standards), excellent rendition (also based on early standards), and high-grade musical programs (again based on pioneer standards). Stations enjoying the Class B rating were permitted to operate on the 400-meter wave length, making them non-interfering with the broadcasters in the 360-meter wave length. The thought behind this new regu-

lation was to create a group of powerful, well-managed stations throughout the country, which could serve the largest number of listeners without interfering with other stations or being interfered with. The local field was left to the smaller stations.

With the two wave lengths now available, 360 and 400 meters, it was possible to accommodate a still larger number of stations. There were several dozen operating on the 360-meter wave length, or 833-kilocycle frequency, and a dozen or more on 400 meters (or 750 kilocycles). But as broadcasting activities leaped ahead, with scores of additional stations entering the field each month, the transmitters soon began stepping upon one another's toes. Meanwhile, the Department of Commerce neither provided additional wave lengths nor curbed anyone's broadcasting aspirations. As a result, the broadcasters themselves, noting how seriously they interfered with one another, began to adjust their transmitters ever so little, so as to reduce mutual interference. Thus they shifted one way or the other from the allotted wave lengths. From 360 meters they drifted as low as 280 and as high as 420 meters. It was quite logical, therefore, for the Department of Commerce to add the 400-meter wave length, which it did. It merely sanctioned the use of a wave length already extensively appropriated. In fact, it was the gradual spreading out of the transmitter wave lengths which led ultimately to the assignment of the 200-to-550-meter wave band now enjoyed by broadcasters. As in the growth of empires, in broadcasting as well the squatter rights of yesterday become the dignified titles of ownership of tomorrow.

A Gentlemen's Agreement

Traffic through the air is not widely different from that on the highways. In order that there will be room for everyone, traffic must be controlled. No interference with neighboring vehicles or traffic jams must be allowed. So too with radio. But the traffic rules were those laid down by an international understanding back in 1912, an understanding that never envisioned radio telephony for radio broadcasting. It failed to take into account the need for dozens upon dozens of wave lengths for non-interfering broadcasting. The Department of Commerce, with nothing but the 1912

regulations to go by, was about as capable of carrying on its work effectively as a policeman of 1865 attempting to direct 1930 traffic in Times Square, New York. One Herbert Hoover, then Secretary of Commerce, was by no means new to these serious problems, and through his sagacious efforts, the various broadcasters came together for conferences, out of which grew gentlemen's agreements, serving to impose self-regulation upon the broadcasters, to the end that broadcasting might not suffer unduly in the absence of suitable legislation.

Thus, we have a typical conference in April, 1923, held at the U. S. Customs House in New York. The purpose of this conference was to inform the broadcasting interests concerning the new classifications of broadcasting stations to be hereinafter known as Classes A, B, and C. The necessary requirements, together with a résumé of the new plans governing broadcasting stations in the Second District, were carefully gone into, and a new time schedule of operation established. We learn that the committee, known as the Inter-Company Radiophone Broadcasting Committee of the Second District, was engaged in the voluntary regulation of broadcasting, with Arthur Batcheller, U. S. Supervisor of Radio, in charge of the Second District, acting as Chairman.

It was agreed that the hours most suitable for broadcasting were those between 9 A.M. and 12 midnight. Also, that no experimental station transmitting with radiating antennas on wave lengths between 200 and 1,000 meters would be permitted between the hours of 11.30 A.M. and 12 midnight. Furthermore, it was agreed that where a number of Class A stations could operate simultaneously on the same wave length without interference, this practise should be permitted. Even at that time, when there were probably 350 broadcasters operating or about to go on the air, it was urged that the Secretary of Commerce, in the interest of the public welfare, should not grant further licenses on the available wave lengths. Among themselves, and quite amicably, the broadcasters arranged time schedules whereby they might operate without mutual interference. No hard and fast contracts were signed. It was all done by a gentlemen's agreement, which, of course, is the best possible agreement—between gentlemen.

When Gentlemen Forget They Are Gentlemen

Like the famous Topsy, broadcasting just "grewed and grewed." Gentlemen's agreements came out of conferences called by the Secretary of Commerce and his staff. When there was any hitch in the use of broadcast wave lengths, the broadcasters worked out their own salvation. They even had a neat way of bootlegging their programs through illegal channels, above 400 meters and below 360 meters. The more powerful stations, which enjoyed the Class B or exclusive wave length, remained more or less within the gentlemen's agreements, but those not so favored felt that they simply had to shift for themselves.

Some there were who were not gentlemen—or, to be more charitable, we should perhaps say that they felt their broadcast mission to be so paramount that they had to reach the public in the most effective and frequent way, irrespective of the rights of others. In various sections of the country, there were soon many figurative toes being stepped upon, and many indignant corresponding howls. By 1924, the gentlemen's agreements began wearing thin in spots. There were more frequent infractions of the agreements. Broadcasters began encroaching on one another's wave lengths and time allotments.

To complicate matters further, the early receivers were far from being highly selective, so that even when broadcasters operated simultaneously on what would today be considered sufficiently separated wave lengths, there was excessive interference. We learn, for example, that when station WRC of the Radio Corporation of America, and Station WCAP of the Chesapeake & Potomac Telephone Company, decided to operate on the same evening, one on 469 meters and the other on 435 meters, in November, 1924, there was chaos in Washington radio circles. Only a small proportion of the receiving sets could separate the signals. Although newspapers of the day reported the event in terms of a knock-down, drag-out fight between the two broadcasting stations, as a matter of fact the affair was really intended, in large measure, to test the possibility of simultaneous broadcasting efforts. Stations WCAP and WRC had agreed to operate on the same wave length, namely, 469 meters on alternate evenings. However, WCAP wanted to try

simultaneous broadcasting, so on the evening of the election, it borrowed the NAA wave length of 435 meters and went on the air. A veritable Tower of Babel was reported by Washington listeners. There was righteous indignation. Terrible things were threatened by the public. But it was only a test of reception possibilities, in which the public was taking part quite without realizing the fact. Those responsible for the experiment smiled ruefully.

During 1924, the number of broadcasters rose to over 1,000. The Department of Commerce had no alternative but to grant licenses to United States citizens of good standing who wanted to go on the air. With only the space between 200 and 550 meters available, the apparently endless succession of stations had to be handled with the skill of a packer of sardines. However, the stations failed to be as self-satisfied as sardines. Some soon insisted on a bit of elbow room, which led to ugly complications. Many wanted more than their share of oil, or even the whole can. There were requests for different wave lengths, which could not be granted because the Department of Commerce had worked out a plan of wave length allocations with the care of an architect designing a mosaic floor with every stone indicated in its proper place and size and shape. There were requests for greater power, which could not be granted without intruding upon neighboring wave lengths or "channels." There were requests for changes in the allotted time, which could not be granted without interfering with the scheduled programs of others. And so there was much dissatisfaction. Too many felt called upon to do this work of broadcasting, quite without regard for the rights and the contributions of others. The night was growing dark indeed.

Wave Pirates and Wave Jumpers

The gentlemen's agreements began to weaken perceptibly. Where these agreements proved uncomfortable, they began to be treated with marked disrespect. Came 1925, and one broadcaster in Chicago asked to have his wave length shifted to a more suitable one, then occupied by another broadcaster. The Department of Commerce refused the request. Whereupon the irate broadcaster, not to be refused, went to work and changed his trans-

mitter so as to operate on the desired wave length, and defied the officials to stop his broadcast activities. Having no other power than that conferred by the gentlemen's agreements, the Department of Commerce appealed to the Attorney-General, who ruled that the said officials had no right to assign any particular wave length, power rating or operating time to broadcasters, since the law of 1912 did not cover the developments that had taken place. Hence the Department of Commerce found itself overnight with virtually no power over the broadcasting situation.

The lid was off! It was now a free-for-all. And, as is typical of such a release from restraint, there were some ready to take advantage of the situation, while others still preferred to recognize the Department of Commerce and to maintain steadfastly their assigned places on the air.

The opening of a mining section in the Far West was no more frenzied than the wild dash that took place in the broadcast days during 1925. Many broadcasters had been disgruntled with their places on the air, as assigned to them by the Department of Commerce. The lower wave lengths, peculiarly enough, were considered especially undesirable, whereas it is actually possible to do excellent work in some districts on these wave lengths and particularly so far as distance covered by night is concerned. Some broadcasters were dissatisfied with their power allotments, and wanted to multiply their power many times. Still other broadcasters were not willing to share time with others, but insisted on having a longer time on the air each day.

By the summer of 1926, the radio atmosphere had all the earmarks of a gold rush. Broadcasters new and old were busily engaged in elbowing each other aside and staking out their claims. Without the restraining influence of the Department of Commerce or other Government agency, some broadcasters helped themselves to whatever wave length, power, and time they deemed best. The larger broadcasters, still recognizing their original agreements, stood fast by their officially assigned wave lengths, power ratings and time schedules, only to find the less scrupulous broadcasters seeking marked advantages during the lawless interlude.

Naturally enough, though somewhat disingenuously, the wave jumpers and wave pirates endeavored in every way to justify their

moves. They pleaded with other broadcasters and with the public that they were changing their transmitters for the better, without causing any interference and rather helping clarify the general situation. The fact that many of them did not study the broadcast requirements of the nation as a whole made little difference to them. In many instances they selected wave lengths between those of powerful broadcasters, immediately causing serious heterodyne action or whistles on the programs of both those stations and also with distant stations on the same wave length. The best broadcasting services were often ruined during the period of the gold rush of the air. The broadcasters whose operations were wrecked by wave piracy sought legal recourse, but with little consolation.

Meanwhile, a portion of the public was rapidly becoming disgusted with radio reception. No longer was it possible to bring in various programs in an orderly procession. Indeed, programs were jumbled up. There were whistles and groans due to overlapping carrier waves. The broadcast opportunists, bent on their individual selfish ends, were rapidly killing the goose that lays the golden eggs. Chaos reigned.

Anarchy of the Air

Was there no justice in this fair land of ours? The public appealed to the Government to act promptly. Yet the Government authorities had no law by which to go. Obviously, the matter had to be referred to Congress for action, so that suitable legislation might be passed. The authorities were powerless until armed with a law—with teeth.

The better class of stations began to experience serious interference. WJZ, long immune from any interference, and presenting a clean-cut signal to the delight of listeners-in far and near, soon found a wave jumper in Chicago riding on its back. Even WEAJ, likewise immune and presenting flawless signals in the past, was soon troubled with an annoying whistling background due to a wave jumper's interference.

Listeners were becoming more and more annoyed. The radio industry began to feel the results of the anarchy of the air and took alarm. In Chicago, the listeners-in decided upon a boycott

of radio stations which had jumped the wave length of other stations in the days since the far-reaching decision of the Attorney-General. Certainly the wave jumpers were losing valuable public good will, but this meant little to them in their anxiety to seize what they considered their rightful place in the sun.

To make matters still more serious, certain unscrupulous wave jumpers went so far as to squat on the very wave lengths set aside for the use of the Canadian broadcasters by international agreement with the United States. Such impolitic action was frankly embarrassing to our Government, which had no control over the situation. International ill-will threatened.

A Slow-moving Congress

Congress, having been appealed to by a frantic public, spent much time in discussing the matter of radio legislation, but the meetings of the joint Congressional Committee entrusted with consideration of radio legislation, were constantly being put off. The problems of bringing order out of chaos were generally appreciated. Our law makers were indeed walking into a hornets' nest of trouble, and they knew it. From the summer of 1926 until the December session, little was done except plenty of talking.

With a warning that further delay in dealing with the radio problem would jeopardize a national industry involving \$600,000,000 a year, and disappoint 20,000,000 people in a very vital and personal interest, a special body, known as the National Radio Co-ordinating Committee, urged that Congress enact an emergency control measure to prevent the granting of licenses after an immediate date to any more broadcasting stations. The emergency control measure was urged as a move anticipating the enactment by Congress of a permanent Radio Control Law. Meanwhile, Senate and House conferees were unable to agree on the rival Dill and White Radio Regulatory Bills then under consideration. The Radio Co-ordinating Committee urged prompt passage of a permanent control law, but, pending such a solution, urged Congress to take action to prevent complication of the general broadcasting situation. While refusing to take sides in the matter of the Dill and White Bills, the Committee favored a control

consisting of two bodies—the Federal Radio Commission and the Department of Commerce.

A Radio Reign of Terror

Nero was certainly fiddling while the radio Rome burned. A Department of Commerce report issued early in December, 1926, revealed that since July 1st of that year, when governmental radio control officially broke down, 102 new stations had taken to the air. This was an average of approximately five a week, and brought the total number in operation to 620.

The report moreover emphasized the fact that the interference that was daily becoming more baneful to listeners-in would not be cleared if wave length changes likewise continued unrestricted. It showed that from July 1st to December 1st, 94 reports of changes in wave lengths had been received, most of them being to higher wave-length channels. During November alone, 27 new stations were licensed to broadcast, and 20 wave length changes were reported. While all new stations had to obtain licenses from the Bureau of Navigation of the Department of Commerce under the Communication Law of 1912, they were not required to report changes in their wave lengths, since the opinion of the Attorney-General the previous summer had taken away regulatory control from the department. Those reporting new wave lengths did so voluntarily, and there was no telling the number that may have changed without reporting.

On November 15th, states the report, there were 82 new stations under construction, and more or less indefinite plans for 130 more. Up to November 15th, 20 new stations and 19 old stations had increased their power to 500 watts or more.

The history of young and highly interesting industries was repeating itself in exaggerated form. The Tower of Babel was outdone by radio broadcasting. It was a radio reign of terror.

The Long, Long Trail

The long fight in Congress over radio regulation finally ended on February 28, 1927, when the Senate adopted the conference

report on the Radio Control Bill without a record vote and without a change in phraseology. The Bill was now ready to go to President Coolidge and was to take effect upon its approval by the White House.

The 1912 act for regulation of radio communication, the joint resolution of June 5, 1920, authorizing operation of Government-owned radio stations for the general public communication service under certain restricted conditions, and the joint resolution of December 8, 1926, limiting the time for which licenses for radio transmission might be granted, were all repealed. The new law was to be administered for one year by a Presidential commission of five, with the Secretary of Commerce acting in an administrative capacity, and after that by the Secretary, except as to revocation of licenses and controversial matters which would be referred to a permanent commission. The White-Dill radio regulation measure passed by Congress was referred to as the "Magna Charta" of radio, because it made service to the public the basis for granting, refusing, and revoking radio broadcasting licenses.

On March 1, 1927, President Coolidge sent to the Senate the nominations of the five members of the Federal Radio Commission provided for by the new law for control. The nominees were:

William H. G. Bullard, Rear Admiral, U.S.N., retired, of Media, Pa.; for a period of six years.

Orestes H. Caldwell, of Bronxville, N. Y., editor of radio publications; for five years.

Eugene O. Sykes, of Jackson, Miss., former Justice of the Supreme Court of Mississippi; for four years.

Henry A. Bellows, of Minneapolis, director of Washburn-Crosby radio station; for three years.

John F. Dillon, of San Francisco, supervising radio inspector; for a period of two years.

In all fairness to President Coolidge, it must be emphatically stated that he appears to have ignored the importunities of politicians in making these appointments. He must have felt that the commission should be composed of men having knowledge of radio, and the appointments of four members were made on the basis of their experience in radio and electrical communications.

The Commissioners were selected from each of the five geographical districts specified in the Dill-White compromise radio measure.

The Federal Radio Commission Goes to Work

The Federal Radio Commission, with full power to straighten the broadcasting tangle, immediately went to work. And there was plenty of work. In the first place, when the radio bill had been signed by President Coolidge, the license of each and every radio transmitter in the United States was automatically revoked. Sixty days were allowed for the application for new licenses, and the Federal Radio Commission had full power to renew only such licenses as it might see fit, and likewise to assign any power or wave length.

Not only broadcasters, but other communication interests were involved in the automatic cancellation of licenses. A survey shows that the revoked licenses covered the following: transoceanic stations, 22; general public service coastwise stations, 63; point-to-point inland public service stations, 74; point-to-point limited commercial stations, used by companies in their own business, 207; experimental stations, 179; technical and training schools, used by schools and colleges, 38; ships, 2,035; and amateur stations, 14,885. The 712 broadcasting stations brought the total up to some 18,000 transmitters in all.

The Federal Radio Commission soon took up the international matter of providing cleared channels for Canadian stations as well as certain channels in which other Canadian stations might share time with American broadcasters. Originally, in our wave length allocation under the gentlemen's agreement, there had been provision made for the Canadian broadcasters, but during the air piracy period, some 42 American broadcasters had calmly squatted on the Canadian channels, while others, without regard for the 10-kilocycle separation required for non-interfering broadcasting, took up positions within that limit, alongside the Canadian channels. Without ceremony, the Federal Radio Commission immediately threw the squatters and poachers off the Canadian channels, and restored our friendly relations with our neighbors to the north.

The axe continued to operate. Broadcasting heads were chopped off right and left, as the Federal Radio Commission refused to renew licenses. Different districts were assigned a maximum number of broadcasting licenses, with the result that the surplus had to be eliminated. The Commission attempted in large part to renew only those licenses where the public might best be served by the broadcasters. While the erstwhile wave jumpers, squatters, and pirates were not dealt with much more severely than those who had stood by the gentlemen's agreement, yet most of these unscrupulous broadcasters were ordered off their self-assigned wave lengths, and were sent scurrying down the wave-length band towards the bottom where the smaller broadcasters were struggling for a place on the air. It was like the boyhood game of "Puss in the Corner," with every corner occupied and the hapless broadcaster out in the middle trying to fit in somewhere. Sixty-day licenses were issued to most broadcasters, so that they might continue in operation while the Commission worked out the jig-saw puzzle of fitting together the excessive number of broadcasters into a satisfactory broadcasting pattern of limited area and definite shape.

The Grand Shake-up

The work of the Federal Radio Commission proceeded steadily despite the howls and protests of broadcasters here and there, who talked of the infringement of their constitutional rights. It was impossible for the commission to please everybody, especially since it was primarily created for the task of pleasing just one party to the broadcast deal—the general public.

The Federal Radio Commission had to concern itself quite as much with legal considerations as with technical requirements. Despite its sincere and lengthy efforts to accommodate over 700 broadcasters in the 89 channels at its disposal, there were many disgruntled broadcasters ready to take the matter to court. The Radio Law was being challenged on the ground that first, it was unconstitutional in that it involved alleged trespass on private property, and second, that it proposed to grant an "unreasonable" exercise of power by a Federal Commission. The Commission was kept busy for months listening to arguments, complaints, sug-

gestions, and threats, many smacking of personal desires and aspirations on the part of the broadcasters. It has always been so. Each broadcaster feels that he alone is called upon to serve the American people. Others are simply contaminating the air.

In due course, the Federal Radio Commission evolved what it considered a satisfactory assembly of the jig-saw pattern. Each broadcaster with a worthy service to offer the public was assigned a place on the air. Because the 89 channels had to accommodate over 700 broadcasters, time had to be shared by many of the smaller stations, while a number of so-called "cleared" channels were set aside for the outstanding stations of the country, in order that their signals might not be accompanied by squeals and groans from conflicting carrier waves.

Making the Wabblers Stop Wabbling

To complicate the problem, it was soon found that much of the interference could be traced to stations decidedly off their assigned frequency. By the middle of 1927 it was found that half the broadcasters were transmitting on off-standard frequencies, causing disagreeable heterodyning or whistling interference with other stations. Yet the Federal Radio Commission, already aware of this possibility, had ordered broadcasters to equip themselves with crystal or other frequency controls in order not to wobble more than 500 cycles, or $\frac{1}{2}$ kilocycle either way of their assigned frequency, a satisfactory amount to avoid most of the previous troubles. It was this situation that caused broadcasters to instal crystal frequency controls or other control means whereby they could maintain the assigned frequency within very narrow limits.

Revision upon Revision

It was indeed a most difficult puzzle which the Federal Radio Commission necessarily tackled, beset as it was by scientific and political problems. The latter received as little consideration as possible under the conditions. Stations were shifted about in the broadcast spectrum. Power ratings were increased and decreased to suit the circumstance. New time allotments were made and

cessfully share a channel. And this power is about the limit for duplicating stations on the same wave length, without heterodyne interference. The next usual step, a 2,500-watt station, should have a channel to itself. The country is not wide enough to permit a second station of this power on the same wave length or frequency without carrier-wave interference.

But since the 2,500-watt station can give high grade service only for a radius of about 25 miles, and yet ties up a whole wave length, public interest demands that it should utilize that wave length by giving service over as large an area as possible. Such a station should be urged to go to 5,000 or 10,000 watts, and in fact considerably higher. In this way its useful service area is multiplied while its interference area merely expands over the Atlantic and Pacific Oceans.

Public interest demands that stations occupying exclusive wave assignments should be required to have relatively high powers, instead of medium powers, which ruin the channel with interference and serve only a small area. A 50,000-watt station is more efficient in using a clear channel than a 5,000-watt station. A 100,000-watt or even 500,000-watt station would be even more economical and serviceable in many instances.

All of which explains why the leading broadcasters have been anxious to go to the so-called "super-power" stations, and why the Federal Radio Commission, despite the many protests of local stations and scattered listeners, granted such licenses.

The Axe Falls

By June, 1928, the Federal Radio Commission, having exhausted every bit of ingenuity by way of wave length allotment, time sharing, power limitation, and other considerations, threatened to swing the executioner's axe. A total of 162 broadcasters were challenged to show why their stations should not be discontinued. "There must be further reductions in stations," stated Commissioner Caldwell at the time. "And there will have to be stringent time sharing by many of the remaining stations, as well as power reduction by stations rendering minimum public service,

changed. The pattern of the national broadcasting institution was constantly changing, as the Commissioners sought to fit each worthy broadcaster into a place which would not interfere with others. And still there were complaints galore.

In April, 1928, the Federal Radio Commission had a plan day, set aside for a public hearing at which "all thoughtful persons familiar with the radio problem" were given an opportunity to offer a cure for the ills of the ether. Previously, radio engineers had worked out a scientific cure which was rejected by a certain group of broadcasters and manufacturers. In desperation the Federal Radio Commission might have been seen sharpening its axe once more, preparatory to lopping off a few more broadcast heads. And yet the radio industry pleaded against such a measure, feeling that in the long run the survival of the fittest would eliminate a sufficient number of broadcasters to bring about a natural solution of the air. Meanwhile, the obvious solution as fostered by the Radio Corporation of America and its associates, the General Electric and Westinghouse Companies, was in the form of fewer stations and these of higher power, so as to serve rural sections as well as metropolitan areas.

Why High Power Radio?

The point which few appreciated at the time is that a broadcasting station has a far-reaching "waste area" surrounding the relatively small "service area." Long after the modulation or sound-bearing component of a station's signal can no longer be heard, the carrier wave is present to cause interference or heterodyning, recognized as a squeak or grunt, with other signals. This is why, in the public interest, the wattage or power of every station on a clear channel should be increased to a power such that the service area will cover as large an amount of populated territory as possible while its proportional waste area is spread over the oceans. The service area alone is useful for program enjoyment; the "waste area" causes little but interference.

For even fair radio, only three 500-watt stations can be placed in the continental United States on the same channel. In regard to 1,000-watt stations, only two—on opposite coasts—can suc-

it difficult at first to locate their favorite stations, just as an automobile driver changing from one car to another may be confused by a non-standard gear shift. But they soon became accustomed to the new order of the air. As a whole, a marked improvement was noted. The Commission had succeeded in separating many stations by a sufficient margin of kilocycles of frequency to reduce cross-talk and heterodyning noticeably, and the entire broadcast ether was divided into 10-kilocycle channels with less interference.

Of course there were criticisms. Here and there, unexpected heterodyning did develop. Just as a piece of art can always be improved by a final touch here and there, so the Federal Radio Commission found it necessary to make a few changes in completing its pattern. Law suits continued. Protests were still heard. But the job in the main was going forward healthily. The Federal Radio Commission might well expect the thanks of a grateful public whose radio sets were once again made more of a pleasure.

There will always be complaints and kickers. It is human nature to find fault. But in all fairness to the Commission, it must be said that, in many ways, they did their work in praiseworthy fashion. Theirs was a thankless job after all. That they did not make more enemies is to their everlasting credit.

if we are to fit the existing broadcasting situation into the dimensions of good broadcasting.

“Under our present conditions of the art, our 89 wave lengths will not hold over 350 simultaneous night time stations—big, medium and little. . . . In other words, the accommodations for broadcasters in the Hotel Ether number only 89 rooms, with 350 beds. If any more guests present themselves to be taken care of, all those above the number of 350 will have to alternate in their occupancy of the beds—sleep in alternate shifts, as industrial workers used to do in the old-time bunk houses. . . . The recent move to eliminate 162 broadcasters is only the first step in the necessary program faced by the Federal Radio Commission if it is to enforce the equalization clause enacted by Congress and to bring about good radio reception.”

The public endorsed the desire of the Commission to reduce the number of broadcasters. The benefit of fewer stations was immediately apparent. Eliminating one-third of the broadcasters was obviously the quickest way to cut the Gordian knot which the Commission had been trying to untangle for two years. And despite the howls of the affected broadcasters, interested solely in spilling their advertising messages on the air in return for pay from would-be advertisers, the axe fell on at least some of them. Legal actions there were aplenty, but the Federal Radio Commission plowed ahead towards its ultimate goal of good broadcast reception.

The elimination of some broadcasters gave the broadcast pattern an altered aspect, with holes here and there which could be filled to advantage. Again and again new allocations and reallocations were announced, and the stations were shifted about the chessboard of the broadcast band by the Commission. Big and little broadcasters protested when they felt hurt as their radio corns were stepped upon. It made relatively little difference to the Commission, bent on winning the difficult game assigned to it. On Armistice Day, November 11th, the new wave length allocations were made effective—the consummation of that long game of chess. That morning the broadcast listeners-in woke up to find their radio dials responding in strange ways. Certain settings brought in entirely different stations than heretofore. They found

CHAPTER V

WHO ARE THE BROADCASTERS—AND WHY?

BY this time the reader is aware of the prodigious strides made by radio in less than a decade. The automobile industry progressed rapidly. So did the movies. But they were both snails compared with greyhound radio. And of all the branches of radio, broadcasting grew more rapidly than any. For which reason it might be well to consider those who held and today hold the throttle of this pace-making machine. Like a swarm of locusts, broadcasters sprang up where there were none the night before. Where did they come from? What were they doing before broadcasting? What would they be doing if radio had not come to the fore?

They came from the ends of the earth. Pushing into the background their former occupations, if any, they rolled up their sleeves and went to work as broadcasters. What they would be doing had not broadcasting developed is speculative. They might be in the cloak and suit business. Some might be stock brokers. Others might be working in factories. But—and this is the strange phenomenon—they would probably not be in the entertainment field. For broadcast entertainment is not sponsored to any extent by entertainers. In fact, it is sponsored by organizations having nothing whatever to do with entertainment, organizations that, before the dawn of broadcasting, never gave entertainment as much as a thought.

It might be expected that the radio industry would be the broadcasters, just as the motion picture theatre owners produce pictures for their own houses. Paramount, Radio-Keith-Orpheum, Fox, Warner Brothers, and the other large moving picture theatre owners do not build and buy theatres with the idea that others will fill those houses with suitable entertainment. Having built the theatres, the owners consider it their business to fill them and make a profit from the huge investment that they represent, by

producing pictures to be shown in them. So it might be thought that the manufacturers of radio receivers, realizing that their profits depended on the sale of sets, and the sale of sets depended on the broadcast programs, would be the foremost broadcasters. Such was the case at the very beginning. But some dropped out, and other interests came into the broadcasting field, until now the radio industry represents only a small part of the broadcasters. A most peculiar condition, when the members of the radio industry are dependent on the broadcasting of outsiders to sell their wares. But radio is peculiar in more than one respect.

Little "Orphan Annie"

Broadcasters are the orphans of the entertainment world. Well might we expect to find the great impresarios, the leading stage directors, and indeed the theatrical magnates playing prominent rôles in the exploitation of broadcast entertainment. The stage has, obviously, contributed a fair share of talent to the broadcast studio, but such talent has been placed in the hands of non-theatrical masters for microphone exploitation. And perhaps it is as well. After all, broadcasting is quite a different story from the theatre. The latter prepares a presentation with box office receipts in mind. The presentation may be repeated day in and day out for many months or until its appeal is exhausted in a given territory, whereupon it may be shifted to another territory. The public is invited to come to the theatre, pay real money for admission, and to sit through the performance with little opportunity of stopping the show. No matter how poor the performance may be, rarely are people willing to walk out in the middle. Having paid good money to see the show, they usually see it through, with the faint hope that the next act may be better. A vigilant usher is available to suppress articulate malcontents.

How strange, therefore, must broadcasting seem to the theatrical mind. Broadcasting presents an offering with a view to the widest possible appeal, much wider than the theatre. But there is no box-office barometer by which to judge results. In the individual home, however, the public can accept or reject the performance. A slight twist of the tuning dial and the performance

is killed. Painless for the performers, but death nevertheless. The performance is brought to the listeners, laid at their feet, and disposed of one way or the other in a most private manner. Meanwhile, the "angel," as the financial backer of a show is known in stage parlance, pays the bill, and receives the proud title of sponsor. He receives publicity for his investment. And who is to count or weigh or measure the intangible thing called publicity?

Publicity is all well and good for the man who sells something other than entertainment, by which he gets publicity. But entertainment is the theatrical man's stock in trade. That is what he sells. So why should he give it away? He might gain publicity, but at the cost of demoralizing his market. One does not find a store giving away saleable merchandise in huge quantities for publicity. Publicity rarely deals in the product or service of the one being publicised. So, since broadcasting is largely a matter of publicity, the theatre, as well as other forms of entertainment, has been virtually excluded.

In Step with Its Competitor

Then there are the newspapers—what brought them into broadcasting? One might suppose that the newspapers would discourage broadcasting, which, according to the early prophets, was about to become the newspaper's greatest competitor, even to the extent of devouring the news sheets. Of course there is some competition between broadcasting and publishing; but newspapers, realizing that broadcasting would take place whether they engaged in it or not, have quite sagaciously taken part so as to steer the new art along lines which would not interfere with the stability of their own field. Newspapers are accustomed to dealing with the public. They are the great purveyors of news, both general and commercial. Newspapers must seek public good will, acceptance, circulation. Thus newspapers do not undertake public betterment because it is public betterment, necessarily, but because it means gaining the public's good will, support, and subscriptions.

In broadcasting, newspapers found a wonderful good-will

medium, whereby they might reach into the homes of their territories and bring a cheery message. It was simply an extension of their many promotional enterprises. And the novelty of broadcasting, in 1921 and 1922, made the appeal all the more effective for the first newspaper to undertake broadcasting in a given field.

The *Detroit News* was among the very first to undertake broadcasting, and led the vast army of newspaper broadcasters that has since come into being. As a whole, newspapers are natural broadcasters. They know their public. They have the greatest of raw material—"red hot" news. And they also know the value of entertainment as well as enlightenment, and are doing more than their share by way of providing many of the good things now on the air. Of broadcasting they have made a great public institution—a true extension of their service to the public.

Open Evenings

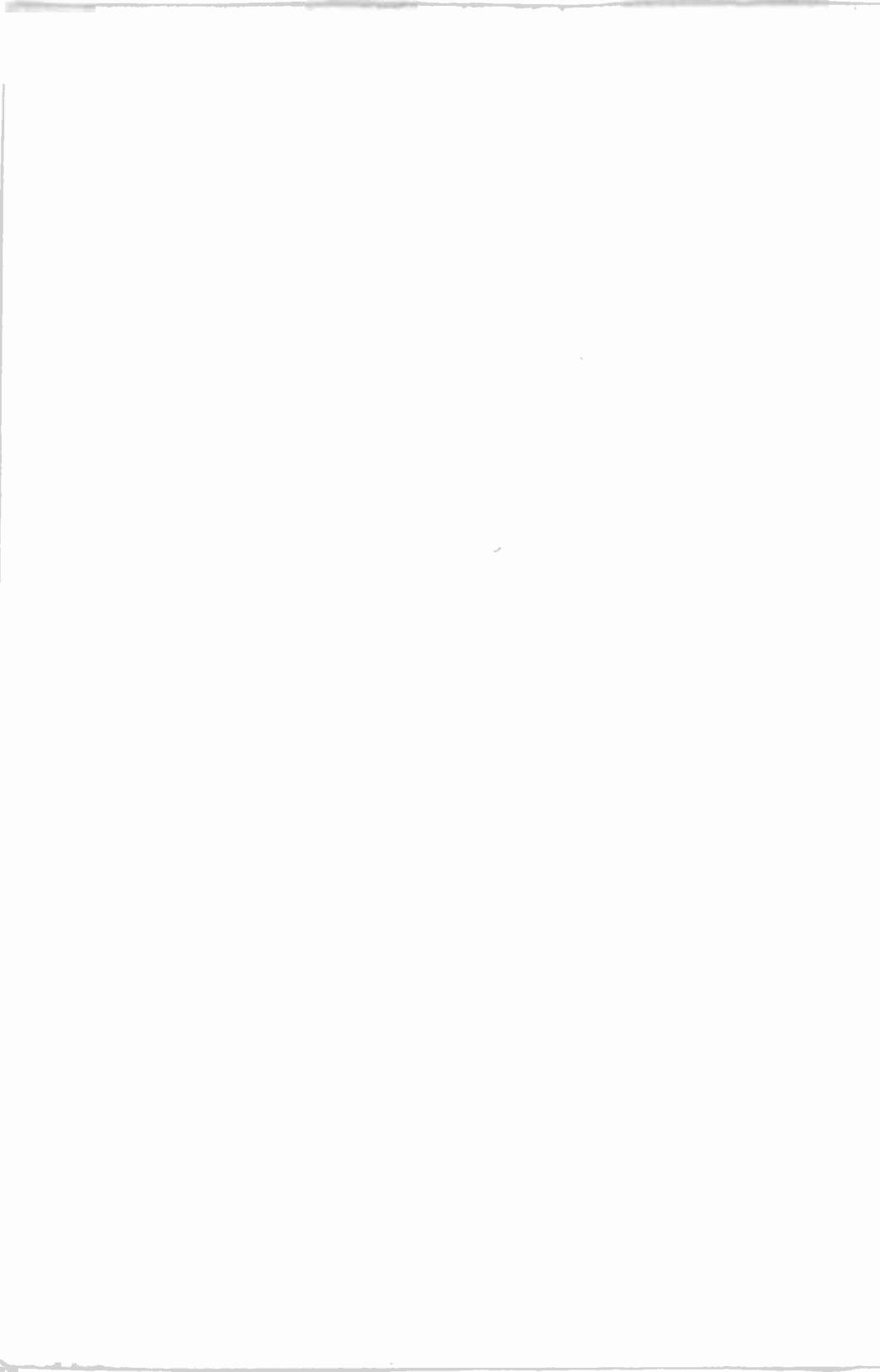
What brought the department store into the broadcasting field? Well might that question be asked, for many department stores have come to broadcast, and broadcast well. L. Bamberger & Company of Newark, N. J., led the parade of broadcasters, beginning with a simple De Forest radio-telephone transmitter and finally attaining a powerful station of the highest quality of modern performance. Department stores are not entertainers. Nor are they purveyors of news. Nor are they educators. What, then, has been the essence of their broadcasting success?

The department store caters to a wider public than any other merchandiser. The poor woman comes in to buy a spool of thread; the wealthy family desires to furnish a home; and another purchaser wants a toy for the tot and a shawl for the grandmother. The department store caters to young and old, rich and poor, families and individuals, selling articles for business and pleasure, costing from a nickel to a thousand dollars or more. Since it appeals to the masses and chiefly to the home, the department store seized radio as a means by which to gain the good will of its potential customers in the favorable environment of the home. And it has had the necessary funds to see



"HELLO, AIRPLANE!" SHORT-WAVE LAND-TO-PLANE COMMUNICATION

Testing short wave transmitting and receiving apparatus on the roof of a broadcasting building. A couple of engineers at the left. Announcer Curt Peterson at right talking to airplanes above Fifth Avenue while engineers get replies.



the job through to success. Accustomed to spending large sums of money for advertising, the department store has come into the broadcasting field with the necessary financial sinews and organizing mind.

In broadcasting, the department store has sought and found a wonderful medium for the good-will message. Broadcasting has been an extension of the free nursery for shopping mothers, the delightful sitting and lounging rooms, the entertainment for the children, and so on—departments which are an expense rather than a source of direct income, yet which contribute more than can be measured in dollars and cents to the general welfare of the store.

Without Benefit of Blackboard

Another major group of broadcasters comprises the colleges and universities. In fact, some of the finest development work of the early broadcasters was undertaken by institutions of learning, such as the University of Minnesota, New York University, and the College of the City of New York, the latter under the more or less direct influence of one of your authors. At first the broadcasting efforts may have been a *means* rather than an end, since professors and students were interested in projecting the waves and the sounds purely as a laboratory undertaking. But as broadcasting took firm hold, the faculty came to look upon broadcasting as a marvelous means of extending the classroom far and wide for the purpose of enrolling the adult student in his home, garbed no doubt in smoking jacket and slippers after a hard day's work. Success has been achieved by several colleges and universities engaged in broadcasting.

Nevertheless, on the whole, the work of the educational broadcaster has been disappointing. True, some good has been accomplished, particularly in individual instances. Educators who have considered a given territory and a given type of audience, arranging their programs accordingly, have covered ground. Those who have limited their efforts to interesting lectures rather than a real course of study have done quite well. However, attempts at the equivalent of real classroom work have failed miserably. Evidently, the face-to-face contact between pedagogue and

student, and perhaps the presence of the pointer or birch stick, are essential to successful instruction. Long-distance teaching has failed so far.

Educational broadcasting is still a much mooted question. Time and again we have heard about the educational possibilities of broadcasting, but the talk has generally vanished into thin air. A few exceptions can be cited to contradict this statement, and fortunately, progress is being made. But mutual mistrust between educators and commercial interests has hindered the development of educational broadcasts. Lack of funds is another drawback, even if time is to be had for the asking.

Educators have done their best work in the way of interesting talks and general lectures. Theirs is essentially a task of cultural development. They are dealing mainly with adults whose days of schooling are over, who crave for more general culture rather than for greater knowledge. By selecting subjects of very broad interest, and by serving their education in modest doses with plenty of sugar coating, the educators have found a painless way of administering much education via the air. But university courses by radio still remain a dream, although much is being done towards the ideal, as explained further on.

Vox Populi

Another great class of broadcasters is to be found in the stations maintained by States and municipalities. While at first one might be tempted to expect nothing but governmental subjects from such stations, even approaching political issues whereby the party in power might foist its pet opinions and selling points on the gullible listeners-in, the programs have been for the most part of a considerably broader gauge.

WNYC, "The Municipal Voice of the City of New York," is an example. A pioneer broadcaster, utilizing for a long time a transmitter which had been built originally by the Westinghouse organization for a station in Brazil, WNYC has done a consistent job for Father Knickerbocker. Year after year it has been broadcasting good musical programs, albeit largely of amateur grade;

excellent talks by educators of its great schools and colleges; foreign language courses, without partiality for any particular language or country; police reports and other pertinent municipal information; the correct time, weather reports and other matters of general interest.

High in the ranks of broadcasters stands WPG, "The Voice of the World's Playground," or the municipal station of Atlantic City. This station, located in the largest resort the world over, is extremely fortunate in the matter of available musical features. Indeed, with remote pick-ups in the leading hotels, dance halls, amusement piers, high schools, theatres and so on, this station is assured of considerable excellent musical material. Its new Convention Hall promises to be another source of interesting broadcast programs. It has done an excellent piece of work in keeping the spirit of the Boardwalk and the call of Atlantic City before listeners over a wide area. It has of late become an integral part of the Columbia Broadcasting System network, being leased and operated by the same.

Of the 611 broadcasting stations listed at the beginning of 1930, 9 stations, or 1.4 per cent were included in the category of state and municipal enterprises. It appears that the exclusive police broadcasting stations, once quite numerous even in such small centers as Mamaroneck, N. Y., and county broadcasting stations, such as the pioneer WRW at Tarrytown, N. Y., in Westchester County, were of insufficient appeal in the face of growing program interest created by the larger commercial stations. Indeed, valuable as police and other special information may be, and far-reaching as radio broadcasting may be as a medium for such information, the broadcast audience's interest being first, last and always in maximum entertainment, such reports found little or no room on the crowded time schedules. There is hardly a place on the air in the broadcasting band for a station devoted to anything else but general entertainment and enlightenment, although police and other special information may well find a small place in general programs, such as the police reports from stations WMAQ of Chicago, WNYC of New York, and WOR of Newark.

Church Bells

Another important class of broadcasters are the churches. Although few religious denominations have stations of their own, the programs originating in the church, or of a religious nature, play no small part in the radio menu. Tuning in the radio on Sunday, one might think that the entire radio world had gone to church.

The early programs of Dr. S. Parkes Cadman, when he broadcast the meetings of the Bedford branch of the Y.M.C.A. of Brooklyn, had a fine non-sectarian atmosphere. This has continued to the present day in the programs presented under the auspices of the Greater New York Federation of Churches.

The time is past when the radio station has to decide whether to broadcast a Presbyterian, Catholic, Methodist or other denominational service. Now programs are prepared especially for the radio audience—programs whose fine flavor of tolerance and broad spiritual quality has brought religion to people who would otherwise have remained without. The divines whose efforts made these programs possible have played no small part in gaining for broadcasting its present universal appeal.

Me, Myself, and I

And then there are broadcasting stations for which we can find no other name than Ego Stations. These, found more in the Middle and Far West than in the congested East, are maintained by individuals. Originally begun as purely experimental transmitters, they have attained a following and have been dignified by a broadcast license. The strong personality of their owners, who are usually the sole or at least the predominant feature of their offerings, is such as to hold an audience in line. There are instances where such stations have been threatened with the loss of their broadcasting licenses, being deemed of insufficient value to the public, only to be saved at the eleventh hour by a flood of petitions from an "X" or hitherto unknown or totally unexpected following.

But petitions, incidentally, are by no means proof positive of

the worth of a broadcaster. We have witnessed small broadcasters hiring energetic gentlemen to canvass their territories for the purpose of obtaining hundreds upon hundreds of signatures to a petition for presentation to the Federal Radio Commission. Many of the signers may never have heard the station in question. But what of it? The Ego Stations have had a definite if whimsical place in the scheme of broadcasting. Their future is not so clear, for the "One-Man Show" eventually loses novelty and public appeal.

To Serve the Cause

While the purpose of broadcasting is fundamentally that of mass communication, or the voice of the people at large, there have been and continue to be many who would broadcast for selected groups or specially organized classes. Chief among these are two labor organization stations, which are primarily interested in appealing to organized labor groups. These stations have found, however, what other broadcasters have also learned, namely, that the working man, whether he be union or otherwise, prefers light entertainment to heavy talk during his leisure moments. Nevertheless, one of these stations in Chicago has been provided with a powerful transmitter, so that its voice may be heard over a large area under reasonably favorable conditions. Certainly organized labor is entitled to be heard by radio and perhaps through its own voice, even though for the most part that voice may speak the universal language of high-grade entertainment, doing its best work by way of gaining public good will for its sponsors.

Fraternal organizations have initiated broadcasting to the extent of two stations, which have provided good general entertainment. Here again, the good will gained for the sponsors has far outweighed whatever messages may be addressed to special groups.

Wealth Before Health

But after all is said and done regarding stations that may be broadcasting for a wide variety of reasons, the fact remains that they are not in the game for their health. The greatest propor-

tion of present-day broadcasters are engaged primarily in making money out of broadcasting. Of 611 stations listed by the Federal Radio Commission at the beginning of 1930, 229, or 37.4 per cent, are engaged in commercial broadcasting, or toll broadcasting for pay. Many of these stations may have begun as experimental or ego or educational or philanthropic stations, but, with the mounting costs and the public demand for higher grade programs, they have turned to commercial broadcasting, which is a good thing for the public at large, because these commercial stations have provided the necessary high-grade entertainment which has been the back-bone of the radio industry, once the mere novelty of broadcasting had worn itself thin. But more about this in the chapter dealing with the business of broadcasting.

Listen to the Adding Machine

Tearing the long thin roll of paper out of the adding machine and analyzing the 611 broadcasting stations at the beginning of 1930, we learn that the largest classified group is commercial broadcasters, as already stated, with 229 or 37.4 per cent of the total.

The radio dealers and radio service organizations total 74 stations or 12.1 per cent, despite frequent criticism that radio men have failed to do their share of broadcasting in support of their own business. They constitute, nevertheless, the second largest group. The third group comprises the educational institutions, with 62 stations or 10.1 per cent. Newspapers, journals, and publishers are fourth with 48 stations or 7.8 per cent, and fifth are religious institutions with 45 stations or 7.3 per cent.

The smaller groups are automobile and accessory organizations, with 20 stations or 3.2 per cent; electrical appliance manufacturers and radio manufacturers, each with 18 stations or 3.9 per cent; department stores with 15 stations or 2.4 per cent; public utility organizations with 13 stations or 2.1 per cent; states and municipalities with 9 stations or 1.4 per cent; furniture organizations with 8 stations or 1.2 per cent; real estate organizations with 1.2 per cent; and insurance companies with 1.2 per cent.

Among the odd broadcasters are creameries, drug stores, fra-

ternal organizations, wholesale groceries, hardware, hospitals, investments, labor organizations, lumber dealers, mail order houses, mining, moving pictures, oil, philanthropic, photographic studios, physicians, rubber products, screw machine products, seed and nursery, ship-building, shoe-merchant, stock medicine, tin-plate rolling, and tobacco.

“—Lend Me Your Ears”

And here is what those broadcasters bring to you when you lend them your ears, during an entire year, as tabulated by the Federal Radio Commission as of December 31, 1929:

Total annual broadcasting time for all purposes, we are told, is 1,252,802 hours, which means that it would require 52,200 days, or 14 years, to listen to all these programs in due turn. Fortunately, we don't have to.

However, of the total, we are told that 410,426 hours, or about 33 per cent of the time is sold to sponsors, exclusive of network programs. Network programs represent 156,581, or 13 per cent. The total time used for sustaining programs, promoting good will for the broadcaster's own business, is 639,991 hours, or 51 per cent. The average annual broadcasting time for each station is 2,747 $\frac{1}{3}$ hours or about 7 $\frac{1}{2}$ hours each day including Sunday. The average total time sold per year by every station, exclusive of network programs is 900 hours, or 33 per cent of its total broadcasting time. The average time devoted to network programs is 345 $\frac{1}{2}$ hours or 13 per cent. The average total time used for station programs and the promotion of good will for broadcaster's own business is 1,403 $\frac{1}{2}$ hours, or 51 per cent.

Reading the Balance Sheet

Selecting 340 broadcast stations, ranging in power from 1/10 to 50 kilowatts, the Federal Radio Commission found that during 1929, 85 broadcasters reported a loss of over \$10,000; 36 reported a loss of from \$5,000 to \$10,000; 23 from \$2,500 to \$5,000; and 33 under \$2,500.

80 WHO ARE THE BROADCASTERS?

Meanwhile, 26 reported profits under \$2,500; 35 from \$2,500 to \$5,000; 54 from \$5,000 to \$10,000; and 53 over \$10,000.

While 167 stations made approximately between \$890,100 and \$1,840,000; more than an equal number, 177 stations to be exact, lost approximately from \$1,090,800 to \$2,307,500. All of which proves that one need not look too longingly and with envious eyes upon the life of the broadcaster.

Then Why Broadcast?

The question remains unanswered, as it always will remain, for there are as many reasons for broadcasting as there are broadcasters. Ask the man who owns one, therefore, and learn the sad or happy details for yourself.

CHAPTER VI

HOW RADIO GETS ITS VOICE

TO many broadcast listeners, it seems that their nightly concert "droppeth like the gentle rain from heaven" upon their ears beneath. There is little inquiry as to its source. While it may be true that the *end*, rather than the means, is the main consideration in present-day radio reception, the fact remains that a peep behind the scenes almost always leads to a fuller appreciation and understanding of supposedly commonplace things. Broadcasting is no exception.

Putting Horsepower into the Human Voice

Broadcasting is a question of picking up sounds, translating those sounds into the electrical language, thundering that language to any desired degree of intensity, by the process known as amplification, loading up a radio vehicle properly called the carrier wave with the desired sounds by means of modulation, transporting the sounds far and wide, and unloading an infinitesimal part of the carrier wave's secret at the doorsteps of every home. That is the broadcaster's job completed. Then follows the acceptance of that gift by every home provided with a radio receiving set. The acceptance is consummated by tuning in or selecting the desired gift from among the many at the doorstep, magnifying it electrically so as better to make use of it, then sorting out the sound portion by means of the detector, followed by building up the potential sounds and giving them to a loud-speaker which translates electrical values into corresponding sound volumes. That is the broadcast listener's job completed.

That such a long and intricate train of events can be carried on without substantial damage to the delicate sound values, or distortion as it is called by those "in the know," is one of the greatest wonders of every-day applied science.

The usual broadcasting station is rated according to the power of its far-reaching voice, to which the radio engineers refer by the unromantic term of output rating. Thus, the usual local station has a $\frac{1}{2}$ -kilowatt rating. Stations covering a moderate area have a rating of 1 to 5 kilowatts. Those counted upon to cover a considerable section of the country, reaching far out into the rural sections, have ratings of from 5 to 50 kilowatts. This novel but correct way of regarding a broadcast station in terms of horsepower is justified by the effect of the power of the station's transmitter, which determines its ability to be picked up in the greatest number of homes.

But what is a kilowatt? Simple enough. It is the unit that appears as a factor on your electric light bill. If you burn 20 average electric lights at one time in your home, you are consuming about one kilowatt of power. If you burn those 20 lamps for an hour, you have consumed one kilowatt hour, which is the unit on which electric light bills are based.

It is more customary to use another unit of power in speaking of broadcasting stations, namely, the watt or one thousandth of a kilowatt. It takes slightly less than 750 watts to make a horsepower. Thus the average local broadcasting station throws out its voice with the power of about one horse to reach thousands of homes. A high-power station, such as WJZ or WEAJ, speaks with the roar of 75 horses. It takes quite a broadcasting station to rival a chariot race.

The output power of the transmitter is sent from the station in all directions, and is, in part, picked up by a myriad of receiving sets. It is far more than ample to feed all the receiving sets within its range, considering the fact that modern receivers strengthen the signals they receive to an enormous extent by power which they draw from the electric light socket or batteries, and thus require very little power from the air to feed them initially.

Probably in no other known practical case is anything strengthened to the same extent as the voice of man in a broadcasting station. Careful measurements have indicated that the power of the human voice, in loud speech or song, is only about one one-hundred-millionth of a watt! Still, this incredibly tiny amount

of power is sufficient to be heard by the ear for a few hundred feet. The ear is therefore a most sensitive instrument. In fact, it is about as sensitive as the eye itself as regards the amount of power required to give a definite sensation.

Stretching Speech from Feet to Miles

But we have desired, in radio broadcasting, to extend the scope of man's voice from a few hundred feet to hundreds, even thousands, of miles. It has been found that we must produce a voice of at least one horsepower, or a 500-watt transmitting station, to reach a purely local audience. This means that we are required to increase the power of the human voice over fifty billion times. In other words, if everyone on the earth were to get together and shout at once, the voice power produced would still fall far short of the strength of the voice of a modest broadcasting station. In fact, the world's call would be only one-thirtieth as strong as that of the broadcasting station. It is little wonder, therefore, that broadcasting stations can be heard so far under favorable conditions. Favorable conditions are naturally those when the night is "electrically silent"; that is, free from electrical disturbances or static, which cause noises or crackling sounds in the receiver, and thus prevent hearing clearly the distant call of the transmitting station. Very literally, therefore, are we justified in calling radio broadcasting "the voice of the world." With the increased transmitting power introduced in recent years, the ratio between signal strength and static has been so increased that it is now commonplace to enjoy clean-cut signals the year round, except for a very few days when thunderstorms may be brewing in the immediate vicinity.

Another way of getting at least some idea of how much the voice must be strengthened in a broadcasting station, is by considering how long it would take to pile up the necessary power out of units made up from the power of the individual voice. Suppose that a man added the power of one human voice to his store of voice power every second, and that this addition of one voice per second were carried on day and night without stop, month after month and year after year. Suppose, too, that the

descendants of this man continued the apparently interminable task of piling up a voice as strong as that of a broadcasting station from individual feeble voices. Sixteen centuries would have come and gone before their long task would have been completed!

This modern miracle of science is accomplished instantaneously, however, through the powerful agency of the vacuum tube which serves as an amplifier, or an electrical microscope. But this tremendous audio or sound amplification cannot be handled in one step. Rather, it must be handled through a long succession of steps, inasmuch as there is a limit to how big each step can be without getting into serious technical and operating difficulties.

The Ears of the Broadcast Listeners

The broadcasting process begins at the microphone, which is nothing more than an electrical ear—the ear of the broadcast listeners. The microphone is a sensitive electrical device capable of converting sounds into electrical equivalents. These electrical equivalents, being quite weak, must be magnified or amplified. This is accomplished by means of the microphone amplifier, usually placed near the microphone. In the studio, the amplifier is placed in the control room, adjacent to the studio, with the control room operator gazing at and sometimes signaling to the studio performers through sound-proof glass windows. The control room operator hears the program via a loud-speaker, just as it is being sent to the transmitter. By means of a monitor control, the operator can make the microphone more or less sensitive or all-inclusive, by changing the “gain” or amplification. It is the monitoring that insures the proper sound level at the loud-speaker end, so that the background noises cannot predominate. The control room operator signifies by signals whether singers or speakers should move nearer to or farther away from the microphone.

From the microphone amplifier, sometimes called the speech amplifier, the electrical voice, greatly amplified, travels over wires to the transmitter. In the case of the largest broadcasting stations, the transmitter may be at a considerable distance from the studio, necessitating the use of wire lines. Thus the WEAf transmitter

is located some 25 miles away from the studio in New York City. Likewise the WJZ transmitter, located 35 miles distant from the studio, and WABC some 12 miles out of New York City. As a still further extension of this system, the network stations are connected by hundreds and even thousands of miles of wire, with the microphone and speech amplifier in the key studio.

The Modulator or Electrical Sculptor

Arriving at the transmitter, the electrical voice is turned over to the modulator, or electrical sculptor, which carves the sounds into the outgoing carrier waves. This is known as modulation, and, depending upon how deeply those sounds are carved into the carrier waves, we have more or less modulation. The modulator comprises a further train of vacuum tube amplifiers for stepping the electrical voice to the point where it can fully control the powerful carrier waves of the transmitter, being flung out into space.

The modulator in turn controls the effective output of the oscillator, or wave generator. In some types of broadcast transmitters, there is a power amplifier following the oscillator, for stepping up the energy to a high degree before it is fed into the aerial for propagation. In order that the radio energy or waves may be radiated or released to the best possible advantage, the transmitting aerial is generally large and lofty. Its location is also a matter of real importance. In order to secure the proper "get away," broadcast transmitters are generally located at sites selected only after extensive so-called field strength tests. A low-power transmitter, mounted on a motor truck, is taken to various places and its signals picked up over a wide area. When the best all-round reception is obtained, the ideal site for the contemplated broadcasting station has been found. And since the best site is invariably out in the open country, rather than in the crowded city with its many steel structures to rob the radio waves of their power by absorbing their energy, the transmitting station is remote-controlled by direct wire from the studio in the city. It was this fact that caused the WJZ transmitter to be moved from Æolian Hall to the open country of Bound Brook, on the

banks of the Raritan River, back in 1925, and the transmitter of WEAJ from West Street, in New York City, to the open fields of Bellmore, Long Island. Likewise, the transmitters of WGY are located in the open country several miles out of Schenectady where the studios are located.

Supreme Amplification

There is one case of amplification of power in broadcasting which goes even further in increasing power than those already mentioned. This is when the modern condenser microphone, instead of the carbon microphone, is employed for picking up music or speech. The condenser microphone can be made to give unusually excellent quality of reproduction, and is therefore widely employed today. It requires, however, far more amplification than the usual carbon microphone, because of its construction and method of use. In fact, instead of requiring the usual amplification of 50 billion times, it requires millions of times more amplification than that. Which means that still more radio tubes or radiotrons must be used, and that amplification running into trillions or quadrillions of times is required. But the mind cannot follow or appreciate the meaning of such high quantities, and so it is not worth while to say more than that a scientific feat in voice amplification, far surpassing the wildest dreams of two decades ago, is daily accomplished for the entertainment of the radio audience.

Modulators and Oscillators

The terms modulators and oscillators are often mentioned in broadcast transmission. Just what do they mean?

Briefly, the oscillators produce a continual series or stream of electrical vibrations of very high frequency and considerable power. They are, in fact, devices for converting the high-voltage direct current, which is supplied them, into an alternating or "vibrating" current of very high frequency, and the ease, regularity and smoothness with which they accomplish this is truly remarkable. We hear oscillators referred to in terms of kilowatts. That is reasonable, for there must be some basis for comparing

their power or output, since power or output refers to service range. When we hear mention of so many kilowatts, let us remember briefly that engineers are referring to transmitting power in terms of units of approximately $1/20$ or less of the power of the usual automobile, or, if you prefer, in units representing the current consumed by 20 of our home electric bulbs, as already stated. So that 50 kilowatts is not very much power, as power goes nowadays. Also, we hear much about frequency. By frequency is meant the rate of electrical vibration, which in turn controls or gives the wave length or "ether channel" along which the signals will travel and be tuned in at the distant receiver. The term kilocycle is applied. What is a kilocycle? Simple enough. It represents one thousand electrical wiggles per second. The quicker the wiggles, the shorter the wave, and vice versa. It might be likened to the continuous snapping of a long whip. A slow motion of the hand produces a few long waves, a quick motion produces many short ones. Instead of using zeros with a lavish and perhaps confusing hand, engineers drop three zeros and speak in terms of kilocycles, or thousands of cycles. An average broadcasting station has a frequency of about 1,000 kilocycles (or 1,000,000 vibrations per second) and a wave length of 300 meters (or about 1,000 feet).

The modulators have a different purpose. They control the alternating electric current produced by the oscillators in such a way that the speech or the music being sent from the station is literally impressed on the output of the oscillators. It is as if the oscillators produced a steady stream of energy, and the modulators controlled this flow in accordance with the sound waves originating in the broadcast station studio. Otherwise stated, in the form of a rough analogy, the oscillators produce a flow of energy which the modulators control and work into a signature of the music going out of the station. The oscillators act like an electrical pump producing smooth and steady power, which, however, is like a blank page, and which produces no sound in the receiving set. The modulators are a sort of controlling hand at the throttle of the valve through which the oscillator power flows, and they impress on this flow the music which is heard by the listener. Either set of tubes alone would be useless; it is only

in the combination that they can produce the controlled electric waves which carry the entertainment.

Of course all this production of alternating currents by the oscillator tubes requires a great deal of electrical apparatus to be connected to these tubes; accordingly, the radio transmitter is a maze of electrical equipment, all of which must be thoroughly tested and maintained at all times to ensure reliable operation. Most broadcast transmitters are provided with what is known as "tank circuits," in order to make sure that the waves sent out by the station are practically entirely of one frequency, so that they will not cause interference at other frequencies and thus disturb other communications.

Sampling the Broadcast Goods

While the power is being sent out, a small sample is taken to the control room of the station, where it is heard through a loud-speaker or, if preferred, caused to operate an oscillograph. This piece of apparatus shows the control of the outgoing waves by the speech or music in the form of a complicated waving line of light which is observed by the control room engineer to make sure that the control is both sufficient and accurate. This modern method of testing the quality to the outgoing performance is most helpful in obtaining consistently satisfactory reception. It is supplemented by having the transmitting engineers listen in on their own station by means of a receiving set, so that they may know precisely what is being shipped out over the air to the vast audience of sound consumers.

When the Show Must Go On

It has been said of the stage that no matter what may happen to players or scenery or theatre, "the show *must* go on." It is a tradition of the stage. And likewise with broadcasting, as practiced by the leading stations: irrespective of what may happen, the show *must* go on. To this end, every precaution has been taken in the leading broadcasting stations to safeguard against breakdown. Much of the equipment is in duplicate, so that the

operating staff can switch from the active unit to the standby unit in the event of a breakdown. The burning-out of a big transmitting tube is a question of a few seconds off the air, since a switch is thrown to disconnect the defunct tube and to throw in the standby or spare tube.

The SOS Watch

The only time the broadcasting station goes off the air for any appreciable length of time, during its scheduled program period, is for an SOS or distress call. In this connection, a licensed radio operator at the transmitting station listens in on the 600-meter or general marine radio wave length during the entire time the transmitter is on the air. All SOS calls are flashed on this wave length. A ship in distress, sending its SOS call, may not be heard direct by the broadcast operator, perhaps, although the receiving facilities are usually on a par with those of regular marine stations. However, the Navy stations, receiving the call, send word of it immediately to everyone, to the end that broadcasting may cease promptly so as to have the air absolutely quiet in order to catch the faintest signals from the ship in distress. It should be noted that a disabled ship often must resort to its emergency radio transmitter of low power, operating on storage battery. For this purpose, there must be an absolute minimum of interference, even from broadcasting stations.

Broadcasters pride themselves upon the rapidity with which they close down for an SOS call. The WEAF and WJZ stations, being indirectly affiliated with the RCA marine service, know full well the importance of speed in answering SOS calls. Both stations have long maintained enviable records for prompt signing off for SOS signals. Usually it is the operator at the transmitting station who disconnects the remote control line from the studio, throws open his own microphone and announces that the station is signing off.

When Radio Goes "Nemo"

Radio broadcasting, in its development, is expanding in two directions, namely, through the air, as its higher power transmitters reach out in ever-widening circles to a greater number of listeners-in, and over pick-up wires as programs are sought far and wide. Programs picked up outside the studio from remote points are known as remote control or "Nemo" programs. Just why they should be thus named, is simply a question of accident. It seems that an NBC engineer once referred to such work in terms of Nemo points, and the term stuck for want of a more expressive one.

Many of the present-day program features broadcast by the leading stations are Nemo features. The dance music, luncheon music, dinner music, theatre, opera, important speakers, banquets, and other features must be picked up where they are found. They cannot be brought to the studio.

Handling the outside pick-up, once a rare art, has become commonplace routine with experienced broadcasters. Suitable portable equipment has been developed for use in different places, while semi-permanent installations are maintained at regular Nemo points, in conjunction with special wires from those points to the control room of the broadcast station. Even transoceanic telephone receiving stations are connected by wire to broadcasting networks for international broadcasting, thus affording an extreme instance of remote control.

The most common way of bringing the desired event to the broadcast station is by means of what is termed "wire line transfer," or, as it is sometimes called, "remote control." This consists in using a telephone line to connect the concert hall, for example, with the control room, and then sending or telephoning the concert over the wire before broadcasting it. To do this, suitable pick-up microphones have to be placed in the concert hall at carefully chosen locations. The music is picked up by those microphones, and the corresponding telephone currents are amplified or strengthened by a "line amplifier." The line amplifier is a carefully designed vacuum tube amplifier, somewhat like that in a high-grade radio receiver except that the most extreme





Dishpan microphone of WJZ "cloak-room studio" in 1921.



Long "tomato can" microphone of WJZ studio on main floor of Westinghouse factory in Newark, in 1922.



Standard "tomato can" microphone of WJZ during 1923.

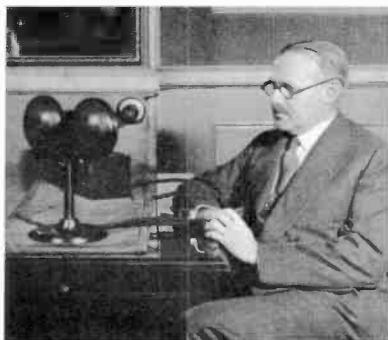


Desk type microphone for speakers, used in 1924.



Microphone housing of WJZ Æolian Hall studios in 1924.

THE SEVEN AGES OF "MIKE": THE EVOLUTION OF THE MICROPHONE



Double desk stand microphone of WJZ in 1925.



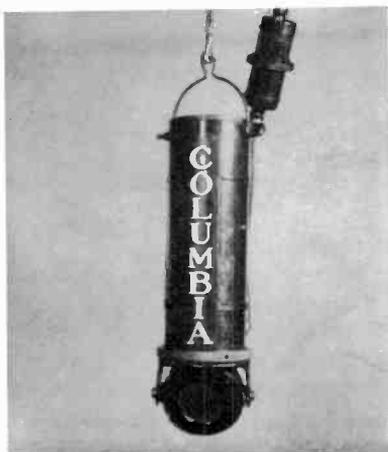
Standard WEAF microphone used until 1927.



Double microphone stand of NBC employed until 1929.



Present-day "camera" or condenser microphone of NBC.



The Columbia Broadcasting System suspended microphone.

THE SEVEN AGES OF "MIKE": THE EVOLUTION OF THE MICROPHONE



care is taken and special adjustments provided to maintain the quality of the music, and to get a suitable amount of power out of the amplifier before sending the telephone currents over the wire from the concert hall to the broadcasting station.

When the currents which carry the music arrive at the broadcast station, they are again strengthened in the control room amplifiers and used to control the radio telephone transmitter in the same manner as though the concert were coming over the short wire line from the studio. The process is called wire line transfer, the transfer in question being from the distant auditorium to the broadcast station over a wire line.

Placing Ears to Hear

It is essential that the microphones at the Nemo point be placed with great care. In fact, the problem of placement is more serious than in the studio where acoustic conditions and artist positions are more readily controlled. If an orchestra is playing, the microphone must be placed so that every instrument will be heard in just the right proportion of loudness and so the orchestra will stay "balanced" when its playing is reproduced for the listener. If a sermon is being broadcast, the preacher, the choir and the organ have to be transmitted correctly, and this may require several pick-up microphones skillfully placed and appropriately "opened" and "closed," or "faded" in or out by a supervising engineer. Theatrical performances are even more difficult to transmit because the actors move about on the stage, do not face the microphone except by accident, and are interrupted by applause, and by the frequently serious echoes found back stage in theatres. Many hours of experimentation are generally required before an important event can be properly picked up for wire line transfer to the broadcasting station.

The line amplifier is a specially designed piece of equipment, containing batteries, tubes, transformers, meters, and controls. The most important unit is the "gain control," which enables the supervising operator to regulate exactly the strength of the telephone currents which he places on the wire line to the broadcasting station. There is also the "volume indicator," which is an

ingenious instrument that visually indicates the strength of this same current and thereby shows that the transfer is taking place correctly.

Exceptionally good wire lines must be used for work of this kind. If they are noisy, or if they do not transmit all tones, of whatever pitch, equally, they will fail to give satisfaction. Consequently, facilities for securing such lines and for testing them to determine their characteristics are needed if acceptable wire transfer of outside events is required. The broadcast listener to a church sermon, faultlessly transmitted, will often fail to appreciate the elaborate process whereby his favorite preacher's words are being carried to his home by radio.

The Long, Long Trail Awinding

In the picking up of important news events, there is excitement aplenty for the engineers and operators. Weeks in advance, the situation is gone over bit by bit, to determine just where to place the microphones; what controlling and switching mechanism may be required; the necessary line amplifiers; and how the wires can be run between various links in the pick-up system. When the great day comes, the engineers, operators, and announcers perform in perfect teamwork. Even so, there is always keen anxiety lest something go amiss. Thus, there may be long wires stretched along benches, along fences, on the floor to be trod upon by hundreds and thousands of feet. The long, long trail awinding from line amplifier and mixer to the numerous microphones must be carefully watched, lest the ears of the radio audience suddenly be "cut off" without undue ceremony.

The handling of the mixer or microphone control board is an art in itself. With a plurality of microphones scattered about for picking up an important sporting or news event outdoors, or again a church service or political rally indoors, it becomes necessary to pick up what is wanted, to shut off that which is not wanted, at the correct time. Thus microphones are "opened" and "closed" by the supervising engineer or operator, who wears ear-phones so as to know just what is going over the wire transfer line to the broadcast station. By means of the mixer, or switching

and loudness-level-regulating mechanism, it is possible to adjust the relative pick-up of different microphones so as to obtain the desired blend of sounds. Thus the applause or the cheering may be anything from a soft background to an overwhelming crash, according to the respective volume level for which microphones for that purpose are set.

The Radio Relay.

There is another way of broadcasting outside events which is known as the "radio relay" method, and now coming into extensive use particularly in securing novelty program features for a blasé audience. This involves sending the material from the scene of action to the broadcast station by radio on a special wave length, and then receiving it at the broadcast station and automatically retransmitting it on the usual wave length. More specifically, a small radio transmitter working on a wave length of say 100 meters, or less, is placed at the scene of action. The broadcasting station will pick up this concert on an excellent receiver, amplify it in the control room amplifiers, and send it out again at full power on the broadcast wave length of say 400 meters.

Quite recently, exceptional short-wave radio relay equipment has been developed, for stretching the long arm of broadcasting to the most unusual places and events. Thus the NBC engineers have developed a short-wave transmitter weighing 20 pounds, which may be worn as a knapsack by the radio reporter. The antenna is supported by means of two poles carried by two attendants. Working on low wave lengths, the transmitter is capable of transmitting a mile or two. The radio reporter, walking about a field, can keep in touch with a special receiving station at the end of the wire transfer line nearby. Thus the essential connecting wire for the pick-up microphone, which could hardly keep up with the perambulating radio reporter, is dispensed with, as the short-wave link goes to work. During the arrival of the Graf Zeppelin at Lakehurst, N. J., during 1929, the portable short-wave transmitter was employed by Floyd Gibbons to good effect.

It was also employed by a parachute jumper in describing his impressions during a plunge to earth!

Short-wave transmitters are also employed on airplanes carrying announcers or radio reporters, in describing important events from exceptional vantage points. Likewise are they carried by small boats during boat races.

Much of the thrill that has been brought to radio programs during recent years, in the way of reporting important news events, can be traced to the increasing use of the radio relay.

Harvesting As Well As Sowing

And so the broadcasting folk are just as keen to harvest as they are to sow. Theirs is the problem of seeking interesting features which are properly analyzed, translated, and then scattered to the four winds so that millions upon millions may be entertained. While radio networks and many broadcasting transmitters are reaching out farther and farther for their listeners-in, there is a corresponding development of pick-up facilities. The latter are the roots—the networks as the main roots, the Nemo lines as the ordinary roots, and the radio relays as the tender tap roots. The transmitters are the branches that reach out into the infinity of space, and bear fruit.

CHAPTER VII

RADIO THE ART

WE have spoken of radio, the science. We have referred to radio, the art. Both terms are greatly overworked in modern English usage. Idiomatically, radio may be considered an art. But in reality it is merely the machinery which art uses for its own dissemination. Radio is not an end, it is a means—a means to the end of bringing art and many other things to the people. One of the oldest scholastic questions is whether or not art can exist without a person to receive it. Is a picture beautiful if nobody sees it? Does Niagara Falls make sound if nobody hears it? These are open questions, debated by the purely scholastic. But it must be admitted that for the world at large that which it does not perceive is non-existent. So the justification of radio must be that for which it is used, the programs which it broadcasts. Only the quality of its programs can justify the investment which radio represents, as only the use of an automobile can justify its building.

Radio has developed in 15 years from an extremely minor business to the sixth largest industry in the United States. And all because people have wanted to use it. For what? Chiefly to hear the *broadcast programs*. Then they must be in great demand? They are. Millions of people buy radio sets, without the slightest assurance that broadcasting will continue; or if it does, that the programs will be to their liking. That is faith. And to date it has been justified. Such programs *must* be good. They are. But how did they come about? To answer that question is this chapter penned (or rather typed).

All this vast machinery and science and industry called radio, all the technology and capital and labor that have been expended, the ingenuity of inventors, the recourses of big business—all would go for naught, even starve to death were it not fed by the hand of Talent with the food of Programs. All the material mass

of radio is but a machine through which the programs pass. Without programs radio would vanish.

But programs are not all. Radio might have programs and still die for lack of sustenance. For without talent the material could not be assimilated by radio. We might call the material, scientific and industrial aspects of radio the body, kept alive by the food in the form of programs, which is energized by the digestive organs in the form of talent.

Call Letters Preferred

The early days were the "DX" days of radio. Radio fans wanted distance, not programs. They were satisfied with the mere thrill of snatching sounds out of the air. If they were to have had their way there would have been no programs at all. Every station would have gone on the air to do nothing but repeat its call letters. That was all that mattered. Get a station. Wait until its call letters were announced so that the listener might feel the thrill of getting Chicago, or Davenport, Iowa, then on to another station. The wait for announcements was delay, programs were but excuses for the broadcasting stations to go on the air that they might fulfil their true destiny, which was to announce their call letters. These programs consisted of anything at all to fill in time. Phonograph records were played and re-played. Poetry was recited, column upon column was read from the daily papers, then more records, perhaps a pianola roll for a change. On rare occasions a harmonica solo, then singing, comments on reception, new circuits, personal messages to other broadcasters who might be listening in, records again, more newspapers, poetry, a new pianola roll, finally the call letters, then the grind once more. Those were the amateur days of radio.

And yet, even before these days, Mr. David Sarnoff, now President of the Radio Corporation of America, had with keen vision foreseen that the receiving set of the future would be what he termed a "radio music box." He saw radio clearly as a leading entertainment medium when others regarded it as a remarkable electric toy for grown-up children. It was the privilege of one of your authors, at the very beginning of the era of broadcasting,

to produce in physical form what was perhaps the earliest realization of the dream of the "radio music box." This was a receiver which had one control for tuning, one control for volume, an enclosed loud speaker as part of the receiver, power unit within the receiver, and ornamental cabinet and hardware. It was a shocking novelty even to skilled commercial radio people in those days of laboratory equipment in the home, but its significance was fully appreciated by Mr. Sarnoff.

As the thrill of receiving sound out of the air became commonplace and the novelty wore off, broadcasters sought more entertainment value in their programs. Orchestras came to the microphone. Prominent speakers took to the air. Of course, the honor was the broadcaster's. It was no easy task to get performers of merit. They had to be lured to the studio. Those were the days when the demand for broadcast talent was greater than the supply. Opera singers, fine orchestras, and soloists were loathe to have their art spoiled by the microphone.

Thespis with Stopwatch

As broadcast and receiving facilities were improved, more and more fine artists expressed a willingness to come before the microphone. Others feared this new and unknown medium of expression. It was so different from direct performance before a seen audience. On the other hand it lacked the privacy of the phonograph recording performance. Thousands were listening in, but none could be seen. Those with reputations in the field of entertainment decided not to risk their good names by submitting to the harsh fate that might await them over the air. And who could tell what the rendition might sound like through the earphones?

In time broadcasting surpassed the phonograph in fidelity of reproduction. Amateurs were replaced by professional entertainers. And professionals compared radio to other media of entertainment. Musicians were used to no hard and fast time limits. Neither were legitimate actors. Vaudevillians, of course, were timed to 12, 15 or 20 minute performances. A few minutes more or less made little difference. But with the ever-increasing value of radio time in the eyes of the sponsor, every second of a

radio program counted. It was not long before programs were run off on a split-second timetable basis. Radio was essentially a "ten-twenty-thirty" art, not in the box-office sense of the old road shows by that name, but rather as an indication of time limits which were strictly imposed on the performers. A statue of radio Thespis would most assuredly be blind and with a stopwatch in one hand, or perhaps in each.

Apron Strings

As the interest in the programs increased, radio naturally followed the path of least resistance. This path was bounded on one side by the technique of the stage and on the other by the rather wider horizon of musical accomplishment. Since the drama was as much visual as oral, whereas music was entirely oral, it was only natural that radio programs were at first developed more along the lines of music than of drama. As radio technique caught up with and surpassed that of the phonograph, original programs were favored and the phonographs, records, pianolas, and music rolls, which had done yeoman's duty in what were even then looked back upon as the "good old days," were stored away in attics to collect dust and memories. Orchestras, singers, instrumentalists came before Mr. "Mike" and "did their stuff." It was very easy. They just performed as they ordinarily would, save for the lack of inspiration from an audience. Their programs were accepted as fine. To be sure they were by no means perfect, but the scientific end of radio was so under-developed in comparison to the performers who sang and played to the radio that all blame for any deficiency was attributed to the engineering failures.

Plays too went on the air, direct from Broadway. We laugh, now, but it was only natural. The motion pictures, now so disdainful toward the stage, had begun the same way, by imitating that which was nearest to them, that from which they were artistically born. And with the recent talkie development the motion picture art reverted to start afresh from the stage. For that matter, the stage did likewise, borrowing from the church, which gave it birth. But that was centuries ago.

In the summer of 1923 "Potash and Perlmutter" was to be heard by radio. Two dramatic stock companies were engaged to give weekly short plays. One of them, the School of the Theatre, was spoken of in a New York paper as "a leader in its line." Their combined offerings were spoken of as "a summer stock season which rivals that of any theatre in the country." Of course, it did not. But the comment is significant in showing that radio desired to be measured in terms of the stage. The art of radio had not yet evolved a technique of its own.

So radio left art to itself and took to reporting. Prize fights, talks, sporting events, election returns—at these radio was well-nigh perfect. In the meantime the science of radio developed. More and better performers were appearing in the broadcasting studios. In 1924 the sponsored program was ushered in, paid for by Big Business. In characteristic fashion, the sponsor sought to get the best possible results from his radio investment. He wanted as many listeners as possible. The race for an audience of the air was on. No electric lights blazened forth the names of famous stars; no well-known playwrights, no particular ballyhoo. The radio show had to get its audience through sheer merit. This program matter was looked into further. Freak programs might do, but only for freak concerns. The Ringling Brothers-Barnum and Bailey Circus broadcast the voices of the menagerie folk. But that was no solution of the problem, just a brilliant idea of that resourceful publicist of the circus, Dexter Fellows. Well, the only way to go about it was to see what had been done thus far. An enumeration of the material broadcast from WJZ from May 15 to December 31, 1923, was compiled. And this is what it showed:

<i>Classifications</i>	<i>Number of Programs Given</i>
Alto Solo Recitals	3
Band Concerts	37
Banjo Solo Recitals	5
Banquets	21
Baritone Solo Recitals	98
Baseball Games	6
Bass Solo Recitals	23
Boxing Bouts	5
Cellist Solo Recitals	11

<i>Classifications</i>	<i>Number of Programs Given</i>
Church Services	67
Concerts	95
Contralto Solo Recitals	77
Duets—Vocal and Instrumental	7
Educational Programs	15
Football Games	7
Harmonica Solo Recitals and Bands	10
Harpist Solo Recitals	11
Miscellaneous Programs, i.e., Calophone, Cantors, Celebrations, Cornet, Lecture Recitals, Monologues, Saxophone, Trombone, Ukulele, Whistler, etc.....	88
Opera Recitals	7
Orchestras	196
Organ Concerts	74
Piano Recitals	266
Poetry	10
Polo Games	3
Popular Song Programs	126
Quartets—Vocal	26
Readings	27
Recitations	18
Songs—Sacred and Folk	17
Soprano Recitals	340
Stories—Bedtime	205
String Music	9
Talks	723
Tenor Recitals	109
Trios—Vocal and Instrumental	9
Violin Solos	125
Vocal Recitals—Miscellaneous	29
U. S. Army Night—Talks and Bands	7
U. S. Navy Night—Talks and Bands	9
U. S. Marine Night—Talks and Bands	1
	<hr/>
	2,922
Theatres and Plays	40
	<hr/>
	2,962

SCHEDULE OF EVENTS BROADCAST FROM OUTSIDE OF STUDIO
MAY 15 TO DEC. 31, 1923

Banquets	21
Hotel Orchestras	146
Churches	36

<i>Classifications</i>	<i>Number of Programs Given</i>
Philharmonic Stadium Concerts	14
Organ (Wanamaker—Estey—Astor)	57
Æolian Hall Auditorium	4
Theatre (Plays and Orchestras).....	49
Miscellaneous Events	49
John Wanamaker Concerts	41
Goldman Band from Central Park	16
Boxing Bouts	5
Polo Games	3
Carnegie Hall Concerts	5
Baseball Games	6
Football Games	7
Town Hall Events (Lectures and Recitals)	5
	464

EVENTS BROADCAST FROM WJZ AND WJY MAY 15 TO
DEC. 31, 1923

	<i>Total</i>
Outside and Inside Events	2,962
Outside Events ONLY	464
Outside Events in Hours	556
Inside Events in Hours	1,338
Per cent Outside	29.35
Per cent Inside	70.65

And on that basis they went to work.

Programs Table d'Hôte

Many were the novel ideas worked out by sponsors and stations. On June 11, 1924, WJY started a series of "Omni-Oral Productions" so called for lack of a better name, each performance consisting of two hours of interrelated programs for those members of the audience who desired to tune in on one station and leave it on for the entire evening. Nevertheless, it was so divided that a person tuning in on the hour or half hour might not be entirely lost for the remainder of the session. There were to be four productions a week, each related to the others. The following week

WJZ put on a full night's entertainment celebrating the first anniversary of the Wanamaker Auditorium Radio Concerts. The *New York Evening Sun* of June 11, 1924, announced the feature as "Presenting a novel experiment in a new type of program arranged with the kind coöperation of Radio Editors of New York newspapers." The program was divided into four half-hour sessions starting at 8.30, the first called "America First"; the second, "In More Or Less Serious Vein"; the third, "Playboys of the Air" and the last, "New York in Convention Time." The individual programs featured respectively the chimes of Ste. Anne de Beaupré, Canada; Hour Chime from Carfax Tower, Oxford; Chime Figure from Chateau de Peyrieu, France; and the Hour Chime from the Metropolitan Tower, New York.

That was but for a single night. When a radio station got hold of something the public wanted time and again it held on. Bernhard Levitow's Hotel Commodore orchestra was booked for 200 radio concerts during the 1924-1925 season through WJZ and WJY. Among the freak or short-run programs was the Ballet music of Pavlowa's farewell New York performance, and a Musical Travelogue aboard the S.S. *Mauretania*.

Without Benefit of Footlights

By 1925 we find a reversion to the stage. The *New York Times* of Oct. 4, 1925, printed an article entitled "Theatrical Producers Join with Radio," which said in part, "One of the most important of the recent developments in the theatrical world that probably will result in the broadcasting of theatrical productions heretofore withheld from the microphone is announced by officials of WJZ, following a series of conferences with Messrs. J. J. and Lee Shubert." This well-known producing firm consented to broadcast "The Student Prince" as a trial proposition, the reaction of the radio and box office audience determining the policy of the producers as to future radio performances.

We in 1930 look over the radio sheet of the newspaper seeking a radio production of a Broadway hit in vain. One more attempt to merge one art into another had failed. Radio was still groping in the dark as to its art form.

Tabloids for the Ear

Prophets are always interesting because we at a later date can so easily judge the wisdom of their words. We laugh at the thought of the man who said the automobile would never take hold, or the radio. On the evening of December 8, 1925, Cosmo Hamilton, British novelist, speaking before a meeting of the Press Club of Jackson Heights, New York, made the statement, "In the future, authors will have to adapt their stories for people to hear, not to read." Speaking of the delivery of a 15-minute version of his novel "Paradise," which he was to give over the air on the following Saturday, Mr. Hamilton said, "I am sure that this and other experiments will lead to the elimination of long novels. In time the radio audience will be taxed. Let us assume that the tax will not be more than one cent per head. There are approximately 6,000,000 in the American radio audience. The author could expect \$60,000 for the first reading of his novel. . . . A second reading could be considered a second edition and the pay could be made in proportion."

Which speech reminded an editorial writer on the *New York Times* of an incident. When the bursar of Pembroke College, Oxford, attempted to fine the youthful Samuel Johnson for cutting a lecture, the future philosopher retorted: "You have charged me threepence for missing a lecture that was not worth a penny!" and presently quit that institution of learning. "Not the least of the virtues of radio," remarks the editor, "are the facilities it offers for walking out."

Nuts to Crack

And that is just one of the many difficulties of radio broadcasting. Radio has no box office. The person who pays two or three dollars to see a play or fifty cents to see a movie enters the theatre and feels obligated to see the show through to the finish. He has paid for it, and might as well last it out. Perhaps the next scene will be better. And it would be too late to go to another anyway, to say nothing of the additional expense. But the radio fan need but turn the dial and he is in another theatre

with no extra cost, nothing lost, and practically no time wasted. The show with a good ending might last and succeed, since the patrons go away contented at the end. But the radio program that relies on its last feature to put it across is bound to fail since none would be left tuned in to that station to hear the finale. One of the characters in Sacha Guitry's play "Deburau" says, "The public is so fickle." The radio public is not only fickle but has the opportunity to display that characteristic to the utmost.

Another peculiar feature of radio is that whereas in almost every other form of entertainment many people partake in the program at the same time and in close proximity, in radio people are alone in the intimate atmosphere of their own homes. The movies, the theatre, the circus, the concert, opera, ball game—all are witnessed by crowds, part of whose enjoyment is derived not from the event but from being a part of a crowd, in appeasing the gregarious instinct. This is manifested in the fact that each member of the crowd applauds or yells louder than he would were he alone. Not only louder but more often and on less provocation. Those who see a play at an empty matinée do not enjoy it as much as those who see the same play on a crowded Saturday evening. Mob psychology works for the exaggeration of emotion. And since the emotion of an entertainment is one of pleasure and well-being, that emotion is magnified.

Tyrant in His Own Home

But the radio audience has no mob psychology to help it along. The radio listener is not lost in the performance. As soon as he buys his set he becomes a critic, tuning out this, tuning in that, preferring, disliking, forming opinions, drastic opinions. We say drastic because whereas the member of an audience at a play might be unwilling to voice his dislike of the play in opposition to the critics and the evident enjoyment of those about him, and, having heard it was good, he believes it to be so, the radio listener is influenced by nobody either before or during the performance. He must form his own judgments. And because he forms them himself he will stick to them. What he says is law.

Thumbs up and the program continues. Thumbs down and the turn of a dial snuffs the life out of the program. It no longer exists. In the American democracy each set owner plays tyrant, giving birth to or killing thousand-dollar programs at will. No argument, no second trial. Mr. Listener doesn't like it. It's out! And that's that. The radio public is the most fickle in the world. The radio program that would bid for its attention in competition with hundreds of others must be good at the start, finish, and all down the stretch.

On New Year's Day 1926 John McCormack and Lucrezia Bori broadcast from WJZ. At last radio broadcasting was coming into its own at the program end. And with the broadcasting of Paderewski it was felt that the science of broadcasting had reached the stage where it might not have to make excuses for the reproduction of the music of real artists. These well-known artists could perform just as well prior to their first radio performances as after. They waited upon radio engineering to make more perfect the means of reproduction. When they thought that technical progress placed the facilities of radio on a par with their own performances, they were ready to go on the air. That they did so at this time was most gratifying.

With the willingness of the finest stars to perform before the microphone, there was a grand rush to the studios by all and any who thought they could perform. No longer was it necessary to beg for talent. The supply was overwhelmingly greater than the demand. And the ratio has steadily increased to the present.

Ether Artists

On January 21, 1927, the first nation-wide transmission of grand opera was accomplished. Early in that year the newly formed National Broadcasting Company published a statement reporting its activities during the three months since November 1, 1926. Among the public officials who gave addresses over the air in that time were Calvin Coolidge, Charles G. Dawes and Alfred E. Smith. Mme. Alda, Lucrezia Bori, Mary Garden, Martinelli, Rosa Ponselle, Titta Ruffo and Schumann-Heink sang in that period; Harold Bauer, Mischa Elman, George Gershwin, Percy

Granger, and Paul Robeson performed before the microphone; Damrosch, Mengelberg, and Toscanini conducted their orchestras to unseen audiences. "The Meistersinger," "Romeo and Juliet," "Norma," "Rigoletto," "Lohengrin," "La Traviata," and "Siegfried" were among the operatic performances: as were the dramatic plays, "Hamlet," "Romeo and Juliet," and "Othello." All in three months.

But these performers were not primarily radio performers. They belonged to other stages, loaned to radio because of the quality of their merit in their own respective spheres, and because radio had no such artists of its own. Radio had still to find its own niche as an art form. In the autumn of 1927 the National Broadcasting Company again attempted to broadcast dramatic performances, this time direct from the stage of a New York theatre. The vehicle was the musical comedy, "Peggy Ann." It aroused no great huzzahs nor closed the playhouses of the land. And why should it have? Plays are written to be seen as well as heard. Of course it is only natural for a new medium of expression to hang on to the apron strings of an older one until it has learned to walk. But what did the public think about it?

It Did Not Help

The theatre and the movie magnates had been afraid of radio, as they had of the phonograph, as they will be of any new form of entertainment. But without foundation. In the fall of 1927 the movie stage hands' union called a strike in Chicago and all the city's motion picture palaces were closed. An inquiry as to how the movieless thousands of Chicago spent their evenings revealed that radio patronage was not in the least affected. Chicago's radio stations declared that "fan mail" and telephone requests for musical numbers were no higher than usual. The larger radio distributors denied that there was any substantial increase in the sales of radio sets and equipment. Although scant evidence on which to base a generality, this one instance points to the fact that radio does not take away theatre fans. Radio has a public of its own, made up, of course, of people who also seek entertainment elsewhere, but do not substitute radio for other di-

versions. But it does seem peculiar in view of the fact that radio was still closely following the technique of the concert and legitimate stage.

In October, 1927, a cast of London actors came to this country to broadcast "The Beggar's Opera" from WJZ and stations associated with the National Broadcasting Company, 177 years after the play's first American production.

The Long Quote

Speaking of dramatic radio programs, the trials and tribulations of those concerned with dramatic radio presentations can scarcely be exaggerated. Don Clark, the continuity editor of the Columbia Broadcasting System, pointed out some of radio's idiosyncrasies so well in a short article entitled "The Technique of Radio Drama" that we take the liberty of quoting the article in toto, even though we cannot agree with Mr. Clark on the extent to which dramatic programs have been developed. But listen! Mr. Don Clark at the "mike."

"When Shakespeare staged a 'first night,' his players came onto an almost totally barren stage and verbally set the scene.

"So do we set our scenes in drama on the air. We cannot depend on lighting and stage effects to produce the desired mood in the audience. Neither can we depend upon the skillful visual characterizations which repeatedly remind us of the genius of a Barrymore or a Moissi. The voice is divorced of grease paint, cloak and wig. Silks and satins become rustles and swishes. A jewel-hilted sword is a clank and a phrase—terror is a breath.

"The character of the radio player must be entirely in the voice—the locale must be viewed by the audience solely through its imagination. Our physical—or rather, mechanical—aids are restricted to sound effects.

"First efforts to transplant full-length plays and short sketches from the legitimate stage to the air theatre were something very little this side of grotesque. The effect on the listener of these first attempts was simply that of sitting in the theatre blindfolded. Where long periods of stage business occurred were great open spaces of time. The by-plays of actors were, of course, entirely lost, for, for the purposes of radio, they had not the slightest value.

"This condition could not and did not exist for longer than it takes to tell of it. The broadcasters realized that if the 'theatre of the air'

was to succeed they would have to write their own material. Not only must special adaptations of stage plays be made—but drama must be written especially for the air, just as a special technique had been found necessary for the motion picture. That point marked one of the most important milestones in the development of radio dramatics.

"To be sure, the radio play has taken a great many pointers from other forms of writing. But it has been obliged to coordinate these things into a quite new and hitherto unheard-of technique. For every piece of business in the regular stage play, we have had to devise means, either in sound effects or in the lines, to denote the same idea. The lines must be vivid, understandable. The mere fact that an actor is gazing from a window must be suggested with subtlety in the lines. In short, the Broadcast Theatre plays to an audience of blind listeners.

"Every night is 'first night' in Broadcast Drama. We open and close the same evening. We play Broadway and 'the road' simultaneously—all the cities and towns of the country. Our plays must appeal to no single class of audience, but to all classes. Neglecting this salient economic factor, a radio dramatist must soon turn his attention to some other means of earning a livelihood.

"The newspaper man has contributed his part to the writing of Broadcast Drama, too. He has a conscientious regard for the deadline—the hour at which his material must be ready. The Molnars, the Maughams, the Pirandellos can spend months preparing their plays and sketches, but the radio dramatist must turn out one or more of them week after week—on time for rehearsal.

"To drama on the air, the novelist has brought his ability for plot construction—the short story writer his novelty and brevity—the dramatist his sense for characterization. All these are going into the development and improvement of drama on the air. We have not been at it as long as have the scenario writers or the playwrights, but we are making headway. It will be rather soon than late when we will begin to talk about names as important in Broadcast Drama as Barrie, O'Neill and Shakespeare are to the theatre of settings and footlights."

The Thinned Ranks

By the spring of 1928 the Old Guard of those concert and operatic stars who refused to appear before the microphone had dwindled perceptibly. Galli-Curci gave way. Lawrence Tibbett made his début. Sir Thomas Beecham had conducted an orchestra over the air. Almost alone in his perseverance against radio stood Fritz Kreisler, world's premier violinist. A few others had failed to appear, some because of contracts forbidding such performances, others because they feared that radio appearances would

weaken road tours. But managers were beginning to think of radio as the primary field and the concert tours as secondary. The tide had definitely changed. Those who held out were in the minority, a minority whose ranks were growing ever thinner. And as the finest operatic and concert stars were entrusting their voices to the microphone, there were other singers rising from the obscurity of the opera chorus and small-time vaudeville to stardom via the air, training themselves in microphone technique. Not only did the stars have to compare their natural voices to their radio voices, but also to those of lesser lights who were bidding fair to gain popularity from an unseen audience.

With the continued improvement of the technical end of broadcasting and the production of superior sets, including such features as the dynamic speaker, the high output amplifier tube, and later the screen-grid tube, excuses for non-appearance before the microphone became weaker and weaker, until it was taken for granted that the radio was a legitimate medium for any kind of entertainment without regard to the artistic quality of the performer. All manner of fine programs were tried, and many now survive. Such dance music programs as the Atwater Kent, classical music such as the Edison Hour, varied programs as exemplified by the Palmolive Hour, dramatic hours such as Socony Land Sketches, stories such as True Story Hour, duologues such as Amos 'n Andy testify to the wide range which radio programs have reached, even in the limited field of sponsored broadcasts, whose duty it is to sell as well as to entertain.

We have spoken of radio programs as art adjusted to the stopwatch. Ten-minute, quarter-hour, half-hour, and hour programs, cut to fit and tailored to look well. This is a novel feature of radio entertainment. But by no means an attribute exclusive to the air. Plays are fashioned to last two and a half hours. Why not an hour more or less? For no intrinsic reason. Two and a half hours is the time accepted by the public for the acting of a play. It is standard. And anything not standard is outcast, unless it is accepted as a freak. In Shakespeare's day plays lasted longer. A spectator would consider himself cheated were the play to last only as long as a modern one. But our hectic and speeded life

is tuned to the thought that a longer play infringes on the public's patience. Wherefore, it is two and a half hours.

Radio styles may also change. Today stations try to give their listeners the widest possible assortment. We do not think of one station as a jazz station, another as a purveyor of classical music, a third as a dramatic station, and so forth. All stations present all manner of programs. And present them astonishingly well. But despite this fact, such all-inclusiveness is contrary to our modern mania for specialization. It may not be long before stations get reputations for superior programs along one line of endeavor, either because they have the best artists in that line, or their sponsors favor that kind of program. Just as in the theatrical field we think of Ziegfeld as the producer of musical comedies, George White and Earl Carroll as producers of revues, Winthrop Ames and the Shuberts for light opera, A. H. Woods for melodrama, Arthur Hopkins and Gilbert Miller for fine modern drama, and Walter Hampden for classics, so we may find radio stations specializing in various fields of radio programs. In which case the station devoted to skits and sketches would have no programs much longer than 15 minutes, and the station specializing in operas no less than one hour. A person preferring a particular type of music may tune to a station and remain there all evening, without fear of being suddenly thrust from a night club into an opera house or vice versa. But whatever the time limits they must be strictly adhered to by the station. For directly at least, the sponsor pays the bill. And because of the size of the bill he wants to be sure to get every minute, while the sponsor to follow wants to start his broadcasting on time. So rigidity will remain one of the earmarks of radio programs, paralleling, in this respect, the rigidity of the sonnet form in poetry.

The Three Lacks

Radio has no bouncer. It has no box office. It has no ticket speculators. And each lack is important. No bouncer means that the audience can voice its disapproval to its heart's content—and frequently does. No box office means that programs are not paid for by the listener. One of the axioms of theatrical psychology,

which is no proof of its correctness, is that a show which is paid for is more thoroughly enjoyed than that seen on passes. We have seen shows that might not be wasteful evenings for nothing, but were certainly not worth what we paid for them. We remember once returning to a theatre for a cane we had forgotten. A few rows in front of where we had sat was a man with hammer and screw driver, on his knees, screws on the floor, hammering and pulling at one of the seats. An usher, cleaning up, came down the aisle and bade him desist. He refused. She got the manager, and as we were leaving the theatre we heard the man on the floor say, "Get out of my way, I paid seven dollars for this seat and I'm going to take it home with me."

But the prevalent idea is that a person is likely to value an article or a service at what he paid for it. Which makes radio programs rather worthless in the eyes of the public, unless forced to the contrary by the high quality of the broadcast. The lack of ticket speculators is a blessing of no small proportions. It means no bloating of prices, and consequent bloating of values in the public eye, these values to be violently exploded on attendance at the performance with a subsequent dislike for the entertainment rather than for the speculators who impressed on the public the false values it believed were latent therein. Radio programs are accepted or rejected at their face values.

The Higher Morality

Books are censored. We all know that. So are plays. So are movies. Though, with the talkie element, it is a bit difficult. So is painting, for that matter. How about radio? We hear nothing at all about radio censorship. Seemingly it does not exist. And at the same time we never think of radio programs as libelous, seditious, lewd, lascivious, filthy, immoral, disgusting or tending to corrupt the morals of youth. Why so, if there is no censorship?

We hate to have to admit it, but radio *is* censored. Our hate is due to the evil days upon which the word "censorship" has fallen, and not at all because of the manner in which it is practised in radio broadcasting. We have an innate dislike of the word. Yet we are all of us censors a hundred times a day. Every time we

dial out a station, we censor its program. Any rejection implies some form of censorship. It might not be on the basis of morality, and probably seldom if ever is. But we are all of us censors insofar as we exercise our selective faculties.

Censorship in other fields of art, literary and dramatic, has achieved ill favor through the means by which it is applied. Fortunately, radio censorship is based on broad principles, allowing of interpretation, and seeking the aggregate judgment of the program as a whole rather than the inclusion of particular words or phrases.

The Federal Radio Commission, in judging whether or not a station is broadcasting immoral, libelous or seditious programs, looks upon its programs as a whole. Its judgments have been fair. The Commission is to be highly commended in this regard. The individual broadcaster also judges the programs broadcast by his station in like manner. A man desires to make a speech over a station. The station manager does not demand to see the script and delete from it anything to which he personally objects. He investigates the prospective speaker's reputation, the authority with which he speaks on the proposed subject, his general character. Then he is allowed to go ahead. He may say what he likes. Any inappropriate remarks can never be taken back after they go on the ether. But few ever go out. If they do, he is debarred from speaking again before the radio audience. The supply of fine and eminent speakers has been so great, however, that seldom need a station take the chance of allowing a doubtful character to broadcast.

There is no censorship on the basis of political, religious or other beliefs. Radio has remained impartial, the means through which the nation may hear all sides to a question. Radio broadcasting does not take upon itself the duties of editor. In the last presidential election campaign both sides had equal access to the broadcasting stations. Nor is there a censorship of particular words. Yet radio talks and scripts are surprisingly free from off-color words. "Damn" and "hell," freely used in books and on the stage, are heard over the air on only the rarest of rare occasions. The reason is merely to offend nobody, and because "it is the thing to do."



**"SOCKS, SOCKS, WE'RE THE INTERWOVEN PAIR": BILLY JONES AND
ERNIE HARE**

Two musical fun makers whose popularity has not declined with the years.



After all, custom is the great censor. To date radio broadcasting has been thought of as an example of fine English, well spoken. The day might come when radio speech will fall into the vernacular, the idiomatic, the common. We hope not. Its power for the improvement of speech is too great to allow it to fall into vulgar usage. By great care in the choice of speakers we have established a reputation of high-mindedness in radio speech. We hope this attitude will be maintained. The censorship of qualification is the deciding issue. If the prospective speaker is qualified to speak, he may say what he pleases. His taste rules. So far it has ruled well.

The Goal

Radio broadcasting has not yet found the perfect form for its programs, a form which will allow of values obtainable in no other medium of expression, a form imitative of no other, a form which will mark off radio broadcasting as a distinct means of expressing that which can be expressed in no other way. But throughout the world program directors, writers, composers, musicians, are seeking this new form. A new art form is slowly being born. F. W. Bischoff, a German radio pioneer, has found what he considers a true basis on which to build the radiophonic theatre. He has developed what he terms "*hörfolgen*," or radio sequences. In form they are a series of selections from literature, usually modern, presented under a general title as a complete unit (according to *World Radio*, which has written on the subject). The first of these works bore the title *Song*. In Germany, the word indicated a small poem or incident from current life. Among the other sequences produced by Bischoff were *Love*, *Longing*, and *The City*. These were accompanied by impressionistic music. Many others are trying to write dramas peculiarly suited to the capabilities and limitations of radio.

When the time comes that a form is found, and its technique is mastered, radio programs will emerge as an art form, to compare with the opera, the stage, the motion picture, the concert and like forms, to the end that man may express his many moods in a new medium, a medium which shall be the embodiment of all that is fine and significant in radio broadcasting.

CHAPTER VIII

BUILDING THE RADIO PROGRAM

REALLY, so confidential and frank a chapter as this has no place in a book which we believe will be read by thousands—and, to be candid, we hope, by hundreds of thousands. Having made this admission, we will continue by inserting the chapter as was our intention from the beginning. We would be more than a little hurt if you skipped it, out of respect for our wishes as stated in the opening sentence.

Forming the Illusion

To reveal a secret of the showman, radio entertainment, like the theatre or the motion picture, is successful only insofar as it creates for the audience an illusion, carries the listeners to another world, away from their own lives to a land of joy and happiness. We think of science as reality incarnate. We pride ourselves on being realists. We frown upon romanticism. And still, we seek entertainment, not in the drab reality of our own prosaic lives, but in the romance which we find in the theatre, at the opera, in hearing a beautiful concert, even in attending a prize fight. Were it not for their romantic qualities, these institutions would be valueless as entertainment, the prime factor of which is the ability to transport one in the literal sense of the word into other realms of being.

The illusion of radio is no less important than the illusion of the theatre. The radio is limited in its machinery of illusion as compared with the theatre. The illusion of the latter begins before one so much as enters the building. The imposing structure with the huge electric lights, the wide marquee, the vast lobby, and the ornate box office, the cordoned passageway into the auditorium—all lead away from the scenes of everyday life. The scented auditorium, the dim lights and the gorgeous murals,

the carpeted floor, the rich velvet curtain, and the soft music quiet the nerves of the city dweller, making him forget the atmosphere outside the theatre's walls—the city street and the roaring traffic. The cold rain outside is forgotten in the warm comfort of the auditorium. In these ways the theatre prepares the mind for the chief illusion of the play itself. Then, the darkened house makes of the mind a *tabula rasa*, on which is stenciled in many colors the illusion of the play. Lighting, setting, actual performers seen as well as heard, music, atmosphere, plot, theme, characterization, a different time element—these and many more factors do their utmost to draw a veil over the dim and tired eyes of the mind and paint for the audience a picture of life as it ought to be, exciting, happy, or terrible, as the case may be, lightening the burdens of the soul with laughter or purging it in the cleansing emotions of tragedy, fear, pity, and terror. Such is the illusion of the theatre, than which none today is greater. How foolish it would be to point out the machinery of this illusion, which procedure would make it doubly difficult to produce the illusion on those who know how it is brought about.

The Machinery of Illusion

So too with radio. Radio is poverty-stricken in its machinery. But it is young. It may create new machinery; indeed, it has already done so. Illusion is the one excuse for the existence of radio as entertainment. Why, then, disclose to the radio public the means by which the trick is worked? Of course, many already know. But when they turn on the radio they tacitly agree to forget that they know, and are willing to place themselves and their imaginations at the disposal of the broadcasters.

And still, a work such as this would be incomplete were such a chapter not included. Some there are who would argue that a knowledge of the machinery of illusion will tend to greater appreciation of radio entertainment. With this view we disagree. Entertainment does not exist to be understood or analyzed. It exists for its own sake. Not for the listener to think how well

the singer sings but to be so transported by the performance that the listener is unaware of the beauty of the singing, wholly immersed in the emotion and the beauty of the performance as a whole. We only ask that the reader of this chapter, when he turns on the radio, agrees to forget what he has learned, and like a little child, relax into the fairyland of entertainment.

Programs for Sustenance

Two kinds of programs are broadcast, sustaining and sponsored. The former are programs presented by the radio station, paid for by the station, and broadcast for the purpose of building good will for that station, keeping it on the air even during hours that are not bought by sponsors, making the radio day continuous, and increasing the listening public, to the end that the station may be favored as a medium for sponsored programs, thus enhancing its value to sponsors, and either gaining more sponsors or warranting the raising of rates per hour over the station, or both. Sponsored programs are presented under the auspices of a business firm as a means of creating good will on the part of the radio audience, and an acceptance of the firm's product or service. Such programs are interspersed with continuity, or spoken matter relating to the sponsoring company or its product. Like advertising, its purpose is to sell.

Let us consider the sustaining program first.

More than half the broadcasting time is unpaid for by sponsors. True, the number of hours being bought by sponsors is continually growing. But even though there should be demand for all the hours of the broadcasting day, the station would probably reserve for itself some time on the air. In this way it may vary the programs so as to widen the scope of the station's appeal, broadcasting programs of national or international importance, sporting events and the like. As things are at present the station must fill many hours a day with its own programs. Not only must the station fill the time but it must occupy that time in such a manner as to enhance its value to the public and thereby to the sponsor. How is the sustaining program made?

Programs for Sale

The large chains such as the National Broadcasting Company and Columbia Broadcasting System have syndicated programs, much in the manner of the syndicated articles released by newspapers. A number of such programs are prepared by NBC. One example is the many farm features. The National Broadcasting Company confers with the Department of Agriculture in Washington. The department would like to have its information disseminated among the people. NBC wants a program that would be of interest to its listeners. They make a bargain. The Department of Agriculture will supply the farm programs in the form of talks on various subjects. Perhaps they will also supply the agricultural authorities to deliver the speeches. On the other hand, NBC may use its own announcers for the presentation. NBC will furnish the broadcasting facilities. No money changes hands. It is an even trade—the broadcasting facilities in exchange for the programs. Then NBC informs the many stations throughout the country affiliated with it that at a certain hour three times a week, as the case may be, a farm program prepared by the Department of Agriculture will be given from one of the key stations, WEAJ or WJZ. Those stations which desire to accept such a program may do so. A subscription by any station for the whole series of farm programs for a year will cost so much, a very nominal sum. Please notify NBC if you wish to hook up. Some stations may have sponsored programs for that hour. They will decline. Others, with the time open, may decide that such a program will please their listeners, most of whom are farmers. Such a subscription is cheaper than the preparation of a program of their own. No trouble or time involved. They subscribe. Other stations feel that their publics would not be interested, and they too decline. NBC gets the replies, also the checks to cover expenses of connecting up those stations which subscribe. At the appointed time the stations are connected and the program given. The subscribing stations do nothing more than plug in to the network at the correct time and they are connected to the program. No auditions, rehearsals, salaries. Very simple. This is the syndicated program. It may have been pre-

pared by the Department of Agriculture or by NBC. Perhaps they go over it together.

Radio Boilerplate

Other syndicated programs of a purely entertainment feature may be prepared by NBC at its own expense. The NBC staff may arrange the music, hire the musicians, rehearse them, pay their salaries, and again get subscriptions from affiliated stations. In any case the station may take or leave the syndicated program. NBC does not require the station to subscribe. Other sustaining features may be in the form of events of public interest. In the case of a big sporting event, the World's Series, or a boxing bout, NBC first gets permission from the baseball or boxing management to broadcast the event. Sometimes the management gives such permission free of charge, glad of the publicity accruing to the management from broadcasting the event. At other times the management feels that the broadcasting company benefits more than the management by having permission to broadcast so important an event. In this instance the broadcasting company pays for permission to broadcast. It installs the microphones, wire connections to the station, and other facilities. Perhaps it uses the program as a sustaining feature for itself alone. Perhaps it asks other stations to subscribe to a "hook-up." Again the stations must decide. They may have a sponsored program on at that hour. On the other hand, the sustaining feature may be of such importance, as in the case of presidential election returns, that the station feels that more good would result if it gave its listeners the sustaining feature rather than the sponsored, even if the station lost money by so doing. The station asks the sponsor if he will be so kind as to give up his time for the sustaining feature. The station will refund his money for rental of the time. The sponsor may agree, often does, feeling that such a gesture of self-sacrifice will create more good will than the program. The sustaining feature is of such importance that nobody would listen to the sponsored program anyway. So the station refunds the money to the sponsor and takes the sustaining feature. The announcer tells the audi-

ence that the ABC Company has been kind enough to relinquish its time on the air so that the station may broadcast the sustaining feature. The sponsor does not lose, and the station gains the favor of the audience.

The Audition

Finally, there is the sustaining program prepared and presented by the station itself. Singers, actors, musicians, lecturers call at the station daily. They receive auditions. These auditions are miniature replicas of an actual broadcast. The performer does not work directly before his judges. He performs into a microphone. In the case of singers, the aspirant may sing songs of his own choosing. The station also has a number of songs from which to choose. An actor may do a part he has already created. Again, the station has a number of dialogues from which the actor can choose one best suited to his talents. So too with the musician.

In any case the performance is before the microphone, in a sound-proof studio. The judges are in an adjoining or more distant room, sometimes the mixing room adjacent to the studio. They may look into the studio through a glass in the wall. The mixer at the panel controls the sound as it comes to him through the microphone, perfecting it so far as he can electrically. The judges hear it through a loud speaker, the same as would a radio audience. One or two selections and the man in charge, perhaps the program director of the station, comes forth. He tells the performer that maybe the station can use him. The aspirant, taking up his hat, cane, and gloves, departs. If he is young, inexperienced and optimistic, he waits impatiently for a call from the station, or returns repeatedly for a verdict. Otherwise he goes about his business knowing that the station will notify him when it needs him. Hundreds, thousands, troop into the larger stations every month. Their names, addresses, and telephone numbers are placed on cards, along with their work—"Actor—female, straight, character, dialect, leads, juveniles, etc." Or "Singer—male, crooning tenor." Each one is given an appointment for an

audition. After the audition the card is marked VG, G or NG—very good, good, or no good. These cards are filed.

Casting

The station wants to get up a sustaining program. Back of the program director's mind, or sometimes in the very forefront, is the idea that he will evolve a wonderful program, put it on as sustaining, and in a few months some prospective sponsor, realizing its merit, will buy the program as a sponsored feature. Thus the station will gain a sponsor and sell a program. He decides on a musical or dramatic program, or perhaps a combination of both. The musical director and continuity writer, as the dramatic writer is called, labor and finally come forth with the script. The program director looks over the file of possible artists. Supposedly he picks those whose cards show them to be best suited to the program. Perhaps he consciously goes outside for talent. They get together, argue over time and salary. The performers make a good or bad bargain as the case may be, and sign on the dotted line. The program is fifteen minutes, once a week, planned to run for 52 weeks. The performers' contracts stipulate the number of rehearsals. Usually there are two rehearsals and one performance, for which the performer receives from \$25 up, but usually \$25.

At each weekly performance the performers are given the parts for the next week's performance. Then come two rehearsals and the presentation. For actors used to the problems of the legitimate stage, a radio program is something of a joke. No lines to memorize. The lines are read from the script at the performance. How easy it looks—at first. But for many of them it really becomes a difficult proceeding. They are accustomed to consider the holding of a script in their hands as a rehearsal. When the script is no longer in their hands, it is a "performance." They are used to performing before an audience, which is alive, and partakes of the program, but not before a cold, silent, and unresponsive microphone. They are dependent on laughs to "get across" their humorous lines. But the "mike" does not laugh. A cold shiver goes down their collective spines. They feel that

their lines did not "go over." And yet the many listeners at the loud-speakers may be laughing themselves sick. How is the actor to know? How is he to time his laughs? It is all very disconcerting.

In the sustaining programs, prepared and paid for by the network, the same procedure takes place, except that the checks are signed not by the station but by the broadcasting company. However, since they may be cashed, the performer does not particularly care. In large centers such as New York the actors are drafted from the legitimate, musical, and vaudeville stages. They supplement their regular work with broadcasting. Other actors, well known over the radio, limit themselves to the air. The same holds for musicians. Many sustaining programs originate in hotels. The network wants to broadcast a well known orchestra playing at a hotel. The hotel is not averse to the publicity accruing from such broadcasting. A "mike" and wire are placed in the hotel. The announcer remarks that the next presentation, a feature of the network, will be so-and-so's orchestra playing from the grill room of the such-and-such hotel in New York. The station or stations get an excellent program; the hotel luxuriates in good publicity.

"Let's Be Showfolk"

Sponsored programs are more complicated. A large national advertiser raises the pay of one of its up-and-coming executives. He buys a new radio set. He listens to the programs, and becomes enthusiastic over the quality of some of the sponsored programs he hears. Perhaps one of them is put on by a competitor of his firm. At any rate he decides that his firm ought to go on the air. The next morning at the office he tells the executive in the next cubby hole. They discuss it at lunch. For the next couple of months the major executives of the concern spend much of their so-called working day imagining themselves as broadcasters. They speak of profits to be derived. But at the back of their minds is the bewitching thought that they are showmen. A peculiar back-stage romance attaches to broadcasting. In thinking of advertising they are hard-boiled business men. But

when it comes to this radio business, it gets into their blood. Finally they decide to "do something about it." They go to their advertising agency. Perhaps the agency has no radio department, and with an eye on its 15% commission, advocates only space advertising. Perhaps the advertising agency has no radio department, and yet suggests a sponsored program prepared by the broadcasting company. Perhaps the agency has such a department and advocates broadcasting to be prepared by itself. The company decides to go on the air.

"Gosh, It's Work!"

But the company is a merchandising concern, not an entertainer. Its officials don't know how to go about entertaining the public. Three roads are open to them. They may have their programs prepared by their advertising agency, by an independent radio program concern, or by the broadcasting station or chain. Supposing their agency has no radio department: they go to one or both of the two large broadcasting systems. There they are handed rate cards indicating the costs of time on various stations and networks belonging to the systems in question. Maps of the United States hang on the walls with colored pins indicating the stations belonging to various broadcasters. The representatives of the firm get literature as to the coverage of the various stations, or how many people listen in. If the advertiser is a small concern, he goes to his local station and gets a card for the one station and its coverage. Then things become complicated.

The executive thought all he would have to do was order a program and that was all. There are so many things to consider. Broadcasting is so expensive. If a slip is made in the program, it cannot be brought back from the loud-speakers. Whom does the concern want to address—the farmer, the city dweller, New England, the South, the entire country? Women, men, children, laborers, business men? Does he want their attention as they sit at dinner? When do they sit at dinner? What time do people dine in Boston? New Orleans? On the farm? Or after dinner? Or the woman in the morning? Prices vary for different times of the day. The evening hours are most expensive. But there is

three hours' time difference between New York time and San Francisco. The executive begins to grow dizzy. They lay him on a couch. In his delirium he repeats over and over, "This program is coming to you through WJZ and affiliated stations of the National Broadcasting Company." That decides the issue. When he is revived, the executive is informed that his company is to broadcast over the Blue network. The executive by now is too weak to refuse. He looks at the calendar. Tomorrow is Columbus Day. Should not they broadcast over the Columbia system? However, too late now, the company is already signed. "All right. What difference does it make?" he groans.

When the doctor thinks he is sufficiently recovered to stand the news, the executive is told that some broadcasting matters have still to be arranged. The program for instance. "Pork or ham?" he asks, still in a fog. "I don't want anything to eat." He turns his head to the wall and whispers: "Go away." This executive is then sent South for a suitable vacation and much-needed recuperation.

Many Cooks

In the meantime the network program department confers with the sponsor and his advertising agency. Would the firm like to take over the sponsorship of a program, already on the air as the network's sustaining feature? It has already acquired a goodly public. No? Very well, then, a program must be prepared. Perhaps one of the executives has ideas as to what should be the nature of the program—fortunately or unfortunately, depending upon the executive's knowledge and appreciation of public tastes. Too many broadcast programs, like advertisements, are prepared to please a given executive who okays the bill, rather than with a view to pleasing the public.

The program manager picks cards from files and asks actors and musicians and singers to appear. A musical director is assigned to the program. He prepares the music, popular or classic. He makes special scores. A writer writes the continuity. They gather a cast. It is rehearsed. The program is assigned to a production manager. He takes charge of the mechanical end,

gets the stations in line, the connections properly scheduled. An announcer is assigned to the program. More rehearsals. The program director tells the sponsor that everything is perfect. The sponsor hopes it's true. It sounds well, anyhow.

He is then told that the music does three things. He never knew that. It reflects the character, personality, mood, atmosphere, tempo, and quality of the sponsor. The sponsor smiles. That flatters his ego. It also portrays his product. Fine. And thirdly, it caters to the musical tastes of the audience he wishes to reach. Great! As to the continuity, that also portrays the sponsor and product, at the same time linking up the sponsor and the program. This may have been done in several ways. Perhaps the characters or singers or orchestra are given names indicative of the programs, such as Olive Palmer and Paul Oliver in the Palmolive Hour, or the Seiberling Singers.

In preparing the program the station may use its salaried talent in the way of musicians, directors and the like. Often they call in outside talent. For instance, Gustave Haenschen and Frank Black, two of the foremost radio musical impresarios, have been called in by NBC to score or direct programs.

Ghosts

Sometimes the advertising agency prepares a program. In this case, some writer in the agency looks over the advertising copy that the sponsor is using, and fashions the continuity accordingly. Often programs prepared by advertising agencies are characterized by the advertising copy angle of the continuity. Sometimes a sponsor thinks that his advertising agency is preparing his program, whereas in reality the agency has given the program over to some firm that specializes in the preparation of broadcast programs. In the eyes of the public the real preparers of radio programs are ghost concerns, staying in the background. The public is supposed to think that the sponsor originated the program himself. This is almost never the case. It is done by the station, the agency, or a radio program concern. The last named is also a ghost concern from the standpoint of the sponsor. Frequently, such a concern never meets the spon-

sor but always works through the sponsor's advertising agency. For instance, Sound Studios of New York, with which Mr. Haenschen and Mr. Black, before-mentioned, are affiliated, prepares such programs as Palmolive, Wonder Bakers, and many others. But it always works through the sponsor's advertising agency. For the finest programs, the music is specially scored, and often theme songs are composed. Frank Black, in order to obtain for a certain program an unique quality all its own, scientifically experimented with musical instruments. The result was the Singing Violins, which have a quality all their own. They are heard in the Seiberling Program prepared by Mr. Black's organization, which was given the program to prepare by the advertising agency, which receives the credit for the program from the sponsor, the Seiberling Rubber Company, which broadcasts the program through WJZ and affiliated stations of the National Broadcasting Company. Such are the ramifications of a sponsored program.

Opening Night

The great evening arrives. The sponsor is to inaugurate the first of his series of broadcasts. The officials of the company arrive at the station in evening clothes. An air of expectancy is on their faces. They feel that the whole world is waiting for their program. It has been so carefully prepared, every word of the continuity measured and discussed, every musical selection carefully selected, especially scored. The orchestra has been put through its paces, the various items switched around a dozen times. Ponderous and lengthy have been the arguments as to whether it were best to have the violin solo before the duet or after. Monumental decisions have been reached as to the proper announcer. Now at last it is ready to go on the air. Or is it ready? In a few minutes it will begin. The executives expect everyone in the studio to be as highly keyed as they. They are somewhat dismayed to see a few casual young engineers, in whose hands the fate of the program largely lies, walking about, listening with ear-phones, making a few remarks into mouthpieces or through the microphone. One switch for-

gotten, one plug wrongly pulled, and half a million people will miss the program. Still, the engineers seem unaware of the importance of the occasion. The executives feel like going up to the young man and saying, "Listen here, don't you realize that this is a \$4,000 program you are handling? Be careful. Be sure everything is right." But they don't dare. The musicians assemble. They too seem to be callous to the occasion. Then the director. The announcer is at his post. The second hand on the clock in the studio gallops around the face of the clock, past I, II, III o'clock, quarter way around, down past IV, V and to the half way mark. The director calls for attention. The second hand starts uphill on the other side, VII, VIII and IX o'clock. The director holds his baton aloft. The hearts of the executives stop. Their eyes bulge. They cease breathing. A little light flashes on the panel in front of the announcer's microphone. He flips a switch, down comes the baton, and the orchestra sends the program flying on its way with the opening chord.

The program goes very quickly. Half way through, one of the executives has a funny feeling. Supposing the network is not linked up for some reason. Supposing nobody outside the studio hears it. He becomes momentarily pale. He perspires freely. But he cannot confess his fears. Silence is golden in the studio. Before he knows it the program is over. He confides his fear to the program director, who laughs. The executives relax. The young engineer in the booth yells, "Take it away" and another program goes out from another studio. The musicians depart, the director shakes hands with the sponsor, who congratulates him—then he too leaves. The engineers leave. A porter comes in and arranges the chairs, places the microphones for a later program, and the executives feel that they are not wanted about. One of them remarks, "You don't get much for \$4,000. Now that it's over, what have you got to show for it?"

But the next day letters begin to roll into the office of the sponsor—letters by the thousands, telegrams, telephone messages, and such. This fan mail increases as the programs continue week after week, and acquire a definite public, a place in the radio scheme of things. The executives take their firm's

programs more casually, until they no longer bother to listen to them any more.

As to that unfortunate executive whom we left on his way South to recuperate, he is rapidly recovering. His doctor tells us that listening to his company's weekly broadcasts helps a lot.

"Spot" Broadcasts

The answer to that executive's question—"What have you left to show for your \$4,000 after the program has floated out into thin air?"—is exactly nothing—tangible. But sales show the result. However, of late more and more sponsors have been asking themselves the same question. Not that they are dissatisfied with their network programs. They would not give up their network program for anything—well, almost anything. But it does seem a pity that these beautiful programs, prepared and rehearsed at such expense in time, money and talent, should be discarded after but one performance. For which reason, some people have become interested in the possibility of the broadcasting station to broadcast recorded programs.

In this process it is planned, after the original network performance, to record the presentation either on small, 78 revolutions-per-minute discs, or large 16-inch discs which revolve at the slower rate of $33 \frac{1}{3}$ revolutions per minute and play for 14 minutes approximately. One of the arguments advanced in favor of the broadcasting of these recorded programs is along the following lines. Suppose, for instance, that an advertiser finds that his product is selling well throughout the area served by the national network through which his original programs are broadcast. Suppose, however, that sales are low in certain rather sparsely populated portions of the country which, according to this theory, are not reached by the network or are not reached as frequently as the advertising sponsor desires. Under such conditions, the sponsor chooses the stations he wants in these special sections of the country and buys time from them.

However, he naturally finds that talent is scarce in such station studios. He therefore argues that it would be expensive to have the original programs prepared again by each of these stations,

and besides he could not hope to have the same fine quality as his network program. He would therefore instead send out a recording of his original program to the outlying stations, and they would play it for him at an assigned time. Of course, they must announce that the presentation is a recording. They are supposed to return the record after it has been played once so that it may be destroyed. It is claimed that the recording devices and the reproducing equipment at the radio station have been so much improved recently that the reproduction of the record is faithful and not easy of detection as such on many receivers. Aside from the announcement that the program is recorded, some of the audience would never know that such was the case. And, it is claimed, the program is superior to that which might originate at the station studio. The subject of recorded program transmission is not so simple as here indicated, and we shall have more to say about such programs in a later chapter of this book.

Talk vs. Music

We have taken as instances musical programs, since they are the most prominent at present. But there is a decided swing in the direction of the dramatic program. Since music has been easier to utilize for radio, it has been more popular. The early attempts at dramatic radio writing were quite frightful to behold. Writers for the theatre and the vaudeville stage depended on visual stage business to accentuate the meaning of their lines. The positions of actors, their movements, facial expressions, gestures, settings, dress, and voices were taken into consideration in writing words for them to speak. Such dialogue was badly underwritten for the radio. Since the characters could not be seen, their personalities had to be portrayed wholly by the voice. This resulted in standardized, flat, type parts, using a thick unmistakable dialect. The country hick with his nasal twang, the gruff old type, the saccharine juvenile, the little girl heroine—they were neither subtle nor true to life. Radio people were not characters: they were caricatures. Moreover, in sponsored



THE MACHINERY OF ILLUSION: A SOUND EFFECT EXPERT

This sound effects expert has carried on thousands of experiments to gain the right effects. At the extreme left is the wind machine. The thunder sheet hangs against the back wall. Beating the cushion at the extreme right with one of the wooden sticks fires the shot heard round the world. Literally.



VERSATILITY PLUS: NO, HE CANNOT PLAY THEM ALL AT ONCE

A few of the twenty-seven different instruments played by Ross Gorman in various broadcasts.

programs, the plot revolved, and still does, around the product. The product plays too important a part in the play.

These traits are merely exaggerations, used by radio dramatic writers in lieu of skill. With practise and the learning of ways and means to gain desired effects, these obvious methods are being quickly discarded. The time will soon come when both radio writers and radio actors will have mastered radio technique and evolved methods of performing in such way that subtle characterization, theme, humor and other dramatic effects may be easily gained without slapping the public in the face or resorting to the obvious. More and more sponsors are looking for dramatic programs. Music has been so developed as to offer keener competition for listeners. Moreover, there is less continuity from one program to the next. And it is more difficult to link the name of the sponsor to a musical than to a dramatic program. The dramatic program may have fewer listeners, but those listeners are more loyal, and come back every program so as not to miss any of the closely connected series. The dramatic program has the more steady following. And in many respects it is cheaper to produce. When dramatic programs are developed to as high a degree of perfection as are the musical ones, radio will be a perfectly balanced diet for the entertainment-hungry public. Comedies, written along the lines of the serial comic strip of the newspapers, are showing marked radio value.

And now remember, having read this, you need not be over-critical when next listening to your favorite hour. Don't view the program objectively. All this complicated machinery has but one purpose: to give illusion to the listener. Help it to do so. When you tune in on a program through the air, tacitly forget that you know how that program has come into being. For a few hours, give yourself fully into the hands of those at the other end of the air, who will try so hard to lead you into far-away fields of happiness.

CHAPTER IX

THE ANNOUNCER AND HIS RÔLE

DO you remember the "rustic" comedian of bygone years? He is fast losing his place in the limelight of laughs. The reason is that true comedy concerns things with which the audience is familiar. And rustics have just about disappeared from the American scene.

"The Glass of Fashion—"

In the old days the well-dressed person was considered a dude by those who did not possess his accoutrement. A dude was a person who could not stand on his own feet as a man but had to hide behind fancy clothes. The real man did not have to "put on airs." And besides, wearing fine clothes set a man apart from his fellow creatures who were "just as good," and that smacked of aristocracy, that much hated word in so-called democratic America. It was not until the clothiers of the country banded together to teach America how to dress well that the idea of the dude went by the boards. It was a long and difficult process. Its final accomplishment came about as a result of linking dress with success. Taking a phrase from that well-known playwright of a few years back, William Shakespeare—"for the apparel oft proclaims the man"—the clothiers flaunted before the public the idea that success is portrayed in clothes; that clothes make the neighbors and business acquaintances think you are successful; that being well clothed gives one the feel of, *i.e.*, the ability to be, a success. It was only when "well clothed" became synonymous with "successful" that the dude became the rule and America became a well-dressed nation. The movies have also helped to an enormous degree.

“—and the Mould of Form”

Next, an enterprising publisher investigated the common social feelings. He found that dress, though it affected the surface and even the psychology of society, could not take the place of manners and knowledge of etiquette. By picture and print he contrasted the well-bred person with the vulgarian. “She Spoke to the Man on Her Left” was the caption of a picture showing a beautiful girl at the dinner table conversing with a well-bred man on her left, completely turning her back on the subject to her right, whose napkin was tucked under his collar, who was drinking his coffee from a cup with a spoon in it, and holding the cup around its middle with his left hand while he picked his teeth with his right! There followed chapters as to the proper behavior at banquets, carefully subdivided into formal, informal, stag, dinners, wakes, as host, as guest, *ad infinitum*. How to greet a friend (male and female), acquaintance (ditto), enemy. What to do if you have to sneeze as you are about to say, “I do” at your (or anybody’s) wedding. Books of etiquette flourished, thrived on the fear of social ostracism. Along with them came books on how to write letters, the proper phrasing of thoughts to father, mother, sister, aunt, of condolence, congratulations, an invitation to week-end, acceptance, regrets, sweetheart letters. Other kindred books showed the young business man holding the board of directors spellbound by his oratory and brilliant ideas. Or conversely, showing the big man of whom miracles are expected, in a state of dismal collapse on getting up to talk, only to find that his mind will not function, neither will his voice, while his legs no longer support his corpulence and his “heart beats a tattoo on his ribs.” Still another variation of the same general theme showed the otherwise perfectly eligible young man rapidly losing credit with the beautiful girl because he thought that Perruchini was an Italian city and Adam Bede a popular novelist. The text gives hints and stray wisps of thoughts on art, literature, science, travel, and other subjects spoken of in polite society; no real knowledge, to be sure, but just the surface smattering with which one may, un-

less he goes too far, fool an admiring audience into considering him a well travelled, well read, well versed, cultured cosmopolite.

“—*Trippingly on the Tongue*”

Having made the American citizen into a well dressed, well mannered, well read, successful, cultured man of the world, those who cater to the social instincts of the *genus homo* sought to mould his voice. Surely all the other accomplishments were as nothing to a man with a rasping, nasal voice, using incorrect grammar, ill-pronounced and indistinctly spoken. To make America speak distinctly and enunciate clearly became the goal of the social welders. Diction was the order of the day. Voice culturists set up studios. Afternoon sessions devoted to play reading, *trying to imitate* the way they *thought* Julia Marlowe *ought* to recite “The quality of mercy is not strained.”

Filler-in

It was about this time that radio took to the air. The programs consisted of entertainment, music. Meet the artist, the musician. He makes this station popular. Who is that man over there, did you ask? Oh, I don't know his name; he is just the announcer. You see, the musician can't play all the time. And his numbers must be announced, as well as the call letters of the station. The announcer does that, and fills in time. And so the announcer of the early days was looked down upon by the station management in many instances. In compliance with radio regulations, he announced the call letters of the station, the wave length on which it operated, and the feature about to be presented. He was the super, the filler-in.

The Powers of Darkness

As radio audiences grew it became apparent that the announcer could do much to ruin a program. No one yet thought of the fact that he could aid it. But he could most certainly spoil it. Suppose that he mispronounced a distinguished name.

Or, filling in while the artist was tuning his instrument, he should try to converse on the subject of the program. He might refer to "that other great violinist, Paderewski." Or speak of "Puccini's opera, 'Babes in the Woods.'" The announcer could most certainly ruin a program, and make necessary apologies in the morning's newspapers. It became necessary to employ announcers who knew a variety of subjects, could speak easily of music, art, jazz, baseball, the theatre, politics, the morning's news. Furthermore, he must be able to pronounce French, German, Italian and Spanish names, and even a few Norwegian or other Scandinavian syllables.

With great effort the broadcasting stations procured men with varying degrees of ability along these lines. No one line of knowledge was essential: a smattering of all was the happy mean desired. But there was one quality essential to all announcing: a good voice. Men could study up or "cram" on art, music, politics, and sport; but a good voice either *was* or *was not*, and training could only iron out the faults incidental to the voice itself. The lungs, the vocal cords, the shape of the mouth, the machinery of speaking, remained about the same. Wherefore, the authorities began to study the subject—"What is a good radio voice?"

The Judges Sit

On the evening of February 4, 1925, the first definite step in the perfection of the newly born art of radio announcing was made in the organization of the Radio Voice Technique Committee, which was formed at the request of the Radio Corporation of America and New York University "for the purpose of determining what characteristics constitute the perfect radio announcer." The Committee met in the studios of WJZ at 33 West 42nd St., New York City. The group was composed of people representing many widely divergent points of view, and whose collective judgment approximated as nearly as possible that of the average radio listener. Leading figures in the educational, religious, scientific, journalistic, and dramatic worlds served on the committee to consider ways and means of bettering announcing.

Alvin Busse and Robert C. Borden, public speaking instructors in New York University, had recently produced a radio recording device, by means of which the Committee listened to records setting forth the various factors inherent in radio announcing. Rate of delivery, accent variation, average pitch, pitch variation, formality, distinctness, mechanically recurrent falling inflection, arbitrary stress placement, provincialisms, tone qualities—all were illustrated and passed upon by the Committee.

It was not the aim of the Committee to standardize radio announcers to the exclusion of "radio personalities." Rather, it strove to classify those physical and mental characteristics on which the most pleasing types of radio announcing are based, in order to give the impresarios of the air a scientific foundation on which to base their art.

The first subject of study was rate of delivery. It was found that 175 words a minute was the best average. Of course, this number was flexible, church services and solemn announcements requiring a slower pace, along with such announcements as stock quotations and statistics, which require about 125 words and careful enunciation. On the other hand, the report of a prize fight required speeding up. A test of WJZ's announcers showed them to use a 170-word average.

The majority of the Committee favored a change of pitch, slightly stressing the important words. It was pointed out that George Hay, gold cup announcer of the Middle West, had a very even pitch. His popularity was attributed to his voice personality.

It was noticed, moreover, that most announcers varied the rate of their speech very little. It was pointed out that such variation must correspond with the thought rate.

It was found that a fairly deep voice carried better than a high pitched one. The formality test aroused considerable debate because Roxy had recently been asked by WEAf officials to be more dignified. Here again, the subject matter was the criterion. In many cases the chatty or friendly announcements are likely to become comic. But they carry very clearly over long distances because of the many brief stops and variations in speech.

As to dialect, it was found that the Southern drawl was the most pleasing. The down-east accent of Maine was also very char-

acterful. But much as the New Englander might delight in hearing a Southerner from a Southern station, he would not be popular with the Yankees were he to broadcast his provincial accent from a Boston station, in which case his accent would seem out of place.

“—But If You Mouth It”

Other conclusions arrived at by the Committee were that mechanically recurrent falling inflections were preferable to rising ones, but both were objectionable. The incorrect breathing of some announcers causes a painful panting when amplified over the radio. Arbitrary stress placement tends to misinterpretation of the announcement, and vowel elongation is very bad. Provincialisms were found to be all right in the proper place, but aside from those of the South, the effect is not very pleasing. Foreign dialect is entirely out of place. Nasal and harsh tone quality is amplified to a distasteful degree, and neurotic mannerisms and lapses are particularly distressing.

Of the various factors considered, their order of importance is rate of delivery, stress variation, distinctness, average pitch, pitch variation, change of pace, and formality. The most important element in a good announcer the Committee could not give him, namely, personality. And, like any artist, the most popular announcer was as likely as not to be one who had a peculiarly attractive “radio personality” and broke most of the rules laid down by the Committee.

The Sexes Compete

As radio came to be conducted on a more sound business basis, and the various studio activities were sifted and organized, men and women alike looked for jobs as announcers in countless droves. Especially did women haunt the studios. The field of activity for women was rapidly spreading. Already they might have been found selling such difficult articles as real estate and bonds. Announcing seemed peculiarly suited to their temperament and ability. The work entailed no physical labor though the hours were sometimes long, and the pleasing voice and gentle manners

associated with women seemed to favor their selection for this work. Many were chosen.

In July, 1926, the Radio Corporation of America canvassed 5,000 listeners of WJZ on the question as to which were preferred, men or women. What a surprise was in store for the RCA and the women! The vote was 100 to 1 in favor of the male of the radio species. The Radio Corporation expected the men to poll the larger number of votes, but not in such proportion. It sounded the death knell of woman in a field that seemed, from superficial observation, to be suited to her characteristics. Having found men to be so much preferred by the listeners, the natural question was why? One of the reasons, about the only one outside the power of women to correct, was that most receiving sets at that time did not reproduce the high notes as well as the low. A man's voice "took" better, and had more volume. Another reason is that announcers cover sports, shows, concerts, operas, public meetings, politics and large conventions. Men were deemed better fitted for the average assignment covered by the announcer. And even if they were not, tradition associates most of these assignments with men rather than women.

The women who answered the questionnaire seemed to prefer to hear a man's voice. It might then be expected that men would prefer the dulcet sounds that issue from the throat of a woman. But such was not the case. A cynic looking over the questionnaire results made the unkind remark that women in general might take the hint and attract men, not by their voices, but by remaining quiet. Fortunate it is, at least, that man's vocal préëminence does not hold for the home.

The peculiar element of the survey was that women singers and entertainers found great favor at that time. Soprano voices came over the air well, and were as welcome to the ears of the radio audience as the voice of the tenor. But not so with the announcer.

Still another reason might have been that women's voices have too much personality. The highly individual and characterful voice does not seem to be appreciated by an audience that cannot see the face and expression that accompany the voice. But probably the greatest fault with the woman announcer was that she had difficulty in repressing her enthusiasm and maintaining the

reserve and dignity of her position as announcer. Radio audiences resent a voice that is too intimate on short acquaintance. The reason for this is probably that the audience is sitting at home, the supposedly private and sacred precincts of which the announcer enters. If he behaves himself as behooves a visitor of slight acquaintance, all is well. But if he bursts into the parlor without ringing the door bell, slaps the host on the back, and in other ways intrudes himself on the intimacy of the family circle, he is not tolerated. The public hall is different. In that case the audience goes to the speaker. But when the speaker comes into the home, he must act accordingly.

The bane of the radio voice is a certain patronizing quality, such as a teacher might use talking to a class of children. Women for some obscure reason have difficulty in avoiding this effect on the listeners. People dislike being talked down to in a condescending manner. In the struggle to avoid this, some women fall into the opposite fault of monotonous, colorless, dead delivery.

He Runs the Show

With the disqualification of women, the burdens of announcing devolved upon the men. Slowly they rose, from being only announcers to a position where they were virtually stage managers. At present they are fully and solely responsible for at least the minor run of program, in much the manner of a stage manager in a theatre. He does not necessarily write the program or rehearse it. But once it is prepared he must see to it that it gets on the air on time, and in perfect shape. On major programs, however, special managers are present.

To many people the running off of a radio program is a complete mystery. How do the announcers switch so quickly from hotel or auditorium back to the studio? How do the stations of a hook-up know exactly the second to cut in on the key station or to give their station announcements? Let us follow the broadcasting of a typical program.

Wheels Within Wheels

When the special circuits which will carry the program to the stations in the network have been tested and the studio is ready to go on the air, the announcer takes charge of the control box in the studio. Buttons mounted on the front panel of this box control various combinations of stations, and by pushing the proper buttons the announcer connects the studio with the proper special circuits to transmit the music and speech to the broadcasters who have signified their intention of broadcasting the event.

In an adjoining studio radio performers are finishing another program, which may have a different audience from the one that is about to go on the air, broadcast through a different combination of stations.

The announcer beckons the artists to stand by, ready to proceed. He stands, watch in hand, close by the control box. The hour arrives, a light flashes on the panel of the box, indicating that the program in the adjoining studio is finished and that this studio is on the air. The announcer throws a switch and speaks into his microphone to the listeners of the network stations. He remarks that the National Broadcasting Company and associated stations are about to broadcast a program from New York.

In the studio of every network station connected with NBC an announcer wearing headphones is listening to the words from New York. The announcer at 711 Fifth Avenue completes his introduction and throws another switch, releasing the out-of-town stations, and without perceptible pause the various announcers in different parts of the country speak into their own microphones, giving their own call letters.

Fifteen seconds later the NBC announcer has finished his local announcement. He throws his switch again, once more linking up the network. If the out-of-town announcers have not finished their remarks their words may be lost. Time is the all-important element, and chain broadcasting must go forward on schedule. The announcer in New York opens the program, introducing the performers and stating the first number to be heard. He throws another switch, cutting out his microphone and throw-

ing in the performers' microphone, either in the studio or the hotel, auditorium or other remote points from which the program originates. The program is on the air. It is being heard by local listeners and in addition special circuits are carrying it to the transmitters of other stations, which are broadcasting it simultaneously.

Every fifteen minutes during the course of the program the same general routine as that which opened the program allows each of the out-of-town announcers to state the call letters of his station to his listeners, while the WEAJ announcer is giving his audience similar information. Between selections the WEAJ announcer talks to the combined audience of the network. The program has been carefully timed in rehearsal to fill the allotted time. No time is allowed for applause or other interruptions from the audience and no encores are allowed. Moreover, the last five minutes of the program are planned to allow considerable flexibility. Seconds of delay may pile up during the course of the hour so that the sum will amount to minutes, and a minute's leeway in a network broadcasting schedule is a serious matter.

In the meantime another studio is being set up for the program which is to follow, and perhaps a dress rehearsal of still a third program is in progress in another studio. Program features must march before the microphone on time. The audience cannot be kept waiting, and the announcer who is handling the feature on the air must make sure that his program finishes on the dot.

As the end of his period approaches the announcer watches the typewritten detailed program closely. He consults his watch every few seconds to determine the best manner to finish on time. If the program is ahead of schedule a short encore number will fill out the hour. Such selections are always rehearsed but seldom needed. When a program fails to run exactly on schedule it is usually slow rather than fast. The announcer informs the conductor how much time is left, and the elimination of one or two repeat passages enables the feature to finish on time.

The music stops. The announcer throws a switch and informs the combined audience of the network stations of the completion of the program. "Please stand by" he finishes (or else sounds a chime), and another switch is thrown. In an adjoining studio a

light flashes on the panel box. The new announcer opens his microphone and greets a new audience.

It is much the same story with that other great network, CBS, which is similarly known for clockwork precision.

The Performance Must Go On

All of which seems to indicate that the announcer has great responsibilities. He must meet all sorts of emergencies, such as failure of artists to appear, the snapping of a violin string, a sudden crippling of the wires due to some storm in an area hundreds of miles away. He must meet these emergencies spontaneously, as they arise, and in a manner so smooth that the audience is hardly aware that any unforeseen accident has occurred. That the announcer meets the mechanical requirements of his job is more than evident to the listener-in on any network program. His ingenuity manifests itself in the absence of any breakdown in the modern broadcast program, to a large degree, although more and more in present-day operation the announcer's responsibility is decidedly on the wane. The production man and control operator take care of most of the responsibility. Indeed the time may come when the announcer will have little more to do than read his lines at the right moments, while every other detail of the program will be handled by others.

But the announcer's is one of the few jobs that requires the precision of the scientist with the qualifications of the artist. And the latter qualifications the modern announcer sometimes woefully lacks. True, he has been voted better than women. But that refers to "radio voice" quality and certainly does not always make him good.

"I Had as Lief the Town-Crier Had Spoke"

In the early days announcing ran towards spontaneity. Announcers spoke like the man in the street. Then came the period of artificiality, the forced laugh, the heart-rending care with which each syllable was uttered. This period is now fading out in favor of artistic imitation of spontaneity. By that we mean well man-

nered spontaneity, not vulgar and not artificially stiff. And above all, suited always to the occasion. This is the new goal, and a fine ideal indeed. The trouble is that some announcers are neither artistic nor imitators. Their idea of artistry is to speak clearly, slowly, and flatly. Their announcements are all written out beforehand. The announcer reads his announcement, and 999 times in a thousand this fact is all too evident. The listener can not only see him reading the announcement, but can also see the underlined words which the announcer is to stress.

Moreover, the average announcer's idea of good English is neither English nor American. In spite of his broad A and hissing S, the mispronounced U and the swallowed ending give him away as a synthetic speaker. His voice is pretty but it lacks character. As a thing apart he views it and rolls it lovingly on his tongue, forgetting that in itself its beauty is negligible. The value of the voice is in its ability to portray character, emotion, mood, atmosphere. The announcer should at least simulate belief in what he is saying. Those who try sound too often like ham actors, overplaying their parts. The announcer should, if he cannot read the announcement as though it came from his own mind, memorize it. He should speak with more conviction, varying his voice to suit the announcement, changing his tempo, and more important since less the rule, he should vary his pitch. It is difficult to illustrate these points in print, and, we presume, still more difficult to find announcers with perfect qualifications. But they can be and slowly are being found.

"To Hold the Mirror Up to Nature"

Announcing such things as sporting events and political conventions is still another thing. This branch of the work has progressed by leaps and bounds. Such favorites as Major White, Graham MacNamee, Milton J. Cross, and Phillips Carlin, attract almost as much attention as the events they cover. In this phase of announcing the announcer has found the needed path of spontaneity which, nevertheless, in no way impairs his power of analysis. He does not lose himself in meaningless Ahs and Ohs. Still, he uses some of the more polite slang of the occasion. And with the ex-

citement of the moment manifested in his voice, he maintains his judgment sufficiently to explain the play, the blow, the vote, or whatever the action might be. So real and exciting has been the announcing of sporting events, for instance, that people have been known to die in their living rooms of heart failure, caused by the excitement stimulated by the announcer. Studio announcing has still to reach those heights. It is under greater handicaps because of the nature of the subject matter, and therefore requires intensive development.

Radio personalities are few, but those who have come to the fore have exceptional qualities. Not only do they inject themselves into the program through the color and character of their voices, but they give life and meaning to the entire presentation.

Yours Is the Power

Realizing the great influence of the announcer on the diction of the country, a prize is awarded to that announcer whose diction is voted the best by a jury of scholars, literary figures, the foremost actors, and exponents of the art of speech. Last year this medal was awarded to Milton J. Cross of the National Broadcasting Company's Staff. The award is in high repute and fosters the highest ideals of the announcing art. That the announcer's influence is great needs no argument. The sectional dialects are rapidly disappearing, so much so that two years ago a well-known writer went to Charleston to pick up and preserve in printed form the Gullah dialect which was fast dying out. The same is true of the speech of the Tennessee and Kentucky mountaineers, while the Mid-Western rabbit R, the "down east" nasal tone, the South-west twang and the Southern drawl, as well as the "New Yorkese" are losing their strong individualities and are merging into a common American tongue. What this will be like nobody knows. Schools have for years tried to make it the King's English. They have failed, due to the fact that correct speaking has never been the style. Some elocution teachers have tended to the continental syllabic style. This too has not been successful.

But America is standardizing her speech. Which is a good thing, for, aside from the Southern drawl, the other dialects are not

particularly pleasant on the ear. That the new language will be an improvement is certain. That it will be the best possible is at best only probable, depending to a large extent on the speech of the radio announcers who have such power in their voices. That there will be a change is sure, for the announcer is already bringing the change about. And the change will accelerate as correct speaking becomes "the thing to do." Good diction and pronunciation are being accepted. People will no longer make fun of the correctly spoken man, calling his speech affected, throwing the word snob in his face. It will be acknowledged as a cultural asset in an age when culture is nothing of which to be ashamed, but rather a prized asset. That this greater culture is coming about merits our thanks in part to the radio announcer. To ensure that it will take the highest form we may well look to the announcer for guidance. And thus there will eventuate one more audible proof that America has come of age.

CHAPTER X

WHO PAYS THE BROADCAST BILL?

ONE is supposed to get that for which he pays. However, many people try to get without giving. They usually fail in their mission. For nothing, nothing is had. Amen.

But broadcasting—that, at least, costs nothing! But just a moment, please! Does it cost nothing? No, it simply cannot cost nothing. Well, who pays? The broadcast sponsors pay. Why do they pay? Because it is worth their while and money. What do they get back for their money? That intangible thing called good will. All right. But the public doesn't pay? Wait a minute! The public pays—necessarily.

Thereby hangs the most important story of the development of broadcasting, or the all-too-brief history of an industry that started out on the something-for-nothing basis, ran counter to all economic laws, and finally evolved a most ingenious economic system which has brought a world of entertainment and enlightenment within reach of every family in the country, while providing American business with the greatest good-will medium of all times.

As It Was in the Beginning

We recall that broadcasting started as an experiment. One does not expect to make money out of experiments; that is, not immediately. Ultimately, perhaps, some reward may be realized, but the immediate urge is the love or interest of the thing itself. And so broadcasters began with just one purpose in mind: to expand their personalities to limitless proportions. They gave vent to their egos, whether aware of the fact or not. The message itself, or the thing they said to their listeners, mattered little at the time. There was sufficient thrill and reward in listening to voices coming through the four walls of the home, irrespective of what those voices might be saying.

Even as recently as November, 1924, when organized broadcasting had been under way for four years, a keen observer noticed that American listeners cared little for the subject matter of their programs. Their musical consciousness had not yet been awakened. Captain P. P. Eckersley, Chief Engineer of the British Broadcasting Company, was attending a radio conference in Washington, D. C. Said Captain Eckersley: "In England, the program is of supreme importance. I understand that American listeners are interested chiefly in distance. It is still a hobby with about 90 per cent of them. In England, only about 10 per cent of the listeners are interested in distance. The majority prefer to tune in local programs."

And so it was. The *means*, rather than the end, was the great attraction. Broadcasting as a *science*, rather than broadcasting as an art, held the center of the stage.

The First of the Month

We have spoken of the costs of broadcasting. Let us itemize the bill, the better to understand whose fault it is that broadcasting costs anything. First, there is the purchase of equipment, which the great electrical companies design and manufacture. Then comes the rental of property and building for offices and home for the equipment, which cannot be housed in a mere hole in the wall. Broadcasting stations must be much larger than agents' offices. Then the apparatus must be installed. The next item is personnel to run the equipment, once it is in—engineers, technicians, program directors, and maintenance experts. The electricity consumed in transmission appears on a monthly bill. Besides the broadcasting studios, a transmitting station must be bought, built and maintained. And finally, the artists who furnish the programs must be induced to appear before the microphone. The more stations, the more competition, the more need for better programs, the more demand for the better artists, the higher their prices. Broadcasting costs plenty of money.

Just to mention one item, the National Broadcasting Company is today the biggest single customer of the telephone company; in fact, it is the largest telephone customer in the world. Originally

it signed up for a minimum of \$800,000 dollars a year. It has never used less service than this sum represents, and today it uses several times that much—over \$3,000,000 annually, to be more exact. And that is just one item, of just one company. Meanwhile, that other broadcasting system, CBS, has a telephone bill of very sizeable proportions.

For the first four years of commercialized broadcasting, costs received scant attention. In the first blush of broadcast fever, the broadcaster did not stop to calculate the cost of installing and operating a radio telephone transmitter. Once the transmitter was on the air, there was endless talent available to bring before the microphone. Even the personnel of many stations could be had at virtually no cost. The announcers were volunteers, only too anxious to spread their personalities far and wide. There are cases sufficient to prove that many smaller broadcasting stations were inaugurated just because some individuals, more blessed with money than brains, craved to prove to an expectant world that they were the greatest radio announcers of all time. The vocalists were volunteers, particularly the early sopranos, who came forth in a never-ending supply. The fact that sopranos today are alleged still to be of somewhat diminished standing, so far as average radio programs are concerned, marks the aftermath of a great plague of mediocre sopranos badly transmitted and worse received. Musical ensembles, anxious to proclaim their musical wares to the world at large, could be had at short notice and without return. It has taken time, and improved modern receivers, to restore singers to the full good graces of the radio audience which they lost in those days.

What to Use for Money

Publicity—that was the rallying cry of the early broadcasters. Men, big and little, were coaxed before the microphone with the promise of *publicity*. Singers, good, bad and indifferent, were coaxed before the microphone with the promise of *publicity*. Musicians, actors, and other entertainers were coaxed before the microphone with the promise of *publicity*. Publicity paid the bill. It was the legal tender of the broadcasting industry.

But after a time, that legal tender was handed in at the window of that great bank of everyday experience to be converted into cash. Publicity was great business, but the holders of publicity promissory notes wanted to cash them. Particularly where a radio performer had built up a large stack of publicity notes, the demand for exchange was most insistent.

Soon the broadcasters found that the publicity promissory notes were no longer regarded as good commercial paper. Broadcast entertainers now began to take the publicity as a matter of course, while demanding real money for their services. Why give their services away? The broadcasters were making money, surely, or they wouldn't stay in business. And look at all the radio sets and accessories and radio tubes that were being sold! Surely there was big money being made in broadcasting. So why not get a slice?

Meanwhile, the thrill of playing announcer or broadcast engineer had cooled off. Announcers wanted to be paid for their time—and there is plenty of time called for in broadcast announcing. Engineers wanted money, too. The electric bill had to be paid. Also the rent. The equipment had to be steadily improved to keep up with the march of progress. Money. Money! Money!! Where was it to come from?

Passing the Buck

Meanwhile, our British cousins across the Big Pond were working out their own salvation with regard to broadcasting. It seems that they watched our broadcasting experiment with a good deal of keen interest. They let us go ahead with our trials and tribulations, for a year or two, and then decided to engage in broadcasting in accordance with their own ideas, assiduously avoiding what they regarded as our mistakes.

Our British cousins knew, as we must know, that something costs something, and for nothing there is nothing. Of an intensely practical turn of mind, perhaps, they decided from the first that the listener-in would have to pay for his radio entertainment, as he did for his motion picture, theatrical, and sports entertainment. The obvious agency in their opinion was the government, working

with a system of licenses for each and every receiving set, and collecting a yearly tax. The money thus raised was turned over to a national organization, in this case the British Broadcasting Corporation, to defray the cost of installation, maintenance, and operation of broadcasting stations, together with the cost of the programs.

The British plan evidently met with the approval of many other countries which subsequently engaged in broadcasting, for they too inaugurated a system of licenses and taxes as a means of paying for broadcasting.

In due course the idea was suggested in America. It might have received a warm reception but it is practically impossible to collect for anything which has hitherto been given away. The American listener-in would not consider a license nor pay for the privilege of listening in. He had bought a radio set. He was buying tubes and batteries right along. What more did the broadcasters expect!

The fact that automobile companies do not provide good roads did not seem to have any weight in this argument; nor again the point that the broadcasters themselves, except in a few instances, had nothing to do with the profits derived from the sale of radio equipment.

Who Shall Pay the Piper?

By 1924, the economic situation had become acute. The shoe was beginning to pinch. Obviously, something had to be done.

David Sarnoff, then General Manager of the Radio Corporation of America, had given much thought to the economic angle of broadcasting. His own company maintained Station WJZ in New York and Station WRC in Washington, D. C. He knew from personal experience the rising cost of broadcasting. WJZ was operating on a budget of over \$100,000 per year, without visible or tangible earnings of any kind. Meanwhile, the Westinghouse Company, operating a group of broadcasting stations, was wondering seriously whether there was a way out. Once amply repaid by publicity for its organization, the competition of many other broadcasting stations had reduced the publicity value to the point where it was considered hardly worth the cost.

It was Mr. Sarnoff who conceived the equitable and far-sighted idea of having the radio manufacturers and merchandisers foot the broadcast bill. After all, he reasoned, why should they not be willing to support the very institution which created their business? Without broadcasting, they would cease to exist. Therefore, broadcasting was their business. Why not pass the bill on to them? His own company had been paying its share of broadcasting expense in return for its sale of radio goods. The tentative plan was for each radio manufacturer and radio merchandiser to assess himself or be assessed a small proportion of his annual profits—something he would hardly feel, yet which, in the aggregate, would meet not only the existing broadcasting costs but provide for better programs of the professional kind.

Logical as the plan was, it did not go through. The radio industry, relatively disorganized, was not ready to maintain broadcasting—the activity on which its very existence depended. So the broadcasters continued to hold the bag.

A Broadcaster Begs

Even the staid and dignified American Telephone & Telegraph Company, through its Station WEAJ in New York City, realized that with the demand for excellent programs the economics of broadcasting had become a paramount issue. During 1924, the audience of WEAJ was appealed to for voluntary contributions, for the purpose of securing the highest type of musical talent. Did a landslide result? Hardly. Shortly after, the WEAJ staff returned every cent contributed. The funds were too small to consider. Obviously, the public was not going to pay for something which it was accustomed to get for nothing.

No More Free Air

Meanwhile, an astonishing new angle was developing. As the number of broadcasting stations had increased to a point where no more could be accommodated on the hard-pressed ether, the telephone company announced that its WEAJ facilities could be hired by any worthy company or individual for broadcasting purposes.

Why not? Toll wires are rented to individuals and firms. A telephone call is nothing more than leasing a wire line for a few minutes. Why not lease a broadcasting station?

The idea was economically sound. Soon organizations began to make use of these facilities. They would otherwise have been forced to the trouble and expense of installing and operating their own broadcast stations. Toll broadcasting came into being. Of course those buying time on the air were permitted to secure the publicity which they would otherwise obtain in operating their own stations. Meanwhile, they did not have to shoulder the entire overhead of a station, let alone the responsibility of filling in many hours of broadcasting each day.

Thus came the pay-as-you-enter era of broadcasting. The broadcasting institution began to collect money at last, and at a manageable box office, namely, the microphone. It was high time, too, for with a vastly increased audience came discrimination. Having outgrown the pristine thrill of novelty, the audience became blasé and insisted at last on genuine entertainment. It was no longer willing to spend its time and money on amateur talent, but came to expect of the broadcasting station the same quality and perfection of entertainment which the stage and screen were wont to furnish.

Sound Follows Sight

The broadcasting and publishing fields, as Merlin H. Aylesworth, President of the National Broadcasting Company, has so aptly brought out in his paper read before the students of the Graduate School of Business Administration, Harvard University, present a parallel altogether too striking to be ignored. Both the director of a broadcasting studio and the publisher of a national magazine are faced with a problem which is basically the same, although its solution is, of course, different. The problem is one which Walter Lippmann has aptly called the "enlistment of interest." In order that he may sell his magazine to as wide a public as possible, the editor must see to it that his editorial content, or text matter, is of high quality and wide appeal. It is on this, and this alone, that his circulation depends. When in this way he has achieved extensive "coverage," he is in a position to sell

space in his publication to such individuals and corporations as have a message which they wish to bring before the public. In other words, he is in a position to sell advertising space.

Now the broadcaster, points out Mr. Aylesworth, is in a similar position. It is only when, through the intrinsic excellence of his programs, he has built up a clientele, or radio audience, that he can sell his "space," which happens to be time, to those who wish to come before the public with a message, a product, or an idea.

Station WEAF, in New York City, establishing at the very outset of its career a reputation for efficiency and artistry in its programs, commanded a far greater audience than that to which any new station could possibly aspire. And now "space" or time on the WEAF programs, which had become a public institution, was being offered to those who had expressed a desire to engage in broadcasting on their own account. Thus the idea of toll broadcasting came into being, marking a definite step forward in the economic solution of the problem. Facilities for broadcast transmission, and more important still, an assured audience, were now made available for those who wished to utilize them.

"—the First by Whom the New Are Tried"

The first commercial feature undertaken by WEAF took the form of a ten-minute talk under the auspices of the Queensborough Corporation, a realty organization interested in the development of Jackson Heights in Long Island City. Sponsors thought that they could get their messages over in the most convincing manner with words—just as in the case of newspaper advertising. Pictures could not be transmitted. Only words remained. It soon became painfully apparent, however, that these talks, unless they were on subjects of absorbing interest, were poor broadcast material. Accordingly, good music, sponsored by the organization seeking good will and recognition, came into vogue as part of the *modus operandi* of toll broadcasting.

Among the first advertisers to recognize this salient fact was Browning, King & Company, a well-known clothing house of New York City. It introduced the sponsored musical program, and listeners soon grew accustomed to hearing their announcer say:

"You will now have an hour of dance music by the Browning, King Orchestra, coming to you through the courtesy of Browning, King & Company of New York City." The Lucky Strike Orchestra, sponsored by the makers of Lucky Strike cigarettes, was another pioneer in this type of program designed to establish good will and featuring the ultra-conservative "courtesy" announcement which alone was permitted by the stringent broadcast policy of the telephone company.

Hitching Up the Network

All this early toll broadcasting was handled exclusively through Station WEAF. It soon became apparent, however, that the nation-wide organizations which had taken up this new medium for catching the public ear were desirous of reaching not only listeners within range of the New York City station, but those in other metropolitan areas as well. It was natural that the American Telephone & Telegraph Company, equipped as it was with the requisite telephone line facilities for linking scattered stations, should introduce network broadcasting when the demands of the advertisers warranted it. This was done in due course, with a two-fold object in view: firstly, to make the program features in New York City, the amusement center of the nation, available to stations in other and less favorably situated communities; and secondly, to secure for the toll broadcasters a greater "coverage" or radio audience.

The network broadcasting system of the American Telephone & Telegraph Company, with WEAF for its key station, enjoyed a remarkable growth. Soon it covered New England; then it reached southward into Philadelphia and Washington, and west through Buffalo, Pittsburgh, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, Davenport, Minneapolis, and Kansas City. This group, at the time the National Broadcasting Company purchased WEAF and assumed the management and operation of the existing network, comprised approximately 3,600 circuit miles of special telephone lines, with Boston, Hartford, Providence, Worcester, Philadelphia, and Washington linked by permanent wire facilities, and with the remainder on a temporary wire basis.

A National Audience

The first feature handled on a national basis was the Victor program on New Year's Night of 1925. So many stations had requested the program that all the permanent and many of the temporary stations were linked together for the occasion.

The American Telephone & Telegraph Company had now proved to its satisfaction that network broadcasting was feasible from a scientific standpoint and decided to retire from the field of radio broadcasting. Appreciating the enormous void and serious threat to the healthy development of the radio art which such a withdrawal of support might mean, the Radio Corporation of America, charged from the beginning with a large measure of the stewardship of the radio industry, purchased Station WEAF and entered into a non-exclusive contract with the telephone company for the leasing of permanent telephone wires for national service. Late in the year 1926, the National Broadcasting Company was organized by the General Electric Company, the Westinghouse Electric & Manufacturing Company, and the Radio Corporation of America, under the sagacious and far-sighted guidance of Owen D. Young. The new company took immediate title to Station WEAF and the leased wire rights, by purchase from the Radio Corporation of America.

Early in 1927, the National Broadcasting Company assumed the management and operation of Station WJZ in New York City and Station WRC in Washington, both owned by the Radio Corporation of America, together with a considerable network which had been built up by that organization in collaboration with its associates, the General Electric and the Westinghouse companies. With WJZ as the key station, this group became known as the Blue Network, offering an alternative program in virtually the same territory as the Red Network. Still later came the complete development of the Red and Blue Networks, as well as supplementary networks available for use with either. This was followed by the formation of the Pacific Coast Network, with seven leading stations receiving service from San Francisco. In this manner, the National Broadcasting Company outgrew its

early sectional limitations and became a national organization in the full sense of the term.

One of the first problems recognized by the young organization was the crying need for a more definite and specific broadcast appeal. The National Broadcasting Company was established with the two-fold purpose of sustaining interest in broadcasting and of insuring the permanence of the infant radio industry. It was keenly alive to its responsibilities to the American public, which had invested millions in radio equipment, believing broadcasting to be a permanent institution. It had to evolve an industry out of the nascent broadcasting art, which in many respects was still an experiment. The economic phase of broadcasting continued to be a prime consideration.

Time Is Money

The sponsored program has helped to solve the economic problem of broadcasting. It has developed broadcasting from an experiment to a legitimate and artistic branch of advertising and publicity, the manifold possibilities of which are capable of great development. Buying a copy of a magazine of national reputation brings to the buyer, at a ridiculously low cost, the writings of the leading authors and the illustrations of the leading artists. The reason for it all is the generous support of the national advertiser. Likewise with present-day broadcasting: the public in return for its relatively small investment in a radio set receives entertainment of far greater value, day after day and year in and year out. It is as though by purchasing one theatre ticket the entire family could see all the shows at all the theatres into the distant future, and at any time; the theatres to be open as much as fifteen hours a day, and never to run a show more than one performance. Obviously, the support must come from some other source. And it does: the business house, seeking public good will, offers rare entertainment features in return for public approval, which is the price the public pays.

There is no longer anything philanthropic in sponsored radio broadcasting. Nobody expects nor gets anything for nothing. Everyone pays, in one way or another. And the program sponsor,

often looked upon as a philanthropist, is assured of ample return for his investment. According to Merlin H. Aylesworth, broadcasting does the following for the sponsor:

1. It can create a *consumer acceptance* of the product and a better appreciation of the manufacturer. The quality of the product can be suggested by the quality of the program; and good will, hitherto the great desideratum of the broadcast appeal, can still be retained.

2. It can *increase dealer coöperation*. In fact, it has been shown that some dealers are more partial to this form of advertising than to any other. It is therefore in many cases most effective in securing the desired coöperation.

3. It can *increase the value of space advertising*. The broadcast feature, with its constant appeal, promotes a certain friendship, expansive in nature, between the listeners and certain performers whom they have come to associate with a definite company or product. The listener reads the printed advertising of these organizations with increased interest because he feels a sort of semi-personal contact between them and him.

Having determined what broadcasting *can* do for the sponsor, let us examine a still more pertinent proposition, to wit: *does* broadcasting really do what it is supposed to do?

The accurate analysis of so intangible, so impalpable a thing as a radio audience might seem, at first blush, a well-nigh impossible task. There are so many *variables*, as the engineers say, so many things beyond the pale of normal experience. Yet broadcasters, according to Mr. Aylesworth, have succeeded in solving the problem by resolving it into understandable factors. Thousands of questionnaires, intimate contact with local newspapers, and statistical procedure applied to census figures have given us a reasonably accurate cross-section of the radio audience. The claims of the "blue sky" days, when the whole world was held temptingly before the dazzled eyes of the sponsor, have vanished into thin air.

Today, the National Broadcasting Company or the Columbia Broadcasting System can readily furnish a comprehensive estimate of the total number of radio sets within reach of their respective systems; how many radio sets there are within the service range of every station in the network; the quality of the people

being reached; what proportion of the total number of potential listeners may be depended upon to tune in to a given program; and so on.

Sponsored Cake and Sustaining Delicacies

As with a magazine, the broadcasting program comprises editorial matter known as *sustaining features* which have no reference to any commercial product or company; and advertising matter or *sponsored features* which have to do with broadcasting revenue. The two classes of program features are very closely related, and, indeed, must be blended into a composite program of a general tone for maximum listener appeal. The public is attracted to a given broadcasting station or network by the amount of entertainment and enlightenment provided. If, for any reason, the programs lose their appeal, that station or network loses its audience, and thereby its value as an advertising medium. Consequently, the broadcasters endeavor to maintain the highest type of programs. Sponsored programs must be of a requisite calibre so as to maintain the station's or network's popularity.

It is not unusual for a broadcasting organization to build up an acceptance for a sustaining feature and then turn that feature over to an advertiser as a sponsored program. In this manner, the audience is assured of that which it likes best, while the sponsor is assured of a tried, tested, and perfected feature.

Some stations, being endowed as in the case of college or university broadcasting stations, need no sponsors to pay the bills. Other stations are owned by interests who use them entirely for their own good will messages. They prefer to sponsor their own products or services throughout the day and night to selling time to others. Still other stations are owned and operated by special interests, who sponsor their own names in their sustaining programs, but also sell time to other sponsors. But most of the larger stations are run, not as a supplement to any other business, but purely as a broadcasting business, getting all their money from the sponsors, having no goods or service of their own to sponsor, aside from their service as broadcasters.

Measuring Results

It is often asked whether broadcast advertising can include enough copy to do a good selling job, thereby justifying the not inconsiderable expenditure it involves.

It is quite generally admitted that 85% of all sales are made because the public has a previous acquaintance with the product involved. The American public has accustomed itself to buying definite brands, products, reputation or prestige. Furthermore, an analysis of modern merchandising discloses that 85% of all goods sold owe their popularity to the prior creation of a desire in the public consciousness for the product. This desire ultimately blossoms forth in the form of actual purchase.

In the field of advertising, these conclusions have been quite substantiated in actual practice. Copy is being condensed, intensified, "high-powered," if you will. In the rush and whirl of modern life, advertising must tell its story as quickly, as concisely, and as intelligently as possible. Broadcast tempo, therefore, is quite in keeping with modern advertising trends.

Broadcast advertising is unique in that its advertising and editorial copy are combined in the sponsored program. The two are blended in perfect union. Thus we speak of the Eveready Hour, the A. & P. Gypsies, the Palmolive Hour, the General Motors Family Party, True Story Hour, Philco Hour, tacitly and unconsciously coupling the editorial or program features which appeal to us with the advertising messages they contain.

An interesting sidelight on the difference between newspaper and radio is that whereas the editorial matter and the advertising in a newspaper are distinct and separate entities, each differing from the other in character, form and appeal, in radio the sponsored program is no less entertaining than the sustaining program. In fact, in view of the greater resources of the sponsor, he can often afford better talent than the broadcasting company. The public delight in each kind of program is the same. The only difference is that the sponsored program is under the auspices of a concern, the nature of whose product or service is likened to the character of the program.

Broadcasting is a great coördinating factor. No comprehensive

scheme of national advertising is complete without it. Broadcasting, basically indirect in nature, can never supply "reason why" copy. This is the province of space advertising, which must form the basis of the campaign. But broadcasting can do much to stimulate interest in the product and to help to render effective the space copy appearing in newspapers and magazines. The present-day trend is towards the fullest coöperation between broadcast advertising and space copy, each emphasizing and supplementing the other. Many broadcast advertisers are advertising and thus merchandising their programs with as much thoroughness and care as they merchandise their products or resell their magazine advertising in reprint form.

The Fourth Dimension of Advertising

Broadcasting has been named "the fourth dimension of advertising," and is now a definitely established force in the advertising world. Today the advertiser and the advertising agency are investigating broadcasting just as critically as they investigate newspapers and magazines. Circulation or "coverage," and type of audience, are carefully checked with broadcast rates; program material critically judged; the place of broadcast advertising in the campaign is determined in advance; and all the factors are cut to produce the most perfect design possible. Jobbers and dealers are appraised of broadcasting arrangements, just as they are notified of nation-wide advertising campaigns.

Broadcast advertising created a new type of advertising specialist—the "continuity" writer. This specialist makes a study of program features that have the maximum appeal for a radio audience, and develops means of weaving the advertising motif into the warp and woof of entertainment. His task is infinitely more complicated than that of the copy writer, since advertising and entertainment must assist each other. For this work radio has drafted many people from the newspaper profession, to which radio has been likened since sponsored programs come under the heading of advertising.

However, there is a great difference, as the newspaper men have learned. News value is no longer the criterion. Entertainment is

the password. Slowly they are learning the difference. They are becoming purveyors of entertainment. Showmanship is being sought, not in the cheap sense of the word, as belonging to the carnival and small-town ballyhoo, but in the larger sense of giving the public the thing that it wants but does not know quite how to request.

"Time" in the Footsteps of "Space"

Broadcast advertising is indirect advertising. While the earlier audience may have willingly listened to long dissertations on the merits of this product or that, the present-day audience will not listen to such direct advertising, the arguments of the smaller broadcasting stations to the contrary notwithstanding. It is true that the Federal Radio Commission has done all in its power to discourage direct advertising, yet it is amazing to what extent some of the smaller local stations have gone in their so-called indirect advertising. After each ordinary phonograph selection, they frequently mention the name of a local merchant, his allegedly high grade of goods, the supposed low price at which they may be obtained, special features such as free delivery, recommendations, and so on—just about the same ground covered by the newspaper advertisement, which is admittedly direct, hard-hitting, selling copy. However, whether or not anyone listens in on such advertising messages is a matter of secondary consideration. The fact remains that the leading broadcasting stations and networks cannot afford to lose listener interest, and therefore avoid direct advertising and lengthy talks. It is generally held that 10 minutes is a long radio talk these days, and that one minute is far more effective.

Meanwhile, the musical message has been found the most effective. It may be likened to the present trend in national advertising, which calls for handsome art work or illustrative material, with a minimum of text. The broadcast advertising comprises beautiful art work—the musical program—with a minimum of announcement. And the announcement, following the idea of printed advertising in maintaining uniformity of style, is made by the same announcer week after week. The guest announcer, whose voice

personality has met with widespread public approval, is now a feature of many sponsored programs.

In order to make broadcast advertising as effective as possible, the leading program sponsors spare no money in the preparation of their hours. The musical end is assigned to outstanding musical directors, working with large music libraries and staffs. The musicians are of the highest calibre, inasmuch as broadcasting offers high remuneration. Hours upon hours of arranging, selecting the musicians and rehearsing, go into the preparation of a typical radio presentation. Meanwhile, continuity writers prepare the various announcements which introduce the sponsor's name and his products with the least offense to the listeners-in.

Selling the Unsalable

Time is perhaps the only commodity, which, though it can be measured, cannot be manufactured, designed, stored, transported, handled, withheld, or accumulated. Time is the one thing everybody has to a certain extent. There are twenty-four hours a day for each of us. We cannot make it less nor more. Nor can we save time for a rainy day. An hour gone is past, and can never be reclaimed. It might therefore seem to be the last thing in the world that can be valued and sold. But such has been the case with radio time. There has been created one more outlet for man's money. For one less thing can it now be said, "Money cannot buy that." Even time can be sold.

"Chipping In"

And so broadcasting has solved its economic problem. It is no longer the anomaly of the ages—the something for nothing. Everyone pays in the broadcasting cycle. First, the public pays by investing in a radio set whereby it may listen in. Secondly, the broadcaster pays by investing in a broadcasting station and its operation. Thirdly, the sponsor pays the broadcaster for the privilege of utilizing his facilities in reaching the public. Fourthly, the

WHO PAYS THE BROADCAST BILL? 161

public pays again in the form of good will and the acceptance of certain brands and trade names. It is a perfect cycle. Each receives full value for money expended. Each is satisfied. And entertainment and culture are spread broadcast among the people. So may it always be.

CHAPTER XI

THE BROADCASTER SPINS HIS WEB OR NETWORK

IF the mountain will not go to Mahomet, Mahomet must go to the mountain. So reads the old proverb. And in such simple philosophy we have the story of the development of the broadcast networks which, for the first time in history, have provided civilization with a national and, perhaps in time, even an instantaneously functioning international nervous system.

The broadcast network is a means of grouping a number of scattered broadcast transmitters on the one hand, so that they may handle the same program as a unit, providing their collective audiences with the highest type of entertainment and enlightenment direct from leading centers of the nation, and offering program sponsors a combined audience of any desired proportion and distribution. On the other hand, the network is a means of reaching out for desirable program features picked up by any associated station. Only too often the *distribution* of the network is praised without giving thought to the alternate possibility of *picking up* programs by means of exactly the same facilities. As time goes on it becomes increasingly obvious that gathering capabilities are almost as important as the distributing process.

As It Was in the Beginning

The real origin of the network, or at least the use of telephone lines in combination with radio telephone transmission, is lost in the dimming days of pioneer broadcasting. One of your authors made use of a telephone line, quite without the knowledge or consent of the telephone company, as far back as 1915, so as to talk from his residence and transmit over the radio telephone transmitter installed seven miles away in the College of the City of New York and used for nightly broadcasts. The author spoke in one room of his apartment, while in an adjoin-

ing room his voice could be heard in the head-phones connected to a radio receiver, after being intercepted via the air.

As for the present era of organized broadcasting, it appears that the network had its beginning in the work of Station KDKA of East Pittsburgh, the pioneer broadcaster. When the station began regular broadcasting, there was no program developed for Sunday evening. It was suggested that church services be tried. There was no precedent for this type of program, and consequently it was not known whether church services would broadcast well or, indeed, if the churches would consent at all to this method of handling their services. After some persuasion, however, permission was received from Calvary Episcopal Church of Pittsburgh, to broadcast its services. A district telephone line was installed between the church and the radio station for this purpose.

Shortly after, casting about for features that would enliven the evening programs, it was decided to broadcast, as an experiment, blow-by-blow returns of a boxing match held in Pittsburgh. A private wire was installed from a boxing club to the radio station, and a man prominent in sporting circles was engaged to render a round-by-round version of the progress of the bout.

After the first novelty of facing the microphone had worn off, early broadcasters found it increasingly difficult to bring the mountain of talent to the distant microphone Mahomet. Studios inconveniently located relative to the center of the entertainment world, such as the WJZ station in Newark, N. J., had to go forth in search of necessary program features. In time, WJZ established a studio in the old Waldorf-Astoria Hotel, New York City, utilizing a telegraph line to transport the delicate sound current from the handy microphone to the remote station. WOR, also of Newark, soon found it necessary to maintain a studio in New York City. Other stations likewise went out in search of program material, even to the extent of maintaining remote studios. A quaint relic of the old days when studio and station were at the same spot persists in that whimsical clause of the radio law which states that the station is legally located at its studio.

A Pick-up Network Built to Order

By 1924, outside pick-up was commonplace practice, so far as leading stations were concerned. Station WJZ, at that time installed in the Æolian Hall, New York City, had a most elaborate pick-up network. Because of the fact that the telephone system had its own broadcasting activities in the form of WEAF in New York, the Radio Corporation of America found it necessary to employ wire lines other than telephone lines. The WJZ pick-up system was therefore installed by the Western Union Telegraph Company in collaboration with RCA engineers, and consisted partly of new facilities exclusively provided for such service and partly of existing facilities which were leased as required from time to time.

The system was based to a considerable extent on the use of the elevated railways, which traverse Manhattan Island lengthwise, to carry trunk line cables. These cables had outlet terminal boxes and switchboards at important points, so that overhead twisted pair connections could be made from the trunk lines to points from which broadcasting was to be done.

The system thus obtained was most flexible, and made it possible to lay trunk cables exclusively for this work at moderate expense, and also to provide connections at a reasonable cost, since the work of running weatherproof twisted pair over the housetops, from the trunk cable terminal boxes to a desired point, could usually be done by one lineman in a few hours. Fortunately, also, the theatrical and hotel district, in which the great majority of events originated, was fairly restricted in area, and thus the trunk cables did not have to be unduly extensive.

The Business of Supplying Programs

It was but natural that WJZ and WEAF in New York City should build up a vast fund of program material, being located in the greatest amusement center the world over. Meanwhile, after the first blush of novelty had worn off, and listeners-in began seeking programs of solid worth, stations in other cities found it increasingly difficult to build up attractive programs.



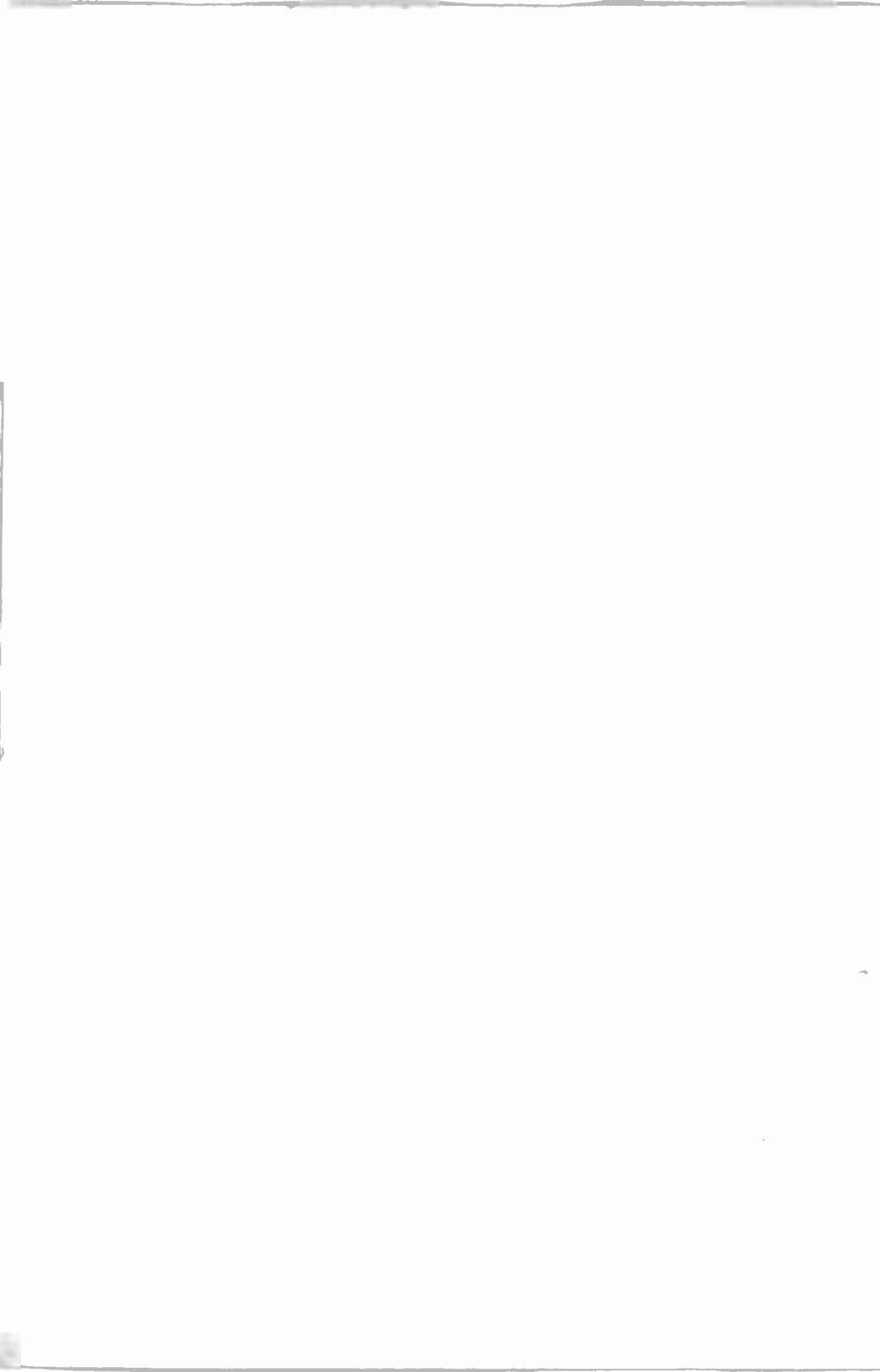
"FROM THE NEW YORK STUDIOS OF NBC": CATHEDRAL STUDIO, NBC

Here some of the best-known hours on the air originate. Walls, floor and ceiling are made of sound-proof materials. The draperies regulate the acoustics. Temperature and atmospheric conditions are rigidly controlled. The announcer's stand is in the far corner, the control room beyond.



ONE BAROMETER OF LISTENER INTEREST: THE MAILMAN COMES TO CBS

Although you may never express your appreciation of programs by writing the broadcasters, many listeners do. Tens of thousands of letters are received by the broadcasting stations each week, commenting on the sponsored programs. Perhaps that is yours being read.



They called for help from the New York City stations, and this help came in the form of programs sent over direct wire lines from key studios to scattered transmitters. Thus the distributing network, as distinguished from the pick-up network, was born.

Because of its elaborate wire line system and the fact that its prime interest lay in the direction of building up the telephone business, the Bell Telephone System soon was supplying a number of scattered stations with programs from the WEAJ key station in New York City. With the development of the sponsored program as the solution of broadcasting economics, the Bell System enjoyed marked advantages over all other broadcasters in that it could offer the facilities not merely of a single local station with its corresponding local audience, but a group of stations catering to a wide-spread audience.

Meanwhile, Station WJZ of the Radio Corporation of America, in addition to its pick-up network, was soon called upon to supply programs to its other station, WRC, at Washington, and to WGY, the station of its associate, the General Electric Company, at Schenectady. Unable to obtain the necessary telephone lines, the RCA broadcasting staff again turned to the telegraph companies for aid. Soon the Western Union Telegraph Company had a line installed between New York and Schenectady, a distance of 160 miles, while the Postal Telegraph Company provided the line between New York and Washington, via Philadelphia and Baltimore, a distance of 220 miles. Active steps were being taken to extend the network from Philadelphia to Pittsburgh, and from Schenectady through Cleveland to Chicago.

The Birth of the National Broadcasting Company

With broadcasters still operating on an experimental basis; with a growing scarcity of good program material in the smaller centers; with an audience of increasing discrimination in the matter of program offerings; with the economic burden increased to crushing proportions; and lastly, with a further shrinkage in broadcasting forces virtually a foregone conclusion, something had to be done—and done quickly—back in 1926. The WJZ

and the WEAF networks, while pointing the way to an economic solution of broadcasting, were quite incomplete as they stood. They were really experiments; and, as experiments go, their future was clouded.

Now the organizations most interested in the future of broadcasting were obviously the General Electric Company, the Westinghouse Electric & Manufacturing Company, and the Radio Corporation of America. Two of these companies were engaged in the production of radio equipment, while the third undertook the merchandising of those products. With their commercial interests at stake, together with a genuine sense of their obligations to the public that had invested capital and confidence in the permanency of radio broadcasting, these three companies joined together in the formation of an organization that would create a permanent broadcasting institution. Thus the National Broadcasting Company was born on November 1, 1926. It was in order to meet two obvious necessities of advanced broadcasting that this company was formed, namely: (1) adequate financial strength, ultimately self-sustaining; (2) adequate program material, with an organization and equipment capable of coördinating and presenting this material in the most desirable manner.

No organization which did not involve the three great radio firms themselves and have at its disposal their technical as well as financial resources, could have hoped to accomplish the full development of broadcasting. The coöperation of G. E., Westinghouse, and RCA in the formation of the National Broadcasting Company, was therefore the most fortunate happening imaginable for radio, and for the public. The participation of these potent key firms, endowing the new NBC with all their vast resources of every description, was a guarantee to the public that broadcasting was now placed on a firm and lasting basis, and with every assurance of progressive improvement as time went on.

Pioneer Days of Network Broadcasting

The NBC began its commercial career with Station WEAF and a means of simultaneous broadcasting through a large group of scattered stations known at that time as the Red Network,

covering New York City through WEAJ, covering New England through stations WEEI Boston, WTIC Hartford, WJAR Providence, WTAG Worcester, and WCSH Portland, Maine; extending south through WFI and WLIT Philadelphia, and WRC Washington, and west through WGR Buffalo, WCAE Pittsburgh, WTAM Cleveland, WWJ Detroit, WSAI Cincinnati; WGN and WLIB Chicago, KSD St. Louis, WOC Davenport, WCCO Minneapolis, and WDAF Kansas City. The network comprised at that time approximately 3,600 circuit miles of special telephone lines, with Boston, Hartford, Providence, Worcester, Philadelphia and Washington covered by permanent facilities, while the remainder of the stations were on a temporary basis.

In January of 1927, WGY Schenectady, was added to the Red Network on a permanent basis, and the stations in Buffalo, Pittsburgh, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, Minneapolis, and Davenport were changed from temporary to permanent status.

Also, shortly after the formation of the NBC, the management and operation of Station WJZ New York City, and WRC Washington, were taken over from the Radio Corporation of America, and the Blue Network inaugurated, including WBZA Boston, WBZ Springfield, KDKA Pittsburgh, and KYW Chicago, with Boston and Springfield operating on a permanent basis. The Blue Network was connected by approximately 1,200 miles of wire.

A Southern group of stations consisting of WHAS Louisville, WSM Nashville, WMC Memphis, and WSB Atlanta, was added in January, 1927, on a temporary basis, giving 800 more circuit miles for use in conjunction with the Red and Blue Networks.

In February, 1927, with the addition of KVOO Tulsa, Oklahoma and WFAA Dallas, Texas, 580 more miles of temporary facilities were added for use on both networks. Between March and September, 1927, WEBH in Chicago, WBAL Baltimore, WJR Detroit, and WHAM Rochester, were added to the Blue Network on a temporary basis. This extended the Blue Network 900 miles. Also, during this time, the addition of WBT Charlotte,

North Carolina, and WTMJ Milwaukee, gave 350 additional miles for optional use on both networks.

The Pacific Coast Network centering in KGO and KPO San Francisco, and radiating north to KGW Portland, KOMO and KFOA Seattle, and KHQ Spokane, and south to KFI Los Angeles, came into existence in April, 1927, on a permanent basis, with the exception of Spokane, which was added with temporary facilities until June, when it also became permanent.

In September, 1927, the Blue Network extended 140 miles farther west, with the addition of WLW Cincinnati on a temporary basis. WHO Des Moines, and WOW Omaha, also on a temporary basis, added 320 miles for use on either network. From October to January, 1928, Rochester, Pittsburgh, Chicago, Baltimore, Detroit, and Cincinnati on the Blue Network were changed from temporary to permanent. The Southern Group also switched to permanent facilities and likewise Des Moines, Omaha, and Kansas City, added approximately 550 miles to temporary facilities for service on the Blue Network. During this time WCSH Portland and WTMJ Milwaukee were also switched from temporary to permanent basis.

Three outlets, WJAX Jacksonville, WBAP Ft. Worth, and WRVA Richmond, while not regular members of any network, were included as special additions for several of the NBC programs. These stations made approximately 610 additional miles of wire available for use with either the Red or Blue Network.

Today, the NBC Networks include 74 stations on a *permanent* basis, gathered together by some 15,000 miles of telephone lines. As its name implies, the National Broadcasting Company is a national service. It is not limited to East or West, North or South. It covers the entire nation through several networks and groups and individual stations. Its programs, therefore, have the widest possible appeal to all classes, localities, tastes, and interests. The organization has truly achieved the aims of its sponsors; it has merited the stewardship of national entertainment and enlightenment—the greatest task ever assigned to a commercial organization.

Enter the Columbia Broadcasting System

Meanwhile another great broadcasting organization has come to serve the American public. The Columbia Broadcasting System, now a nationwide network of 75 stations on a *permanent and temporary* basis, first went on the air September 18, 1927, with a basic chain of sixteen stations which extended from the Atlantic seaboard to the Mississippi. This system was organized on the theory that there was room for another national chain of stations—a theory which has been proven. It was organized for the purpose of engaging in a nationwide broadcasting business, which purpose is realized in today's achievements when Columbia programs are carried nightly across the nation on a coast-to-coast "hook-up," and to Europe on two short wave transmitters.

The Columbia Broadcasting System commenced operations in 1927 with complete facilities for the presentation of programs. In fact, the initial Columbia broadcast was a specially prepared version of Deems Taylor's "The King's Henchman," the first radio performance of this American opera. The founders of Columbia were men with experience in broadcasting. The idea of the new network was conceived two years before the inaugural program—two years were spent in preparation and in the careful planning for covering the principal centers of population.

For the first year of its existence, Columbia used as New York "key" stations the independently owned transmitters, WABC and WOR. Time was leased from these stations which served as the outlets in the metropolitan area for the System's chain programs. In December, 1928, WABC was purchased from the Atlantic Broadcasting Corporation, and became sole key station, on a full-time basis, in September, 1929. In July, 1929, Columbia moved into its new building at 485 Madison Avenue, New York. In this skyscraper are now located the executive offices, studios, and rehearsal chambers of the Columbia System.

As of December 1, 1930, the Columbia network extends from Bangor, Maine, in the East across the continent to Los Angeles and Seattle on the Pacific Coast, and from Toronto and Montreal in Canada to New Orleans at the Gulf. The stations

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in the chain are located in 68 cities. These stations are divided into a basic network and five groups, as follows:

	<i>Stations</i>
Basic Network	25
Basic Network Supplementaries.....	16
Canadian Supplementaries	2
South Atlantic Group	4
Don Lee Coast Unit.....	6
Sectional Supplementaries	22
Total	<hr/> 75

For a Permanent Country-wide Hook-up

For a time the country was divided into two definite radio audiences, namely, that east of the Rockies, and that of the Coast States. On special occasions both audiences were joined together through the use of the transcontinental telephone lines, but so great was the expense that a combined audience was out of reach of routine programs.

However, the demand for a national audience by the largest sponsors brought about the permanent linking of both radio groups on December 24, 1928, when a nation-wide program inaugurated the twenty-four-hour coast-to-coast circuit of the NBC. The final link in the chain between Denver and San Francisco required intensive work for more than a year, and was the final operation in connecting by special wires the fifty-eight transmitters then comprising the NBC chain.

The first span in this transcontinental link was completed on June 1, 1928, when the line was extended from Omaha to Denver. Maintenance of the permanent circuit was estimated at \$220,000 a year. Successful installation of this circuit was regarded by engineers as an achievement of the first magnitude, recalling that the first telephone circuit between New York and San Francisco was not completed until 1915, and that it was comparatively simple to instal telephone circuits in comparison with permanent, specially engineered lines capable of carrying musical tones without distortion. Experiments were made for eighteen months before the circuit was ready. Extensive tests were made to assure uniform transmission of programs to and from the coast.

The new circuit served two intermediate transmitters, KSL Salt Lake City, and KOA Denver, and provided the entire country with network programs. Amplifiers or repeater points in five States serve to check the transmission of each program as it passes along the 1,600-mile line to the Pacific Coast. From Omaha the circuit goes to North Platte and from there to Rawlins, Wyoming. Next it is checked at Salt Lake City and then at Winnemucca, Nevada. The next tests on the transmission occur at Sacramento, California, and then it goes into San Francisco for distribution to the NBC Pacific Coast network.

It was estimated at the time of the inauguration of the permanent national hook-up that the NBC Eastern circuits served 69.4 per cent of the radio audience in the United States, while the Pacific Coast system reached an additional 12.1 per cent. The new link added 1.2 per cent and brought to listeners in the mountain district the same programs heretofore heard only in the East and on the Pacific Coast. Before this link was made, these listeners heard only special network programs and events of national importance.

Telephone Service Plus

Anyone who uses the long-distance facilities of the telephone system must have some conception of the enormous cost of the wire service employed in building up and maintaining broadcast networks. Indeed, the present NBC telephone bill averages more than \$250,000 per month, and continues to increase as more stations and more programs are being added to the radio diet of the American public. Odd as it may seem, a radio organization, the National Broadcasting Company, is thus the largest telephone service customer in the world!

As a matter of fact, the rates for network wires are considerably higher than those for ordinary telephone conversations. Offhand one would expect lower rates, since broadcasting service is virtually a wholesale telephone proposition. And yet the reason for higher rates is simply explained. W. E. Harkness, at that time Assistant Vice-President of the American Telephone & Telegraph Company, in discussing the matter, stated early in

the development of national networks: "We have to disrupt all our normal conditions and set up an entirely new service to broadcasters. This can be done only when the normal service of the company is interrupted. We have to take certain circuits and disrupt them and set up new circuits. To establish those circuits, special equipment has to be used. Special forces must be kept at all the repeater stations. In making installations we have to wait until the lowest point of traffic of the day, which means after midnight. In turn, that means that we have to pay our special men, who are high-priced workers, for overtime. In undertaking the broadcast of an important program, we set up the circuits the day before. We must then take them out to make way for normal telephone service. When the time comes to broadcast, we must put them on again, and, after the broadcasting is completed, we must disrupt the special circuits."

The foregoing may explain why the rates for broadcast telephone lines are high. Many of the smaller broadcasters, desiring lines for temporary remote pick-ups, have been appalled at the charges, and yet the matter is obviously simple to understand. Likewise with the charges for the permanent lines, particularly those of more than a few miles in length, which require repeater stations along the route, in most instances with trained operators to monitor or maintain the signal volume constant. On the NBC networks including over 15,000 miles of telephone wire carrying the programs which are given coast-to-coast distribution, 250 telephone engineers man the 100 repeater stations and main control points. The system is duplicated by a second monitoring or telegraph wire throughout, so that when the entire network is in operation, more than 30,000 miles of lines are employed.

Radio Trunks and Branches

Due to economic considerations, a network must be built up with proper consideration for maximum service with minimum telephone line mileage. Thus at the beginning, if Chicago asked for WEAJ programs, it would have meant charging the entire cost of a telephone line over 900 miles long, with perhaps 20 repeater stations and attendant staffs, to the Chicago station.

However, with several other stations along the same main line between New York and Chicago, the wire line cost per station served could be materially reduced. Furthermore, if a station to one side or the other of the trunk line desired service, it would be economically feasible to run a branch or "tap" from the nearest appropriate point on the trunk line (generally a repeater station) to that station.

Today the networks are laid out in the general form of trunk lines between important geographical centers and branch lines or taps to stations off the main lines. There are groups of stations based on given centers which need not necessarily be important cities. How many people, for instance, have ever heard of Beaver Dam, Ohio? Yet from this point radiate several important lines supplying stations to the north, south, and west. The same is true of Morell Park, Illinois, which serves as a center for several circuits.

Routing specialists have come into broadcasting, fully familiar with telephone line conditions and possibilities. These men determine how stations shall be joined into networks, where the repeater stations are to be located, and what auxiliary or stand-by lines are to be made available in the case of any failure of lines during actual broadcasting. The story is told of how the late President Harding, speaking from Kansas City, quite unknowingly had his words shifted from one line to a second and finally to a third, in overcoming successive wire failures. The third route was a detour of at least 800 miles from the first route, yet the audience heard the speech clearly, which is always the main thing. The end, not the means, counts in broadcasting.

Coördination on a Split-second Basis

The organization of a network, entirely in addition to wire line considerations, calls for the basic philosophy of a number of stations agreeing among themselves to work in perfect harmony. They must be willing to handle the same network features at precisely the same time. The program which goes on the air at 8 o'clock Eastern Standard Time must be prepared for by the

stations subscribing to that particular feature. Obviously, they cannot take that program at any other time.

Hence the building up of networks has involved a wonderful coördination of effort on a split-second basis. A large number of stations, scattered from one end of the country to the other, must be kept in constant touch with the key station by means of telegraph and telephone circuits, so that any changes in the program may be immediately flashed to the subscribing or associated stations. All the more is this true today, when the network not only serves for distributing programs from a given key station, but also serves to make almost any station a key station or pick-up point when local events so justify.

Let us visit the nerve center of a national network. Various circuits terminate in the so-called Operations and Engineering Department, both for signalling and for actual transmission of programs. Operators in this important branch of the service are trained to receive both Continental Morse and the usual Morse codes. However, many abbreviations and call letters have been evolved in order to reduce traffic on these lines, and therefore to an outsider the messages received and sent out while the network program is on the air, would be almost unintelligible.

If you will permit, let us "sit in" with the Communication Operators for an hour or two. Six men are at the keys long before the network program is to go on. The schedule of broadcasting is at hand. The keys begin to click:

"Hello, KSD, WSM, etc. Stand by for tone frequency tests," in prearranged code, of course. Frequency or tone-test signals of 100, 1,000, and 5,000 cycles may be sent out. And back come the reports. If the reading is off, another tone test is sent out from the key station and adjustments made. This process goes on until everything is in order for high quality music and speech transmission. Some trouble may be detected in the circuit and accurate checks are made. Weather conditions must be taken into account. Storms may cause circuit trouble. Such factors must be cleared during the tone frequency tests. If the storm should come up during the actual broadcast, the operators become as busy as train dispatchers. In fact, their work is not unlike that of the train dispatcher. While the latter must direct trains over

the proper routing, a Communication Circuit operator must guide the programs to the proper station and see that they arrive there in close to the same form and clarity as when they originate at the studios of the key station. The preliminaries, then, are for the purpose of "warming up" and preparing for the daily broadcasts.

But this is not all. A schedule shows that all features are not accepted by the same stations. The operator must watch schedules carefully and notify the proper stations. For instance, WRC Washington may take the Coca Cola Girl episode at 10 P.M., but may cut out to handle a program of its own at 10.30. On the other hand, WHAS Louisville may not take the Coca Cola Girl at 10 P.M., having its own local sponsored program from 10 to 10.30, but may desire to be back on the network at 10.30. The telegraph operators handle the messages which keep these various details in order, for be it noted that *all* the associated stations by no means subscribe to *all* the network programs. Many have their own local features, and come in and go out of the networks during the day and evening.

Perhaps there may be a slight delay, and the program does not go according to schedule—a rare occurrence today. This might leave the network stations silent, if it were not for the Communication Circuit Corps. The studio announcer reports to the supervisor at the key station, "The XYZ program will be at least four minutes late, or about 11.04." This news is immediately flashed to the associated stations so that they may arrange accordingly to fill in the time.

Behind the Scenes of the Network

The network program is ready to go on the air. The WEAFF announcer in New York City makes his announcement through the key station, then stands by for fifteen seconds. This interval, known as the station break, gives the announcers at the associated stations time to make local announcements. During that brief interval the WEAFF microphone is switched off the various broadcast transmitters, and their individual microphones are switched in on their individual transmitters. Then the WEAFF

microphone is again switched in, ready to operate the combined transmitters.

The program begins. The coördination of stations has been thoroughly worked out. The local announcers know they have just fifteen seconds and no more; therefore, their announcements just fit.

Now let us assume the Communication Circuit Corps' position on a stormy night.

"Distortion," will flash from KVOO Tulsa; "noisy," clicks in from WSAI Cincinnati; "not clear," from WTAM Cleveland; "OK" from Chicago. And so it goes.

As these reports flash into the NBC headquarters, they are passed along. If the lines cannot be cleared up, an emergency line picks up the program.

"Better," says KVOO; "still off," flashes from WSAI; "OK" from WTAM.

When programs are going out clearly, the network operators flash comments in to the Communication Circuit Corps, which may be jotted down for future reference. "Baritone is dandy," will click in from WFI Philadelphia. "Who's the new soprano?" from KSTP Minneapolis, St. Paul. "Orchestra is snappy," says WDAF Kansas City. "Selection not so good," will flash from WTIC Hartford.

After the air is clear, the Communication Circuit operators check back and get readings on the entire program from the various members of the network.

Further to demonstrate the necessity for this corps of telegraph operators, let us suppose that a storm puts the network out of commission. Months in advance the various stations have contracted for the program, and in anticipation of it have not arranged for local programs. The storm makes it impossible to provide the network broadcast. The Communication Circuit Corps goes into action to warn the network members and give them an opportunity to arrange for an emergency program.

Much the same can be said for the Columbia Broadcasting System and its key station WABC in New York City, which must also maintain constant communication with the many scattered stations of its network.

Record-breaking Audiences

It was during June, 1924, that the stupendous possibilities of network broadcasting were first demonstrated to the American public. Both the Republican National Convention held at Cleveland, and the Democratic National Convention in New York City, were broadcast over national networks to an audience running into the millions, through twenty stations.

The following March, 1925, six microphones, hanging from the framework over the coat of arms of the United States, picked up the inaugural ceremonies and carried every sound over land wires to twenty-four broadcasting stations scattered from coast to coast. Even the school children formed part of the national audience of millions, and the announcer, Graham McNamee, was asked to explain what was happening in terms understandable to the juvenile section of his audience.

By February of 1927, the combined broadcast audience reached by the NBC networks, on the occasion of President Coolidge's address to a joint session of Congress, acquired further millions of listeners when thirty-eight stations were linked together by special hook-up, extending from ocean to ocean. For the first time the seven stations of the NBC's new Pacific Coast network were linked with the East. Among the millions of listeners were 800,000 Boy Scouts who were requested by the national organization, through their local Scout Masters, to hear the President's address. Further to broadcast the words of the Nation's Chief Executive several short-wave stations were included in the networks so that the program might be heard in several European countries. The special wire circuits employed to link the stations covered about 10,000 miles and required over 200 telephone engineers along the lines. There were 53 repeater or amplifier points, with two men at each point. There were 37 terminal points, together with 20 more at the Bell System headquarters in New York City, whence the speech was routed over the wires to the various broadcasters.

A little more than a year and the audience was still further increased for the Republican notification ceremonies of his nomination to Herbert C. Hoover, on August 11, 1928, at Leland

Stanford Junior University, Palo Alto, California. The NBC and the CBS took part, with a total of 107 stations working in unison throughout the country, in addition to overseas stations picking up the short-wave signals for rebroadcasting purposes. More than 88,000 miles of program and coördinating wires and stand-by circuits for emergency use were employed, of which 46,000 miles carried the actual words of the speakers and the music, 22,200 miles more of telegraph lines were used to coördinate the work of the network at the last minute and to superintend its operation during the broadcast period of one and one-half hours, and about 20,000 miles of program wires, balanced and prepared for emergency use, were available in case an interruption in the main lines occurred. Some 600 men were in charge of the wires all over the country, ready to shift the circuits around the trouble points and preserve the continuity of the program. To keep the voices of the speakers and the music at a suitable "level" or loudness on the wire lines, 264 repeaters or amplifiers were placed along the lines.

A few days before this event, a record network had been assembled for Judge Joseph F. Rutherford, President of the International Bible Students' Association on August 5th, when 96 stations were linked. A previous record was that of the Fourth Annual Radio Industries Dinner on September 21, 1927, when 85 stations were assembled.

And so the national radio audience has become relatively commonplace. The ceremonies attending the return of Charles A. Lindbergh and Commander Byrd, the Dempsey-Tunney championship battles held in Philadelphia and Chicago, the Inauguration Ceremonies for President Hoover, the funeral of Chief Justice William H. Taft, the Golden Jubilee of Light banquet held at Dearborn, Mich., and other important news events have been made the subjects of national broadcasts, with more and more stations taking part, even if on a purely temporary basis.

Talking as Well as Listening

Of late years the networks have developed "talkers" as well as "listeners." Otherwise stated, instead of all programs originat-

ing in one or two key stations, the networks have been developing secondary key stations as well as picking up interesting events in various parts of the country. Washington, D. C., almost from the beginning of the networks, has been an important pick-up point. Likewise Chicago. Today more and more programs are being picked up at various points on the networks. Let there be a Mardi Gras celebration in New Orleans, and immediately the local station in that city becomes the originating center of one or more networks. Let a Japanese prince land at San Francisco, and that point becomes the center of networks. Canadian stations as well are now originating programs for one of our American networks. For example, the studio of CKGW at Toronto becomes the point of origin of a nation-wide NBC program. By means of the short-wave signals crossing the broad Atlantic, programs originating in England, Germany, and Holland are made available to American networks.

The CBS is also engaging more and more in the practice of using various key stations throughout the country in picking up not only "spot" or spontaneous programs, but also certain sustaining and sponsored features.

—And Networks Are Here to Stay

Network broadcasting has proved to be in considerable measure the solution of broadcasting economics. It has brought about the broadcasting of programs of real merit. It has taken the outstanding event, anywhere in this country and even abroad, out of the purely local category. It is the only available method of bringing such events "red-hot" to the people. It has provided sponsors with an audience of such proportions as to justify the most lavish expenditures for programs, with the full realization that in network broadcasting the good-will message was being delivered to countless millions in the quiet and responsive atmosphere of their homes. Indeed, it is likely that the general broadcast set-up of today has elements of practically permanent value and application.

The "E Pluribus Unum" Network

Networks are fundamentally necessary—of that there can be no doubt. Yet the restless engineers have had the idea that it might be possible to simplify network operation and reduce the demand for broadcast frequencies by networks through a clever technical measure. Their thought was that it might be possible to place all the stations of a network, or at least a good proportion of such stations, on one and the same frequency. For example, high power stations in New York, Pittsburgh, Cleveland, and Chicago might all operate on the same frequency, say 700 kilocycles. Listeners at any point served by these stations would hear the network program at the 700-kilocycle point on their tuning dials. There would be no cross talk or interference during the normal program since all stations are sending out the same material at the same time. Perhaps the station announcements, which appear at intervals during the program, might be subject to interference because one would hear not only the announcement of the nearest station but perhaps, more faintly, the announcements of other more distant stations. This would not be particularly serious since these announcements come relatively infrequently and, to say the least, are not the most interesting part of the program.

It must be admitted that between this clever engineering idea and its practical execution there are very serious physical obstacles. In establishing a truly "synchronized network," as these groups of stations operating on one frequency are called, it is necessary in a preferred method to have a connection by wire line or radio between all the stations to carry a master frequency control circuit. That is, each station must receive from some central source an exact frequency which it uses to build up its own transmitter frequency. For example, for the 700-kilocycle stations mentioned as an example, there might be sent to each station over the wire line a 5,000-cycle current. A device known as a frequency multiplier would enable one to select at each station what is called the "140th harmonic of the 5,000-cycle current." This 140th harmonic of 5,000 cycles has a frequency

of 700,000 cycles, or 700 kilocycles—the desired frequency of each transmitter.

There should therefore be an “electrically rigid” connection between the stations to keep them all on precisely the same frequency, and it has been found necessary to add certain ingenious additional devices to the transmitter to take care of any deficiencies in the inter-connecting or synchronizing wires between all the stations.

Assuming, however, that it will be possible to operate these large groups of stations on the same frequency, network broadcasting will further expand and will have even greater usefulness. While such a development will doubtless involve considerable further engineering research, and while its economics remain to be proven (involving as it does the establishment of suitable transmitting stations and an inter-connecting synchronizing wire system), yet it appears likely that within the next few years synchronized networks will find practical application with resulting advantage to the listener and the broadcaster alike.

Short-wave International Links

The year 1930 has witnessed proof of the practicability of exchanging broadcast programs between the United States and Europe. While American programs have been rebroadcast in England, France, Germany, Holland, South Africa, Australia, and elsewhere, programs from England, Holland, and Germany have been heard by the American public through the medium of the NBC networks. So many and serious are the technical problems which must be surmounted in the maintaining of satisfactory international broadcasting schedules that one hesitates to make any detailed predictions as to the year-round practicability of this practice. It will be recalled that as far back as 1926 European programs were rebroadcast by WJZ and its associated stations. However, at that time the transatlantic span was in the form of 1,600-meter radio signals from Daventry, England, picked up at Belfast, Maine, and then relayed by short-wave to a special receiving station in the RCA Technical and Test Building at Van Cortlandt Park, on the edge of New York City. From

that point the signals were sent by wire to the WJZ control room. The transatlantic span was perhaps too much for 1,600-meter signals of modest power. The short-wave link of 600 miles from Belfast to New York was an added source of background noise. And so the results were by no means promising when judged purely on the basis of entertainment value, on which basis the public generally chooses to judge.

Year after year, the RCA engineers, in collaboration with the General Electric and Westinghouse staffs, worked on the reception of transatlantic short-wave signals. The British Broadcasting Corporation utilized a more powerful short-wave station at Chelmsford, as the transmitting source. Signal level tests and records were kept from day to day, on an elaborate and thorough basis, noting the changes in signal strength and quality with the different seasons, atmospheric conditions, sunspots, and various other factors.

The present set-up for rebroadcasting European programs is a remarkable advance over what was deemed feasible or necessary a few years ago. At the transatlantic receiving station of RCA Communications, Inc., at Riverhead, Long Island, extensive facilities are available for picking up the short-wave signals from the British, Dutch, and German short-wave transmitters, as well as those of other countries that may care to reach American listeners.

Of course the short-wave signals may be picked up directly by anyone possessing a short-wave receiver, tuning in far below the usual broadcast wave lengths. However, short waves are relatively tricky. They are hard to find on the tuner. They fade in and out. They are usually accompanied by considerable background noises, and local disturbances are often excessive. They are quite weak, so that reception is usually limited to headphones. How, then, is it possible to pick up such signals with sufficiently good quality to rebroadcast them?

After several years of constant research, the engineers now have most of the answer. Briefly, the signals must be picked up at the most advantageous location, far removed from homes, shops, factories, and even highways. Automobiles, through their ignition systems, produce short waves which are propagated a

considerable distance and therefore interfere with short-wave reception. Many other types of electrical equipment generate troublesome short-wave signals. Hence the placing of the receiving station at Riverhead, Long Island, far removed from all interference possibilities.

Next, the engineers make use of a special antenna system, which is directional for the purpose of obtaining the greatest ratio between signals and background disturbances. It is a sort of "radio telescope" aimed at the distant transmitting station, receiving its signals, and largely excluding interfering signals or electrical disturbances coming from other directions.

Also, a multiplicity of antennas is employed for what is known as "diversity reception." Since short waves fade, it is necessary to overcome fading. This is done in considerable measure by employing several directional receiving antennas separated by given distances but with their output signals all selectively grouped together at the receiving installation. Thus when the signal fades at one antenna, it is at maximum on another, and by automatically selecting the best signal at all times, one can secure a satisfactory signal at most times.

Several receivers are employed to receive a given signal, each connected with one of the several antennas. The receivers are connected to an automatic selector which selects the output from one or more receivers so as to maintain the desired output level at all times. The output goes through an automatic volume control to keep the output constant, is duly amplified, and sent by direct wire some eighty miles to the National Broadcasting Company's control room at 711 Fifth Avenue in New York City.

Language—the Only Ultimate Barrier

What may be expected of short-wave links for joining the wire networks of the entire world was demonstrated recently when King George opened the Naval Disarmament Conference in London. Countries in every continent heard the ceremonies. The entire world became one vast audience.

Meanwhile, the CBS has likewise been active in bringing overseas features to American homes. Starting with the Five-

Power Naval Conference at London, Columbia has had no less than one overseas speaker a week over its network. It has also presented a regular series of overseas features each Sunday afternoon at 12.30 New York time. However, for the present CBS employs the American Telephone & Telegraph Company's transatlantic telephone service for bringing the overseas programs direct to the control room of the network.

In time, the technical difficulties are certain to become less and less. Aside from better receiving means, the transmitters are being increased in power, in flexibility of choice of radiated wave length, and in effectiveness of properly directed radiation. Eventually, as with our domestic high-power broadcasting, the vast distances of the oceans will be spanned with plenty of power and to spare. It was simply a case of having under-estimated the task in the first place, and time has served to revise and correct our estimates.

Meanwhile, the sole problem is that of language. Music, it has been said, is the international language. But announcements and speeches, unfortunately, are not international in understanding. It may be that English will be the dominant language employed. Perhaps French may also be employed, with bilingual announcements. Perhaps Esperanto, Ido and other auxiliary or synthetic languages may come into use. Who knows? But there is here a real problem which challenges solution by practical workers for better international understanding.

CHAPTER XII

CREATING A MUSICAL CONSCIOUSNESS

WE have spoken of the origin and rise of radio, from an idea to an industry, through its periods of deep despondency and triumphant glory. We have taken radio in our hands and examined it, turning it over carefully, putting it in the light and seeing where the shadows fall. And having done all this we ask ourselves the question, What of it? What is the significance of it all? Is the game worth the candle? Would we not be just as happy without radio? Is not radio, after all, just another industry? Or has it really done something unusually significant for civilization? And so we shall spend a few chapters analyzing the influence of radio on civilization—how it has affected society in various ways, how it has touched all people no matter what their ages, their incomes, their tastes, their occupations. Not that we can hope to treat of radio in all the multifarious respects in which it comes in contact with life. But we can glance at a few of the points at which radio and humanity are closely inter-linked. One of these points is music.

Two Separate Camps

Of course the musician will claim a great influence for his art on the life of many people. And now, more than ever before, the man in the street, so called, is likely to agree with him. Before the advent of radio, music was either "good" or "bad," and people could be definitely classified as lovers of the vulgar or of the classical. Opera, concerts, and—well, that is about all—made up the first category. Operas were expensive. Concerts of singers, instrumentalists, or orchestras were not cheap. As for the masses, they just did not go to concerts, unless they were rabid fans, in which case they camped on stools in front of the family circle sign and waited for the doors to open. The others

were supplied with music in the form of the musical comedies of the day, vaudeville, and cabaret music.

You either whistled "I'm Afraid to Go Home in the Dark" and bought the sheet music at the store to play on the piano (if you could play the piano), or you flung about in a casual manner names that are usually handled with the greatest reverence. The only place where the two classes joined was in the phonograph, and even here the joint was loose. The homes that had the Red Seal records seldom had the latest fox trot. And vice versa. People sat about and discoursed at length on the relative merits of the classical and the popular. The two camps were opposed.

The Gradual Awakening

With the rise of the moving picture came the ever enlarging orchestra. Places like the Strand Theatre in New York became known for their orchestras quite as much as for their pictures. The symphony orchestra in the pit of that theatre played classical music as well as popular. And since moving picture audiences were composed of both musical camps, each had to listen to both kinds of music.

Peculiarly enough, each found that the other kind was not so bad after all. People were beginning to give ground and admit that their might be something to that vulgar tune or that "high hat" opera after all, when radio stepped in, to become music's greatest advocate. For the movies used music, fine as it might be, merely as an accompaniment to the otherwise silent picture. The music was entirely secondary.

But radio was blind. It catered to the ear. And what is more pleasant to the ear than music? So from the earliest days of radio, music was its chief source of program supply. First, records were used—regular phonograph records. Nor did they aid much in raising the standards of music. In fact, because of technical difficulties in radio transmission and reception, the sounds emanating from the loud-speakers of the early days could be called music only by a long stretch of the imagination.

But as the technical facilities of radio grew, finer music was heard. Naturally, the leading orchestras, instrumentalists, and

singers were anxious not to have their art spoiled by imperfect reproduction. For a time it was most difficult to get the best artists to perform before the microphone. Then some singer took the first timid step. Not so bad after all. Others followed. Then came the orchestras. But for a long time the music was in the form of entertainment only, without any conscious thought of raising the standards of American musical taste. As a matter of fact, the taste was raised, albeit unconsciously, by performances of a high calibre. The broadcasting of the New York Symphony and Philharmonic orchestras and Edwin Franko Goldman's Band were perhaps the leading and guiding features in this growing musical consciousness of the public. These broadcasts were repeated at regular intervals throughout the season. People began to know them, to look for them in the published radio programs, to set aside the evenings on which they appeared.

Slowly but surely America was waking to the joys of beautiful music. The "low-brow" found the eeriness of the oriental strains, the descriptive quality of the Russian music to his liking quite as much as jazz. And the opera and concert devotee, finding the technical facilities of radio growing, was not averse to listening in instead of attending the concert in person. For the out-of-towner who used to look forward to infrequent musical programs of high quality, they now became everyday affairs. Perhaps this spoiled his appreciation a bit. Good music could be had for the turning of a knob. So inexpensive, it may have seemed hardly worth listening to. This sentiment was shared by many, especially those who were in a position to attend the original performances.

The Up-turned Nose

It has always been like that. Those who possess a thing of merit often feel that much of the merit is imparted to the object by its scarcity. In a monetary sense this is true. The more fine pearls there are on the market the cheaper they will be. But any single pearl will gleam just as brightly for all the others that might be found. The intrinsic merit of a thing is in no way influenced by the ease with which it may be had.

All of which points to the fact that the old-time music lover may not so much have loved the music for itself or its own beauty and emotional uplift as for the knowledge, that came with attendance at a concert or opera, that he was being uplifted as were only the few present. He enjoyed music for what it could bring him in the way of self-esteem, a false sense of pride, exclusiveness. For this reason many people, setting themselves up as true music lovers, looked with disfavor upon the broadcasting of fine music. Radio was all right for transmitting light and frivolous music for morons. But the fine music of the world, never. The *hoi polloi* would not understand it. Casting pearls before swine. And the music was spoiled in the transmission. Weak excuses of those trying their best to maintain that exclusiveness for which alone they enjoyed music. And all in the name of art and culture. It did not last long. The unfortunates who could not regularly attend good recitals enjoyed the programs. They may not have known why, but they did enjoy them. And having no possible ulterior motive for tuning in on a classical program, it must have been for the music itself.

The Noses Begin to Turn Down

Little by little the snobs realized they were fighting a losing cause. They could not keep beautiful music from the masses. And then, slowly at first, they began to see that they enjoyed it just as much as before, even though it was being shared by a lot of people sitting at home in shirt sleeves. The thought dawned upon them that the fact that others were also listening should make no difference: it was good music for all of that.

The next step, and perhaps the one hardest for the old-line music-lover snobs to take, was the realization that they had something in common with the butcher, who also liked classical music. It was too bad that the butcher liked classical music. It was far above his understanding. He should not enjoy it. It might make music not quite so worth enjoying to know that he did. Perhaps the butcher was just imitating his betters. But they could not get away from the fact that the butcher did enjoy the music. It hurt, but they had to admit a bond between all

people, the bond of musical appreciation. The same strains that made one cry brought tears to the eyes of the other. The butcher was aroused to the same emotions as the music patron. What a small world it was after all! This reasoning took a long time. In many quarters the final step, the realization of the brotherhood of man in music, that voice of the emotions, is not yet reached.

In the meantime the musical programs were being ever improved. In 1927 Willem van Hoogstraaten, conductor of the Philharmonic Orchestra, whose programs were broadcast regularly from New York, in making a statement concerning the influence of radio on musical appreciation, said in part, "I can think of no greater means of developing a love and understanding of music than by radio. It was after listening in to a great orchestra concert that I realized the limitless possibilities of radio." This from a foremost orchestra conductor, who might have been excused for the opinion that radio lowered the public taste by "canning" the finest music.

The Dream Comes True

For years Walter Damrosch, dean of American conductors, dreamed of educating people to the appreciation of good music. Unlike many artists who desire to work only with and for other artists, Dr. Damrosch was interested in those who cared nothing for his music, interested in showing them the beauty and the enjoyment that might be theirs. Especially was he interested in children, and most especially of all in the children of the rural communities of the country, children who were given few if any opportunities to hear beautiful music. Now at last his dream might come true. Perhaps he could inaugurate concerts, interspersed with lectures, or rather explanatory talks concerning the orchestra, its instruments, comments on the selections, and such. Perhaps people would listen. Perhaps they might be influenced toward an appreciation of the finer music. It was all very doubtful—but perhaps . . .

Early in 1928 Dr. Damrosch made a test. He gave three concerts, one for teachers, one for grammar school children, and

a third for high school and college students. They were a huge success. As a result, the Radio Corporation of America arranged for 48 "appreciation" concerts to be given during the school term of 1928 to 1929 over a network of 26 stations. Schools throughout the country prepared for the concerts by installing radio equipment and regulating classes so that the students might listen to the concerts. Thousands of schools used the concerts as a regular part of the curriculum. Millions listened in. Tens of thousands of letters poured in to the National Broadcasting Company and the Radio Corporation of America, congratulating them and Dr. Damrosch on their fine work. Grown people delighted in the music. The response was tremendous. As Dr. Damrosch said, in commenting on one of the concerts, "In general, the response has been whole-hearted, extraordinary and sincere. It certainly seems that Elihu Root was right when he said that with the beginning of radio broadcasting, people began 'learning through their ears.'" Walter Damrosch's dream had come true. To him and the Radio Corporation of America, under whose far-sighted auspices the appreciation concerts were introduced, the American nation owes a cultural debt which can never be discharged. For with the growing appreciation of fine music, the taste of the entire country will be raised, not only now, but as a foundation on which future generations may build their tastes.

CBS, quite aside from its variety of entertaining features, has given due thought to the fostering of a musical appreciation. It has arranged for the presentation of the Philharmonic series of Sunday concerts during 1930 and 1931, over a period of 28 weeks. Its American School of the Air Series devotes two periods a week to Music.

Edwin Franko Goldman, bandmaster, whose band has been playing before the microphone almost from the beginning, says, "I believe the future of music is in the air and that in future years there will no longer be any traveling musical organizations or traveling soloists. The concerts will be broadcast from the larger cities, so that they can be heard in all parts of the country, or in all the world.

"There is no question as to the invisible listeners preferring



IN DAYS OF OLD: INAUGURAL WESTINGHOUSE SALUTE

The opening program of the Westinghouse Salute series, dedicated to the Steel Industry. One of the best merchandised programs on the air.



standard music. Invisible audiences are no different in this respect than visible ones. They both demand good music well played. They like music of the masters, and I believe our audiences prefer Wagner and Tschaikovsky. Radio audiences react in the same manner. They are no different than the audiences that pay admission to Carnegie Hall or the Metropolitan Opera House."

What of It?

Through its universal aspect radio has unified the musical taste of the American public. That this taste is higher than the average ten years ago, there is no doubt. But a larger question looms. How shall we interpret this change which radio has caused?

It has heightened the responsibility of composers manifold. Formerly the bad music was never even published, the purely transient music was hummed by a few thousand and soon forgotten, while the great masters reconciled themselves to present obscurity with the thought that they would be appreciated after they died. Such often was the case. If Schubert could only be alive now, to know the fame that has been heaped upon his head, the laurel wreaths that cool his once fevered brow! But in his day, his audience was so small that it took many years before an appreciable number of persons had heard his works often enough to be able to judge them. Now it is all different. The bad work is generally unpublished. Still, a few such things occasionally get into print, and then, woe to the musical world! Such songs are played and replayed. They are heard by millions, hundreds of times over. Not enough that one orchestra play the nauseous selection once. Several play it at a time over hundreds of stations. The poison spreads rapidly.

The transient music is no longer local. East and West, North and South, the plains, the deserts, the plantations, the New England fisheries—gone or going are their characterful songs. Writers are carefully ferreting them out, publishing them that they may not be forgotten in the midst of an era of songs not sectional but national in their scope. Since popular music is no longer confined to one locality, its appeal must be wider, must

be based not on local traits and characteristics, but on human emotions and habits of thought. Perhaps our present popular music lacks the quaintness, the atmospheric quality of former days. The broader the appeal, the less can it suit only one particular group of people.

The popular music writers of the present day are national characters—Irving Berlin, Jerome Kern, Friml, Rodgers and Hart, George Gershwin, to name but a few.

As to the composers of fine music, never in the history of the world have they had the chance that is theirs today to be appreciated. Deems Taylor, Percy Grainger, and others of their sort need no longer wait for a hypothetical posterity to acclaim their efforts. Theirs is the power and the glory and the influence today as well as for evermore.

The radio not only increases the rewards of good music, it likewise increases the responsibility of music writers. Radio is a big thing. Its influence is instantaneous and wide. Its power for evil is no less than its power for good. That the musical tastes of the country have been raised is not to be taken as an indication that only good can come of radio. That its influence has been used to the betterment of the public we are thankful. That it may so continue to be used, we must be careful. To this end the National Broadcasting Company and the Columbia Broadcasting System are devoting their efforts, allowing only good music—and even popular music can be good—to be broadcast by its sponsors, and tending more and more to classical music for sustaining programs.

Commerce and Concerts

It is a peculiar thing that the early sponsors leaned toward jazz very heavily, believing that classical music was not popular. That is the fault of terminology. If we are to call one class of music popular, the inference is that all other kinds are unpopular. Sponsors are beginning to change their views. Partly, this is a result of the change in advertising methods. Now more than ever before, prosaic household products are taking to themselves a dignity they once thought would limit their appeal.

This dignity is manifested in the advertising of the products. It is also shown in the type of programs broadcast. Such hours as the Edison and the Chase & Sanborn programs, General Electric, Philco Philharmonic Orchestra and others tend to the classical. The purely commercial benefits derived from them are a seeming desire to serve the public on a higher plane, a lessening of commercialism, since radio programs are listened to in the evening, in the home, at a time when any commercial taint is a liability. It at once raises the standards of American musical taste and recognizes this taste. Industry has joined hands with radio in sponsoring good music.

May more such industries sponsor programs, gain the benefits in store for them, aid the radio industry in establishing itself as a vital factor in the cultural life of the country, and preserve for this nation a growing and nobler tradition of commerce—that the public must be served.

CHAPTER XIII

RADIO AND THE VOTER

AS we start to write each chapter of this book, we are almost sure that that particular chapter is the most important in the entire work. And so, although we may tell you further on that some other aspect of radio is the most vital, at the present minute we are thoroughly convinced that nowhere else in our national life does radio play so great a part as in its political existence. Like the old stock actor we will play tonight's part with all our might, though now, before the performance, we inform our audience that tomorrow we shall be seen in a different rôle and will then partly forget this one and play that one as though for us nothing else in the world existed.

So the reader will pardon us any exaggerated enthusiasm that may appear in the next few pages for radio considered as a political tool. Tomorrow we may grow just as rapturous over radio and something else. We hope you have enjoyed the acts so far presented and likewise hope that you will stay with us to the (bitter?) end. The curtain will be lowered for a minute and when next it rises you will be transferred to the political arena of pre-radio days. Thank you.

Hark Ye! Hark Ye!

The torch parade is taking place through the city streets. Bands blare forth and as the parade proceeds, more people join it, until when it stops before the speaker's stand a motley crowd of several thousand stand about. One of the political henchmen passes out cigars and suds. The candidate has his picture taken with a bucket of coal in one hand and an orphan in the other, amid cheers from the crowd. The following day the picture will appear in the public prints above the caption "Candidate Whosis, the Peepul's Choice." There follow speeches, first an introduction by some prominent

voice pusher, who paints a glowing picture of the man whose name he does not mention. Although he is seated on the platform and there is not a five-year-old child in the throng who does not know to whom the speaker is referring, the chairman continues for fifteen minutes, stringing virtue upon virtue, and finally, when he thinks he has everyone in suspense as to who this marvelous person can be, he climaxes his remarks with the name of the candidate. There follows great applause, first from the professional "hands," then by the crowd. Playing upon mob psychology and the emotions, political orators flourish. They are paid for the most part in cigars, an outlet for their egotism, and promises of due reward if the party is successful. Their emoting and oratorical tongue-rolling is a wonder to behold, and ranks them (in their own estimation) with Cicero, Gladstone, and Patrick Henry, always assuming they have heard of these gentlemen. All due praise be theirs.

The world's political broadcasting career had its premier on election night, 1916, from the De Forest experimental radio station at High Bridge, N. Y. The first program was the election returns of the Wilson-Hughes battle. That this program should have been chosen for so auspicious an occasion is quite significant. No further comment is necessary.

The first commercial broadcasting station, KDKA of Pittsburgh, began its long career on election night, 1920. The first program was the election returns of the Harding-Cox battle. That this program should have been chosen for the occasion is also portentous and requires no further explanation.

The Wee Small Voice of "Mike"

Of course, radio was not yet recognized as a factor in political life. But slowly it impressed upon the minds of speakers both the advantages of spontaneous communication with a vast number of people, and the added responsibility of such a device. When Lloyd George was in this country in 1923, he was tendered a dinner by the Lotus Club, to whose members he spoke in an informal manner. Referring to the American habit of working its prominent citizens to death in the matter of speech-making, Mr. Lloyd

George went on to say, "However, I got on fairly well with the aid of a little machine, right there (indicating a microphone and amplifier for the radio). I believe they are going to revolutionize public speaking, not only in your country but in ours as well. I believe they will circumscribe the activities of politicians and give them a little more time to think what they are going to say. (Laughter.) That is an advantage even to a politician. It is a very great change. I was surprised at the extent to which it had been developed in this country. I tried it in the old country but without much of a success; but it has been a complete success here.

"I delivered a speech, I think, in Indianapolis. I got a telegram the following day from Texas from somebody who had been listening to me. Well, I think that was adding a new terror to public life. I see my friend there who organized this. I was walking along the street, or rather driving along the streets of Cleveland, and I could hear a voice which seemed to be following me around wherever I went, and I found that they were trying the amplifier and I wondered at the time at the thing as an adjunct to a great election campaign.

"I do not know how many candidates you have, but if they are anything like that and amplify such campaign speeches as we have in England, I should say that when you hold meetings simultaneously and amplify each and every one of these speeches simultaneously, it would add something to the complexities of a campaign and the election."

Less than a year later Mr. Lloyd George's prophecy, made jokingly at the Lotus Club dinner, came to pass, when, in the Republican and Democratic conventions for the presidential election, and throughout the campaign itself, radio saw service for the first time. The stress of the campaign forced both parties before the microphone. But as short a time before the conventions as April of the same year, Sir Esme Howard, British Ambassador, objected to the broadcasting of his Pilgrim's Dinner speech. However, when he delivered Premier MacDonald's address to the American Press on the occasion of the annual dinner of the Bureau of Advertising, American Newspaper Publishers Association, a microphone was on the table directly in front of him connected with WJZ and out-of-town stations which gave his words a distribution te about

2,000,000 radio fans between the Atlantic Coast and the Middle West. That was indeed a large audience.

And less than two months later, 3,000,000 people listened in to the National Republican Convention at Cleveland, during the nomination of Coolidge as Republican candidate for President, over fifteen stations located throughout the country, with WJZ as the key station.

"Twenty-four Votes for Underw-o-o-d"

And less than three weeks after the Republican Convention came the famous Democratic Convention Marathon which lasted from June 24th to July 9th, with its recurrent echo of "Alabama, twenty-four votes for Underw-o-o-d." Elaborate plans were made whereby to broadcast the convention, not excluding particular features by which the exuberant static of summer daytime reception might be to some extent overwhelmed. The Republican Convention had shown the Democratic Party the importance of the radio audience to such an extent that the Keynote Address, which was to have been given during the opening day, was postponed until the evening in order that the great mass of radio fans might be able to listen in. So many people listened to the doings of the lengthy session that a noticeable lull took place in business, men preferring to stay at home with the radio. Traffic policemen, expecting huge throngs in the streets, were surprised at the absence of crowds. As an example of the extent to which the population stayed at their domiciles, only five people were counted on Broadway, New York, between Vesey and Barclay Streets at the moment that Al Smith's name was placed in nomination. The New York *Times* of June 26th contained an editorial to the effect that with the rapid advance of radio, the time would soon be at hand when conventions would no longer be necessary. One enterprising taxi driver in New York installed a radio receiver in his cab so that his fares might tune in on the latest balloting during their jaunts about town. The newspapers printed daily ballot tallies by which the radio fan might keep track by radio of the various trends from one ballot to the next. The nominee who finally

emerged successful, John W. Davis, received the news over the radio.

The conventions having done their duty, the candidates set about their campaign plans. Both of them planned to use the radio extensively, thereby lessening the necessity of strenuous travelling about the country and the consequent sapping of their energies. The Radio Corporation, having studied the efficacy of radio speeches, advised the candidates that aside from their acceptance speeches, their talks would be limited to 15 minutes per speech, because after that length of time the listener loses interest.

Stripped of His Mask

Already a difference was noticeable in the technique of speaking before the "mike" and direct to an audience. The *Saturday Evening Post* of August 23, 1924, printed an editorial entitled "The Spellbinder and the Radio," which read in part:

"The Democratic Convention was held in New York, but all America attended it. . . . The convention . . . emphasized what is to become the main function and the greatest service of the radio. It gives events of national importance a national audience. Incidentally, also it uncovered another benefit that radio seems destined to bestow upon us, the debunking of present-day oratory and the setting of higher standards in public speaking.

"The speaker's power,' declared a Greek statesman, 'depends for the most part upon the hearers.' Orators up to the present have been getting by on purely adventitious aids. A good personality, a musical voice, a power of dramatic gesture have served to cover up baldness of thought and limping phraseology. . . . The radio is even more merciless than the printed report as a conveyor of oratory. . . . It is uncompromising and literal transmission. The listeners follow the speech with one sense only. There is nothing to distract their attention. They do not share in the excitement and movement of the meeting, nor does the personality of the speaker register with them. It is what he says and the words he uses in saying it that count with them. . . . Somehow the spread-eagle sort of thinking and all the familiar phrases and resources of the spellbinder sound very flat and stale over the air.

Radio constitutes the severest test for speakers of the rough-and-ready, catch-as-catch-can school, and reputations are going to shrink badly now that the whole nation is listening in. Silver-tongued orators whose fame has been won before sympathetic audiences are going to scale down to their real stature when the verdict comes from radio audiences."

The Gr-e-a-t A-mer-i-cun Peepul!!

The old-fashioned political oratory depended on mob psychology. For weeks at a time the papers praised and condemned, worked up antagonisms, hatreds, fashioned saviors and martyrs. Emotions were wrought to the breaking point as was often evidenced by acts of violence far beyond the normal motivating power of political opinions. The political speaker was aided by parades, newspaper editorials, shibboleths. Those who attended the meetings were either violently in favor of the speaker or unalterably opposed. But they were vitally interested, and that was the main thing. So long as people felt on the matter, so long as they were dynamic, not static, they were at the mercy of the speaker who played upon their emotions. He cared little whether the audience was for or against him. Hate and love are pretty much alike to the public speaker. He can deal with either one. So long as they are moved somehow, that is enough.

The great political speakers of the past, the Patrick Henrys and the Daniel Websters were a race apart. Their like were few and far between. In their stead came what might be termed "sleight-of-hand orators," and at their head some have placed William Jennings Bryan, the most brilliant of them all, and the last of the great orators. They found radio most disconcerting. The emotional orator, like the fine actor or musician, must be face to face with his audience to do his best work. He depends on the reactions of his audience to motivate him and inspire him to cause further reactions. How can he play with their emotions when he cannot see them or know their emotions? The political orators were stumped. The deep voice and the pounding fist were of no avail. Used correctly they were a powerful force. But with

the audience unseen they were powerless. Radio was the Delilah who clipped the hair of the Samson-like political orators.

Conviction vs. Persuasion

The audience, sitting in their homes, unswayed by the emotions of their neighbors next door who were listening to the same speech before their loud-speakers, lacking the heightened emotions of the mob, lost to the speaker as he was to them, lacking the force of personality, of gesture, setting, flags and parades, were ready at any moment to tune in to something else, perhaps the speech of an opposition speaker. The radio campaign was forced to right about face. Emotion must be largely discarded in favor of logic. Now the good public speaker need not be logical. He must know logic, but he can often confound his opponent by playing illogical tricks with his logic, all the time hiding his linguistic maneuvers behind a screen of emotion and gesture as a magician focusses the attention of his audience on something quite irrelevant while he performs the vital moves. All these props were kicked from beneath the political speaker by radio. He had to return to straight logic. He had to cater to cold intelligence instead of warm emotion. Reason rose as the primary factor. No longer could the political speaker *persuade* his audience *emotionally*, he must *convince* them *intellectually*. The art of oratory turned into the science of a lawyer's brief.

No longer could the political candidate deliver a speech in New York advocating his friendship for Wall Street, Capital and the Industrial East, and a few days later tell the Westerners that he was for the Farmer as against the Manufacturer, for Labor as against Capital, knowing full well that in neither case were his words heard outside the territory he was addressing. The radio, feeding the ears of the entire nation, made it impossible for the political candidate to shift his ground to suit his varying audiences. He had to speak to the entire country at once, to satisfy all factions. This could only be done by a logical discussion of all the factors involved in national issues. No beating about the bush, no rash promises, but straight-forward statements for or against every issue, maintained throughout the entire campaign, giving all

the people throughout the country a four-square picture of the man and his policies.

Down the Home Stretch

The final two weeks wind-up of the campaign included the extensive use of the radio by both major political parties. In spite of the fact that the old political speakers were at a disadvantage; in spite of the fact that radio speaking was expensive; despite the fact that the radio audience was fickle; in spite of the fact that the radio audience insists on brevity—both the Republican and Democratic parties found it to their advantage to address millions of people at a time. Costing between \$500 and \$700 to broadcast from a single station, with an increase for each additional station, about \$5,000 dollars would cover the entire country. But the parties adopted radio with gusto. As the candidates travelled about the country, speakers preceded them on the air and their speeches were radioed. Then the final speech in each section was delivered over several stations, and the grand wind-up over a nation-wide hook-up.

Came the fatal day, and about 400 stations broadcast the returns to some 20,000,000 listeners. Europe and South America got the returns by air. Coolidge was elected and the whole world knew it in a flash.

When the shouting had subsided and the winning party sought to find the cause of its success and the losing party of its failure, radio again came into the discussion. In the old days, pictures of the candidates were distributed by the hundred thousand. Few heard the actual candidates speak, but all knew their pictures. In this campaign, there were relatively few pictures distributed. But everybody knew the voices of the contestants. Their tones, inflections, tricks of expression, were common property. Many people were influenced by the voice of the candidate for whom they voted. The voice was deemed an excellent indicator of character and sincerity.

In 1926 elections were held in New York State for Governor, State Senate, and other offices. Again the radio came into use. Two years before, the long-drawn-out Democratic National Con-

vention with its everlasting petty jealousies, its "Alabama, twenty-four votes for Underwood," left a rather poor impression on the minds of the nation's millions of radio fans. Dissension was rife in the Democratic party and the whole nation knew it. Of course, after the convention all sides pulled together for the Democratic candidate, but people were pretty well aware of the lack of whole-hearted support. So it was that in the State Conventions, which were also broadcast, the entire business of both conventions was finished in one afternoon, the candidates selected, and with a minimum of strife at that. The public must not think that either party was divided against itself.

Radio Rules

Then came the Presidential battle of 1928. Already in March preparations were begun to broadcast the proceedings of the Conventions, the campaigns and the final election. By June the newspapers were paving the way for the grand event. *Collier's Magazine* of June 16th carried an editorial which said in part:

"The Radio properly used will do more for popular government than have most of the wars for freedom and self-government.

"We fought for the privilege of managing our own affairs and then half of us decided that voting was troublesome and uninteresting and we stayed away from the polls.

"The radio makes politics personal and interesting and therefore important. . . .

"Good and brave men have died for the right to rule themselves.

"We inherited that right and now through the radio we have the means of acquiring painlessly the information requisite to the conduct of our rather intricate public affairs.

"Turning the dial of your receiver is a casual and prosaic act, but what you may hear through the air is the announcement of the opening of a new political era, an era made inevitably liberal and democratic by the very mechanical instruments which science has bestowed."

On June 13th the Republican Convention convened in Kansas City. Thousands of visitors to the city tried to crowd into the Convention Hall. Millions throughout the country stayed at

home while radio split wide the confining walls of the hall and allowed the light of public understanding to shine upon the happenings. More than 500 persons, of whom 375 were engineers, aided in putting the convention across by radio. More than 14,000 miles of wire were used by the National Broadcasting Company in connecting the various circuits of the network. All apparatus was duplicated in case of emergency. 56,000 miles of telephone and telegraph wire greased the passage of the convention news. Hoover was nominated and the whole world knew.

What did the political lights have to say about this new force in the political field? Interviewed on the subject at the time, Senator Borah said, "I think that broadcasting the national conventions is a splendid thing to do. It is our duty to give the people all we can about the doings of the great conventions." Senator Walsh of Massachusetts commented, "The use of the radio for transmitting to the public the nature and proceedings of our political conventions is of the highest importance—indeed, almost indispensable for a democracy like ours." Senator Moses of New Hampshire seconded the above opinions, and Senator King of Utah did likewise.

The Cost of Talking to a Nation

The Republican Convention having accomplished its mission, parted from Kansas City. Turning our glance for a moment to the twoscore broadcasting stations which tied up with the National Broadcasting Company for the convention, we find that they spent \$77,000 dollars for the job. Since the convention was on the air twenty hours, or 72,000 minutes, the cost was more than a dollar a minute. Itemized, we learn that the operation of the NBC circuits for twenty hours cost \$33,000; the transcontinental telephone circuit called for a check of \$24,000; the special pick-up at Kansas City ran to \$10,000; and salaries and reportorial expenses added another \$10,000 to the cost. And that was just the bill from the National Broadcasting Company. The Columbia System also broadcast the proceedings. The reader can figure out for himself the value of radio to the convention.

Then came the Democratic Convention at Houston, Texas.

This required more miles of wire for circuits, telephone and telegraph. What a difference from the 1924 Convention in Madison Square Garden! One ballot and Governor Smith was the nominee. The Democrats had learned their lesson. During September, October, and November of 1928, the Democratic Party paid \$91,345 to the Columbia Broadcasting System for the time on the air, as contrasted with \$87,779 paid by the Republican Party for the same network.

Then the campaigning began. 1924 had proven the value of radio. This time, the struggle involved two men of entirely different characters, upbringing, vocations, and points of view, and both parties were eager to be heard by the vast audience of the air. Senators Moses and Harrison, Republican and Democrat, respectively, took the floor. In the speech of each, radio was praised as a purifying influence in American politics. It was the one subject on which both men agreed.

Throughout the campaign, speeches, political playlets, musical numbers indicative of Republican and Democratic history went out over the ether. The cheering with which the candidates and speakers were formerly greeted was somewhat curtailed because of the great expense of radio time. Both candidates asked for silence during the time that the meetings were on the air. "Bear in mind that 'raddio' time costs money," were Governor Smith's opening words at one meeting. "You're eating up 'raddio' time," he cautioned another audience. In Boston he said, "Save your applause until the end of the speech. It doesn't cost anything then." And on another occasion, when the audience, realizing that the meeting must not be delayed since certain time had been contracted for with the radio company, arrived ahead of time, the Governor just stood on the platform silently and, pointing to the microphone, waited, watch in hand, until the appointed second. The audience took it all good naturedly and re-sang "The Sidewalks of New York" until the meeting went on the air and the address commenced.

All told, the major political parties spent about \$2,000,000 for radio campaigning. And at that, several stations gave time free of charge. Radio was one of the largest items in both the Republican and Democratic budgets. The rates of the National Broadcasting

Company, with its network of 49 stations, was about \$11,500 an hour, while the Columbia System, with 19 stations, charged \$4,000. The rates of both systems increased when independent stations hooked up. Both candidates wound up with nation-wide appeals, Hoover from his home in Palo Alto, Smith from the NBC headquarters at 711 Fifth Avenue, New York.

The efforts of the radio interested so great a number of people in politics that the popular vote of the public exceeded that of the 1924 election by 7,787,997. The popular vote in 1924 was 29,091,417. In 1928 36,879,414 people turned out at the polls, an increase of more than 26 per cent.

These figures are ample proof that radio is creating a lively interest in public affairs, creating in men and women a sense of political duty to vote, creating in the American citizen a sense of moral obligation to learn all he can concerning the candidates, their policies and experience, deciding intelligently, and voting in such a manner that the result will be a true representation of intelligent America at its best.

And then on Election night more than 100 stations broadcast the returns to about 50,000,000 people, or almost half the population of the country. So ended the greatest radio campaign of history.

Looking over the presidential elections since the dawn of radio we find that in 1916 Dr. Lee De Forest broadcast the returns of the Wilson-Hughes election from his High Bridge station to perhaps a dozen people with receiving sets. In 1920 KDKA opened with the returns of the Harding-Cox battle. About 50 people heard the returns on sets manufactured specially for the occasion. In 1924 the Coolidge-Davis returns were heard by about 20,000,000, and four years later the Hoover-Smith election returns came over the air to about 50,000,000.

With these figures in mind one may well ask, what about 1932, and 1936? Who knows? By then some have hinted that we may have reached the inhabitants of other planets. They might possibly be interested in knowing who is elected president of the United States of America, North America, Earth. But science and engineering do not hold out much hope of such an interplanetary "Entente Cordial" for the present.

"The Middle of the Road"

Since the last presidential election, the President and other public officials have been keeping their constituents informed of policies and actions of the government by radio. Of course, the newspapers get the information, and are in a much better position to comment editorially on the matters at hand. A newspaper without an editorial policy is a newspaper without a backbone. But radio has never taken sides. A few independent stations, such as the Socialist station, have argued and debated. But the large networks, both National and Columbia, have kept themselves free from entangling alliances, apportioning time to all parties, favoring none, commenting on none of the speeches delivered over their networks. While the newspaper explains, comments, and favors, the radio is wholly a means of reaching approximately 50,000,000 people instantaneously, directly, and with the most powerful force of communication, the human voice. For these reasons are the President, Senators, Congressmen, Governors, and Mayors of the nation apprising the people of what is going on in their country.

Realizing the value of speaking to constituents over the radio, its great coverage and time-saving advantages, its policy of being absolutely unbiased, the government became the largest user of broadcast time of any individual or organization. In the first ten months of 1929, 245 government officials were heard over the radio for 300 hours (not consecutive). This information was supplied by Merlin H. Aylesworth, President of the National Broadcasting Company, to Harold A. Lafount of the Federal Radio Commission following suggestions that special broadcasts by government officials be attempted to determine the interest of the radio audience in governmental activities.

Every branch of the government except the judiciary is represented in the government's broadcasting activities. The President, during the ten-month period, made ten addresses; the Vice-President spoke twice; every member of the Cabinet was heard except Secretary of State Stimson and Secretary of the Treasury Mellon; 28 Senators made addresses; 12 members of the House spoke;

and more than 150 chiefs and subchiefs of the various governmental bureaus appeared before the microphone.

According to Mr. Aylesworth, there is a growing tendency for greater use of radio broadcasting in governmental activities. The records of the company reveal each month an increasing number of appearances of governmental officials.

United States Senators and Representatives were very active, discussing subjects of almost every government activity. During the ten months in question the NBC conducted a program known as "Half Hours with the Senate," during which 21 Senators spoke.

Of the Cabinet members, Secretary of the Interior Wilbur led with five radio addresses; other members of the Cabinet speaking at least twice excepting Postmaster-General Brown and Secretary of the Navy Adams, who spoke only once.

Miss Grace Abbott, Chief of the Children's Bureau of the Department of Labor, made 27 addresses on Child Welfare, appearing twice weekly for fifteen-minute talks.

Dr. Julius Klein, Assistant Secretary of Commerce, delivered 20 fifteen-minute talks; seven other officials of the Commerce Department spoke fifteen minutes each, describing the department's activities; and three members of the Federal Farm Board also spoke.

A number of Assistant Secretaries spoke over the radio, among them William P. MacCracken, former Assistant Secretary of Commerce in charge of aeronautics; F. Trubee Davison, Assistant Secretary of War; Davis S. Ingalls, Assistant Secretary of the Navy; R. W. Dunlap, Assistant Secretary of Agriculture; and Charles B. Robbins, Assistant Secretary of War.

Major General Charles P. Summerall, Chief of Staff of the Army, Rear Admiral William A. Moffett of the Navy, and other officers of the two branches of the service, were among the speakers.

Laying the Cards on the Table

The great emancipator, Abraham Lincoln, spoke of ours as a government of the people, by the people, and for the people. We are too apt to look upon that kind of government as the best

possible, *per se*. But the strength of such a government lies in the intelligent knowledge of public affairs by the people. A government is no better than the governors. An absolute monarch is not to be despised, if the monarch is wise and good. Such a monarch is hard to find. And even a successful monarchy means knowledge of the affairs of state by only one man. For an equally good democratic government the majority of the people must be wise and intelligent monarchs. The great argument against democracy in the past has been that it means rule not by the best but by the most, and the most may well be the ignorant, selfish, and petty. The average is alleged to be always low. And dealing with millions of voters, as is the case in this country, it is the average intelligence which rules the country. Still we have faith in the democratic form of government. Why? Because we believe that the average can be and is being raised.

The great emancipator, Radio, is freeing the country's citizens from the slavery of misinformation and lack of knowledge—the great breeders of intolerance and prejudice. The strength of our government depends more than that of any other government upon the intelligent interest of the voters in the affairs of the nation.

Radio is aiding in the dissemination of facts and opinions, uncut by editorial censors, unbiased by outside policies, direct from their sources, or the minds of the foremost thinkers of the country. For example, David Lawrence is only one of the outstanding commentators who weekly give a radio digest of national and international highlights.

That this great country may be ruled, not by an ignorant and misled majority, but by an informed, intelligent people at their best, radio is straining every sinew of its tremendous frame, knowing that a vote is no more intelligent than the voter, and struggling to the end that the United States will in time be governed not only by the majority, but by the best possible majority.

CHAPTER XIV

RADIO AND SPORTS

ON a summer's day in 1881 John L. Sullivan and a man named Flood, accompanied by their seconds and followed by a crowd of hoodlums, sneaked through the dim streets of Manhattan Island, crept through dark malodorous alleys, behind buildings, and finally emerged at the water front along the Hudson River. They boarded a barge that was floating near by, and were towed up the river, beyond Spuyten Duyvil, up to a point opposite Yonkers. Others had gotten word of the bout and were already there. They had come from gangland, pool rooms, saloons and dives. Altogether several hundred of the toughest customers in New York were on hand as the barge was anchored in the middle of the river between the New York and New Jersey shores, safely out of reach of the vigilant police, who frowned upon the fisticuffs. There they went to it with bare knuckles and in the eighth round Flood was counted out and Sullivan acclaimed victor by a knockout. After which the motley crowd slunk back into the depths from which it had come.

On July 2, 1921, Jack Dempsey, the Manassa Mauler, engaged in fisticuffs with one Georges Carpentier, recently arrived from France. Prize fighting was fairly popular. One Tex Rickard had done much to make it so. A showman of the first water, he had given the game a glamor it once lacked, and created an atmosphere of relative refinement that attracted a class of society which formerly thought of prize fighting as nothing more than gangland's method of getting excitement out of life. Dempsey, by his brute strength and fighting personality, had added to the repute and popularity of the ring. Carpentier, being a Frenchman and a professional dancer, and also handsome, added an international and romantic flavor to the scene. Would the crown remain in this country? The question was good for countless columns in the public prints of the nation.

The first commercial broadcasting station, KDKA, had opened a short year before. It was still the only one in existence. Three months were still to elapse before WJZ began its career. The public was scarcely radio conscious. No commercial sets were being manufactured in mass production. David Sarnoff asked Major J. Andrew White to arrange for the broadcasting of the fight. Together with Harry Walker and J. O. Smith, the Major labored to prepare for the event.

Announcers Also Suffer

It was found that the General Electric Company had a transmitter, ordered by the Navy but not delivered. He borrowed it. The Lackawanna Railroad was talked into permitting the broadcasters to erect an aerial between two of their towers in Hoboken. After much trouble, special telephone circuits were installed to Boyle's Thirty Acres in Jersey City. The transmitting apparatus was erected in a galvanized iron shack utilized for a dressing room by Pullman porters, who threatened violence to this mass of wires, bulbs, and switches. Smith slept alongside the set. The equipment was tested until the night before the bout. At best the signals could be heard only a few miles away. But the following night, at the crucial moment, the transmitter enabled many people to listen in on the contest—if they had sets—and would listen.

The three broadcasters stayed up until four in the morning of the day of the fight, testing, arranging. Then, instead of going to bed, Walker and White went to the arena to set up the microphone at the ringside. Having surrendered their tickets at the gate they could not leave the enclosure. They had nothing to eat. They sat, and smoked, and worried. Intermittent showers dampened their clothes and skin. Their spirits were already dampened. When the sun finally rose the heat, mingling with the dampness, caused what is popularly known as humidity. Steam rose from the arena and themselves. Smith was at the transmitter in Hoboken. Finally the arena began to fill, became crowded, the hour arrived and the fight was on. White had not thought how he was going to announce it. He had no time to think. Only time to worry. At first he could not start. But being an amateur boxer, he soon be-

came lost in the enthusiasm of the occasion, and keeping his eye glued to the fighters, announced in the ready, clear, natural style that marks the man who knows whereof he speaks. One eye he kept on the fighters. The other on a thermos bottle of ice water. He never drank therefrom. The holder of the bottle misunderstood his wild beseechings.

Between rounds, Smith at the transmitter telephoned back to White his okay of the transmission. Smith too was having his troubles. Standing close to the transmitter he was partially blind for days afterwards from the glaring tubes. The equipment was not built for continuous service with the power that was being used. It became hotter and hotter. In the middle of the last round, having been on the air more than four hours, one tube exploded. Smith pulled the base from the socket and quickly inserted a new one. After the final signing off, he went to the hospital to have the palms of his burned hands bandaged. Before the end of the fight, the transmitter had begun to smoke, and shortly after the finish of the program it resolved itself into a rather molten mass. Two hundred thousand people heard the fight. And they were not hoodlums.

Sports Promoter Par Excellence

Radio grew with sports and sports grew with radio. Each helped the other. By 1923 the broadcasting of the second Leonard-Tendler fight was one of the big radio features of the year. It too was announced by J. Andrew White, who, in his Carpentier-Dempsey encounter, made a name for himself as one who could thrill an audience, intelligently describe a bout, carry to the listeners the atmosphere of the occasion, and make them not so sorry that they were not at the event in person. He also set a technique which has long been followed in announcing boxing bouts over the air.

Other sports were heard over the air. Boat races were considered exceptionally suited to radio reporting. But in this work the problem of remote control was encountered to the nth degree. From what place to broadcast? The races are usually one to four miles long. The announcer cannot see the entire proceedings without traveling with the boats. But how could he relay the account

from a moving train or boat? This problem was finally met by an ingenious method. A short-wave transmitter was mounted on a motor boat, which followed the racing craft. The announcer in the motor boat described the race by radio telephony to the transmitting station, where the account was reproduced through a loud-speaker, in front of which was placed the microphone, which picked up the announcer's voice and rebroadcast it over the regular broadcast channels. Alternatively, a direct connection between the output of the radio receiver which picked up the announcer and the input of the broadcast transmitter was used. Like the proverbial Englishman, radio has "muddled through somehow."

Baseball was natural material for broadcasting. It was the national pastime, understood by all, easily explained over the air. The only trouble was that the game is rather slow. Time between plays is long and the game may last two and a half hours or more. How was one to fill in between waits? It sounds very easy, but let anyone try to keep going for two and a half hours steadily and remain interesting. That is not so easy as it sounds. It was to meet the demand for information during baseball announcements that announcers looked up baseball records, biographies of players, their records on the diamond, any and all information pertaining to the game. Brilliant ideas, conceived weeks in advance, were jotted down, alongside of wise cracks, puns, anecdotes, similes, figures of speech. These were used as "filler" material and kept the audience from turning to other stations.

Football came into the field of radio news. Six-day bicycle races also broke into the radio programs, not for a six-day continuous session, but on and off during the grind, for the final hour and for results. And sports summaries of the day became a feature as regular as the weather reports and the time signals.

By 1926 radio had become the Joe Humphries of sport. Even his stentorian tones faded into insignificance in contrast with the voice of the radio. He might boast of addressing the largest audience in the world. Radio laughed at him. It turned his thousands of listeners into millions.



**URNS WHISPERS INTO ROARS: THE CONTROL ROOM OPERATOR CAN
MAKE OR BREAK THE PROGRAM**

The clock tells the operator when to fade the program in or out. He listens to the program via the loud speaker in the panel at the left. He sees the performers through the window in front of him. He phones instructions to the studio outside. He regulates mike volumes with a twist of a knob. He keeps the hand of the meter on the case low and steady.



RADIO-CINEMATOGRAPHER CONRAD: ALWAYS AMONG THE LEADERS

The pioneer Frank Conrad with the Westinghouse motion picture radio transmitter. Rather complicated, don't you think?



More Ringside Seats

On the night of September 23, 1926, Jack Dempsey was to defend his title against one Gene Tunney, late of the Marine Corps. It was quite a social event. Everything conspired to make it so. Tex Rickard again displayed his showmanship in the staging, publicity, and general managing of the affair. The fiery Dempsey, still Manassa Mauler, returning to the ring after three years' absence, became the focal point of speculation. Was he still the same battler? Tunney, known as Gentleman Gene, read Shakespeare in training camp, associated with the upper crust of society, and attracted the shirt fronts and silk hats. Ladies in evening gowns attended the bout. And the radio microphone was at the ringside.

A nation-wide hook-up was connected through the National Broadcasting Company stations. The fight took place in Philadelphia but the whole world attended. Well, almost the whole world. WGY of Schenectady relayed the message on short waves to South America and England. Thousands of Englishmen stayed up till the wee hours—the fight was on at 3 A.M. English time—to hear the doings. Argentina, Brazil, and Panama received the tidings. Radio fans of Johannesburg and Cape Town, South Africa, sat up in pajamas and heard the fight. Ocean liners picked up the news for their crews and passengers. Stations from Portland, Maine, to Oakland, California, carried the message of each blow. One hundred and thirty-five thousand people crowded the arena to see the fight. Millions crowded about loud speakers to hear it.

The following morning the papers devoted acres of space to the fight. Feature stories, blow-by-blow accounts, stories of the crowds, their attire, stories of the society people, bankers, gangsters present, statistics of the bout and the principals, stories of the reception of the bout in foreign lands, "I told you so" stories, prophesy stories, interpretations of the fight, impressions of women reporters, ghost stories by fight managers, emotions of the principals. And with it all, the enterprising New York *Times* printed the verbatim radio account—100 column inches plus a

map of the United States showing the stations that broadcast the fight.

At the head of the article was the following announcement:

Here is the story of the fight as 15,000,000 radio listeners heard it when it was broadcast from WJZ, WEAJ and other stations by Major J. Andrew White and Graham McNamee. It was recorded in the New York Times office by three expert shorthand writers . . . working in relays. Incidentally, this is probably the first time that the radio story of a big news event has been reported verbatim.

Several days later both announcers wrote for the papers their impressions. Articles also appeared concerning the fight announcers' tasks, their difficulties, and other radio sidelights. Radio had taken sports as its own.

One might expect a little relapse after the strenuous efforts of the fight. But the same day that the newspapers announced the verdict of the previous night's battle, there appeared in the New York *Sun* an article announcing that the coming World Series would be broadcast. And therein lay the seed for much future strife.

Tex Rickard, taking the broadcast bull by the horns, decided to class the microphone with the camera as a concession. The movies paid for the privilege of filming the fight. Should not the broadcasting companies "come across" for the privilege of announcing it? They not only should, but they did and to the tune of \$5,000. For the previous three years the baseball magnates had generously allowed the world series to be broadcast free of charge. They looked at Mr. Rickard's ability to collect with envy. But three years spells tradition in radio. Once again they had to let the microphone into the ball park on passes. The football games also granted broadcasting privileges free of charge.

The World Series of 1926 started on a Sunday. WEAJ and WRC of the NBC chain had already contracted for religious programs. Realizing their debt to religious as well as sporting America, these stations kept their religious features, while 22 stations, with WJZ as the key station, broadcast the opening game. This was the first WJZ national network. Again the papers printed verbatim accounts of the radio announcement of the game. Not only the game, but also the noise of the crowd, the cheering

as Babe Ruth came to bat, the clapping, yelling and even the hushed silence (in a manner of speaking) was borne to the outer circle of fans.

Spellbinders

The question arises, Why should the radio accounts be printed verbatim? Is it not enough that newspaper reporters' accounts be printed? It seems on the face of it just as inconsistent for the radio report to be published as to broadcast the printed account. For an answer we must look at the broadcast report.

Sports announcing had already developed far beyond studio announcing. Announcers had impressed their personalities upon an eager public. Street corner discussions were not uncommon concerning the relative merits of the announcing of McNamee and White. The former was believed at that time to know relatively little about the technical side of sports. At any rate he did not claim to be an authority. But he did know human nature. He knew that most of his listeners knew about as little of the technicalities involved in baseball, or football or prize fighting as he. And they cared less. What they wanted was the spirit of the game. And this he gave them in a masterly way. As an actor develops character, atmosphere, mood, changes his pace to suit the rising and falling action, so McNamee announced, running the gamut of emotion, becoming audibly excited at the crucial moments, using the popular idiom, putting the spirit of every punch, every pitch, every run into his voice, speeding up his voice with the tension of the play, letting it subside with the aftermath of calm. He is the average fan incarnate, and a true artist in his interpretation through the voice to the radio audience.

White, on the other hand, is a technician of sport. He knows it as a professional, and is keenly aware of the fine points, the subtle plays, the "master-minding" of the opponents, the whys and wherefores of every move. To the fan who takes his sport seriously, as a study, White's announcing is more appealing. Cold, calculating, exact, precise in his terminology, he knows the game and speaks with authority. But he lacks in a measure the spirit, the emotion of the average fan. Both are masters in their own way, the one technically, the other artistically. Both have their

loyal supporters. Both were star announcers, sent all over the country to announce important events. In reporting many sporting events in the past they worked together, announcing alternate rounds, innings, quarters.

Phillips Carlin is another who has joined the small but distinguished group of personality sports announcers. He has a radio individuality and a method of announcing all his own. The work of all three of these and others, not forgetting Ted Husing of the CBS, whose voices are nationally known, debated, and accepted, might well be called vocal literature. Their announcing has style, subject matter, character, atmosphere. But it is spoken only once. That such artistry may be preserved in more permanent form, it is being recorded in the daily papers. Readers, even those who have listened to the original announcing, like to read what they have already heard, and again live over the thrills of the event.

Talking into Three Days

On July 26, 1928, Tunney fought the New Zealander, Tom Heeney, to retain the title he had won from Dempsey. Again the entire nation was hooked up by radio, and not only the entire nation but a large part of the world. Merlin H. Aylesworth, President of the National Broadcasting Company, through whose efforts the hook-up was provided, made the statement that the broadcasting of the fight "was the most constructive thing ever done for the boxing game. . . . It marked the first real world-wide report of a news event, . . . the first attempt to coördinate the great broadcasting systems of the world, and our reports indicate that it was highly successful. As McNamee (who broadcast the fight) said, he was talking into three days—yesterday, today, and tomorrow.

"It was probably the most constructive thing ever done for the boxing game, as it stimulated interest everywhere and gave the world a direct ringside picture of the clean and sportsman-like performance of Gene Tunney.

"In behalf of the listening public of the world I desire to thank Mr. Tex Rickard for his fine coöperation and sportsmanship in this world-wide broadcast."

Large numbers of short-wave receiving sets in the greater portion of the earth were within reach of the blow-by-blow description. The New Zealand fans, rooting for their native son, heard the results a fraction of a second after the act. Heeney's parents knew of the result immediately and radioed Tunney their congratulations. Australia, New Zealand, England, the Continent, Africa, South America—all listened in. President Coolidge, Hoover, other dignitaries sat before their loud-speakers. It was the first event to which the whole world listened.

There is another side of the picture, however. Let us listen to the words of Tex Rickard, the impresario of the event that created such a hook-up, that excited the world. The man who staged the event to which the world listened made the following statement in the next morning's newspapers.

"This is the last big fight I will stage and permit the radio at the ringside unless they pay a handsome royalty. My contract with the radio people expires soon, and I will not renew it unless they are willing to pay high for the privilege."

The fight had lost money. Some blamed it on the absence of the colorful Dempsey in the ring. Tex blamed radio. Nothing remains but to console ourselves with the philosophical thought that every triumph has its disparagers, every moot question has two sides. But even the absence of Mauler Dempsey, the gentleness of Gentleman Gene, and the wailings of showman Rickard failed to stop the growth of broadcasting in the realm of sport. Time passed. Soon the World Series was around again. Radio broadcast the games. The football season displaced the national pastime. Radio broadcast the games. Radio refused to be displaced. The people wanted radio. The people wanted the games. Radio had taught people to want the games, and radio had taught people to want radio. It was too late to take it away, and it was well for sports that this was so.

"Playboys of the Western World"

Man has been called a reasoning animal. When we consider some of man's doings, for instance, riding in crowded subways; when we meditate on certain of man's preferences, for example,

night clubs; when we cogitate on some of man's tastes, for example, hysteric jazz—we are likely to doubt that he reasons, at least consistently. But it is true, nevertheless, that he is not satisfied with merely observing facts. He wants to know the causes, the results, the significance of those facts. Catering to man, the reasoning animal, let us try to interpret the facts of radio and sport.

It has been said by critics of the American scene, who claim to know, that Americans do not know how to play. They know how to work, and work hard. But the securing of human satisfaction during the hours of their leisure is a problem greater than the utilization of their working hours. They do not know how to enjoy themselves. They try so hard to have a good time, and fail. Unable to react normally to play, they grow desperate. Working so hard during the day, at such monotonous tasks, they try in the evening their utmost to lose their work-a-day personalities. Not being able to play, they become children again, blow horns, swing rattles, wear paper hats in night clubs, try to be "good fellows," young, gay, frivolous. Their attempts are poignantly pitiful. They look to the irresponsible, gay, lighthearted collegian and the sport with envy. They try to imitate them. But their business selves protrude from behind their grimacing masks, as from their waistcoats do their paunches, their gold watch chains, and their stuffed wallets. They have lost the capacity of being thrilled, which is at once priceless and beyond price. They have lost the glow of emotion, these Americans, who, in view of their hard and monotonous working lives are probably more in dire need of entertainment and play than any people in the world.

Play by Proxy

As a result they have let other people do the playing while they have managed to satisfy themselves by the vicarious thrills and emotions of watching and listening, mentally putting themselves into the players' places and thereby becoming duly thrilled. Unable to play baseball, they let the Big League players play in their places. But in his hidden self each fan is Babe Ruth as the mighty Monarch of Swat clouts the ball over the fence and runs

around the bases, doffing his cap to the cheering bleacherites as he rounds second base, and to the grand stands as he rounds third. Every man in the stands has hit that ball, run the bases, received the ovation, doffed his cap. In football, every freezing inhabitant of a coonskin coat makes the pass, receives it, runs for the touch-down, kicks the winning goal. The fighting instinct of every man is furnished an outlet at the prize fight. No wonder the sport audiences of America are far larger than those of any other country. But at best only a small proportion of the country's population can attend the events of sport. Those who cannot attend are no less anxious to experience the excitement and tensity of the game. So they have taken to their radio sets. With even less discomfort than the man at the game, the radio listener sits in the warmth and comfort of his favorite chair, in bedroom slippers, before the fire, smoking his pipe, his dog by his side and gets the thrill of the gladiator in the Roman arena. An outlet for suppressed desires, as the psychologists say, which might otherwise manifest themselves less happily in wife-beating, spanking the children, throwing furniture, kicking the dog, or defying Constitutional amendments.

Radio to the Rescue

Our colleges are crowded. Every tousle-haired freckled lad with a high school diploma enters college. He comes home crammed with that intangible thing called college spirit. He boosts the college athletic teams. Among the various sports indulged in by himself or his college chums, the favorite is football. For years this sport has led in popularity all other college sports. But outside of college it was unknown. It was primarily a college affair, like studies, examination marks, diplomas. Radio has changed all that. The millions of men who have no fraternity pins, no alma maters, have listened to games over the radio. They have their favorites, for whom they yell themselves as hoarse as though they were freshmen. They feel a proprietary interest in certain institutions of the higher learning, so called. Radio has brought football forth from the confines of the campus and made it, it is true, an industry. Through the ministrations of radio interest, this sport has

grown to such proportions that hundreds of thousands of dollars are taken in gate receipts each season by single colleges. And the average season includes only eight games, covering as many weeks. This interest on the part of people largely outside of the colleges concerned has enabled some institutions of a scant thousand students to erect stadia seating 50,000 and more. The greatest mass of humanity ever assembled to watch a sporting event was gathered together at an Army-Navy football game in Chicago.

During the nine weeks of the football season the great networks of the country devote their Saturday afternoons to the reporting of football games. For the more important inter-sectional contests coast-to-coast hook-ups are effected. Otherwise the most important games are chosen for broadcasting. The Big Three, Army, Notre Dame, Michigan, and California are among the teams that may be followed through almost their entire seasons via radio. And then almost every year some small college comes out of the obscurity to bowl over some giant of the gridiron and rush through the season undefeated. Center College did the trick one year, Southern Methodist another. The following season radio decides to follow that team, which quietly loses to second rate colleges. It is hard to know where the exciting games will break. But radio chooses as best it can.

The post-season games are ballyhooed for weeks in advance. The annual Christmas Day East-West clash, made up of teams whose players represent various colleges, is broadcast. So is the Tournament of Roses game between the foremost contenders of the East and the West, who fight it out for the mythical national championship amid the profusion of flowers and gaiety that marks the celebration. This game is a favorite broadcasting event, since it permits the announcer on a nationwide hook-up to tell the freezing folks back East how warm and luxuriant is the California setting. The game takes place on New Year's Day.

One of the results of radio's appropriation of football is the overemphasis of sports in the collegiate mind. Personalities are quickly built up to tremendous proportions by radio. Witness the overnight rise to fame of Albie Booth of Yale, whose work in one game was broadcast throughout the country to make him a

hero before sundown. Marsters of Dartmouth and Cagle of Army have also been highlighted by radio, which vividly pictures their exploits and romanticises their personalities.

In the footsteps of radio the newspapers have appropriated football. The Big League baseball magnates have frowned upon the practise of the papers in publishing football news toward the end of the baseball season, and in fact during the important baseball World Series. Football, following so closely upon the baseball season, tends to crowd baseball off the fall sports map. Next year the baseball season will end a week earlier. And whereas the football season used to end on Thanksgiving Day at the latest, the tremendously increased interest in the game has caused the playing of inter-sectional games, post-season games between the leading teams of different sections of the country, stretching the season to the first of the year. Every man in the country now has his alma mater, at least so far as football is concerned. And to hear him talk of his favorite team, the players, coaches, schedule, scores, one would think he was an inmate of the institution.

America may not yet have learned how to play, but it has certainly learned how to enjoy itself. Radio has become the country's chief recreation for the individual. And in a literal sense too. It has recreated the country. A radio game a day keeps the doctor and psychoanalyst away. Times do change after all.

CHAPTER XV

RADIO AND THE WOMAN

WELL, yes, that's true,—a few business offices are installing radio receivers, but for the most part they are considered more as an instrument of the devil to lure clerks from their appointed tasks to listen in on distracting jazz during working hours than as a business asset. They are fine for the executive, otherwise only when locked. No, just as a piano may be called office equipment in a music publisher's establishment but hardly anywhere else, so too radio will have to be looked upon as a feature of the home. And anyway, most of the programs are music, so why not think of the radio as a musical instrument, like the piano, or better still, as a super-phonograph of wider and instantaneous scope and requiring the purchase of neither records nor needles, and requiring no winding? The radio is primarily an entertainer. Its place is in the home.

That phrase sounds familiar, "Place is in the home." Was not that said about something else, a long time ago? Oh, yes, about woman. Woman's place is in the home. The old battle cry of the anti-suffragettes. Remember the suffragettes? But we must get back to the subject. What were we talking about? Oh, yes, their place is in the home, women and radio. Well, that links up women and radio pretty closely. The woman keeps closer company with the radio than anyone else in the family.

The Living Room Laboratory

The broadcaster, indeed the whole radio industry soon after its formation, was faced with the problem of pleasing the ladies. And though men may be more hard-boiled, just try to please the ladies!

From the very beginning, the womenfolk were prejudiced against the radio. It was all right for hubby or son to tinker

around with a lot of storage batteries, spluttering acid all over the floor, stringing wire throughout the room, even up the chimney and on the roof. But Madam Wife did not exactly appreciate the beauty of the early sets, nor did she relish cleaning house with all that truck floating about. Now you know that stuff rightly belongs in the barn, not the house, and much less the city apartment. It took up almost a whole room and was a ghastly sight. What was worse, if anything went wrong, the woman was always accused of having tinkered with it during the day. The least charge was that she must have done something to it while cleaning, even though dust lay thick upon the apparatus. For she kept yards away from anything that looked like radio. Well, women were not to be blamed exactly. After furnishing a home, to have it changed into a combination electro-chemical laboratory and blacksmith shop—that was no fun.

But the radio industry soon got around that. The cabinet model radio sets with the batteries and all inside, swept up the mess into a box and put it on top of the table. All that remained were a couple of wires sticking out, one leading to the aerial, the other to the ground. The woman asked friend husband if it was all right to dust the cabinet. Well and good, but don't open the cover! So the radio cabinet was dusted and polished and civilized. It made its *début* as a piece of furniture. Came the time that grave decisions had to be encountered. The room was done in walnut. A mahogany cabinet would be out of place. Or how about a radio cabinet to fill out an awkward corner? The radio receiver found its appointed place amid the furnishings of the home. Cabinets are now designed by artists and manufactured in every style and period from the days of Tutankhamen to the modern and futuristic.

Sauce for the Goose

The program problem was not so easily solved. Women's interests are in a measure different from those of men. In order to gain an idea of feminine tastes, the broadcasting companies consulted the women's magazines. For one thing they contained household hints. But such hints were not overly suitable to radio presentation. They are too general to write down, but lack perma-

nency unless pencilled. Then there were recipes. The problem here was that recipes are not easily remembered. They demanded painfully slow copying, and that in turn required the listener to be prepared with paper and pencil. If the housewife had to run upstairs for paper or look in the desk for a pencil she would lose some valuable information. Such programs had to be consciously prepared for by the listener, in advance of the hour. Of course, it was impossible to give dress patterns over the air. The best that could be done along this line was to describe the garments and ask those who were interested in any particular pattern to write for it. Finally, there was the usual saccharine magazine story. These were generally tuned out by the male members of the family immediately upon hearing the first sentence. And at best, they lost their flavor unless spoken by women. But women were only rarely popular radio speakers. The ideal speaker for a woman's hour should combine a man's easiness with a woman's interest in feminine problems. Programs were indeed a problem.

The common meeting ground between particularly male and exclusively female programs was in music. But even this was but a minimizing of the problem, not a four-square solution. At first, radio was more of a comfort than a real aid to the woman. The day following the opening night of WJZ, with its jolly program, a Rochester girl wrote to the broadcasting company a letter in which she said, "I live alone and for a long time have been very lonely. I was faced with spending a dismal evening all by myself. I felt so gloomy I expected to have a wretched evening. Fortunately, I was recently given a radio set. I tuned in to your station and heard your program, which cheered me up. I felt so good that I wanted to write you."

Other letters told of lonely maidens who went to bed early, having nothing else to do, and lay weeping on their pillows by the hour. Life was hard and bitter and disappointing. But radio helped considerably, brought them in contact with others, music, something to enjoy, in which to partake. Another woman wrote thanking the broadcasting company for keeping her husband home nights. For years he had frequented poolrooms and bars. An habitué of the haunts of crime, he had been led back to the family hearth, his wife and children, by the entertainment offered

in his once barren home. But this appeal could scarcely be called feminine.

Program Hunters

One consolation there was for the broadcasters seeking suitable programs for feminine consumption. While their special tastes limited the field of action, it also intensified that field. In the morning and early afternoon women were not only the major portion but almost the entire radio audience. Since the audience was so select, the broadcasters could build their programs to fit the needs of their audience more closely. At no other time of day did the radio audience have so much in common, one with another. The audience was almost a closed organization of housewives. At first sponsored programs were few during these hours. Time had to be filled somehow. Not only somehow, but in such a manner that potential sponsors might be willing to purchase time in the morning. The broadcasters were faced with the immediate problem of filling time and with the further problem of convincing the prospective sponsors of the value of morning time by showing the radio audience the value of morning programs.

The first step was to see what women did during this portion of the day. Easy enough. They discharged household duties—cook, clean, wash, shop, take care of the youngsters, perhaps nurse the sick. Some time in the morning the woman finds a few moments for reading or other informative relaxation. In the afternoon she may go shopping, sew, furnish the house, play bridge, attend a reading circle, a lecture, a concert, do charity work—any number of things. To these interests would the broadcasters cater.

As the broadcasting stations found their evenings filled, they sought a wider appeal, or rather, a longer appeal as a basis of increased time rates, by going on the air in the afternoons. Later they went back still further, beginning the day at about 11 A.M. Talks and informative playlets on household topics appeared on the station schedules. As they gained wider acceptance the radio day started earlier and earlier, until at the present time, he who rises while it is still dark in the December sky may start the day right with setting-up exercises. Whereas formerly, radio stations considered themselves purveyors of pure entertainment, and kept

entertainment hours, the same as the theatres, short and late, they have now taken upon themselves some of the responsibilities of public utilities, with scarcely any off hours and no holidays. As the morning radio programs grew in the scope of their subject matter, women came to look upon their morning and early afternoon radio hours as serious business, practical aids in accomplishing the many tasks that fall to the lot of women.

Interest in these sessions assumed such proportions that during a week of February, 1928, Mrs. Elinor G. Hana, head of the Candy Institute, and a regular broadcaster from WJZ since 1923, conducted a public exhibition of candy and cakes. The scene was the Savoy-Plaza Hotel in New York. All the dishes on view were prepared by listeners-in from recipes and directions broadcast by radio. In spite of the difficulty of writing down the recipes as they came in over the loud-speaker, sufficient interest had been shown in the course to lead to the exhibition of enough cake and candy to satisfy all the youngsters in the country for—well, we do not know for how long.

The Five-foot Shelf

As a further indication of the width of appeal to which radio programs for women had attained, and likewise the interest of women in radio programs, those devoted exclusively to women's interests broadcast during the week of February 27, 1928, included one talk on sleep, two French lessons, twelve health talks, one dancing lesson, five discussions of fashions, four discourses on the home, five on shopping, four on children, two gymnastic studies, one political discourse, one on psychology, one on charm, three on diseases, three on books, one English lesson, six on food, one on nature study, two on the problems of parents, two on international affairs, one on charity, another on aviation for women, one on citizenship, two bridge lessons, and one of general interest, known as the Woman's Hour.

Nor was this an exceptional week. In fact, compared to the present-day programs, it rather lacked for variety of subject matter. A typical late 1929 daily bill of radio fare taken at random and classified according to subject reveals not so much that broad-

casters have found the great feminine interest, as that women have become interested in a greater variety of subjects. In one day there were the following programs catering chiefly if not entirely to women.

<i>No. of Programs</i>	<i>Subject</i>	<i>No. of Programs</i>	<i>Subject</i>
1	Sleep	3	Diseases
2	French Lessons	3	Books
12	Health Talks	1	English Lesson
1	Dancing Lessons	6	Food
5	Fashions	1	Nature Study
4	The Home	2	Problems of Parenthood
5	Shopping	1	Charity
4	Children	2	International Affairs
2	Gymnastic Studies	1	Aviation for Women
1	Political Discourse	1	Citizenship
1	Psychology	2	Bridge Lessons
1	Charm	1	Woman's Hour

Where is the woman who is not attracted to several of the interests treated in the above list?

The Woman Buys

Whereas evening programs are looked upon as pure entertainment, and do not allow of much instruction, informative value, and advice, except in a casual way, the women's programs are received not so much for their entertainment as for their instruction. It is in the same frame of mind that a financier looks through the stock market reports in the morning newspaper that the woman listens in on the morning radio programs. She wants information, dressed up a bit perhaps to be more appetizing, but primarily instructive.

Manufacturers and distributors of household articles and services soon recognized the advertising value latent in these morning programs. In many cases their products are bought chiefly by women. The survey of one woman's magazine shows that no less an amount than 85 per cent of all the goods sold in retail shops is bought by women. Here was a chance for the

advertiser to speak to the prospective purchaser of his goods, at a time of the day when time on the radio was cheap. Moreover, in the morning his message required fewer adornments by way of entertainment than in the evening. The advertiser took advantage of the opportunity. Morning sponsored programs have taken a firm hold. One advertising agency has gone so far as to buy an entire hour, which it in turn sells in 10 and 15 minute periods to its clients who wish to go on the air.

Plays for Products

Since the morning radio program can be somewhat more outspoken concerning the sponsored product and its uses, the frills of program making are done away with to a considerable degree. Many of the programs are confined to talks. Often playlets are put on the air, demonstrating the use of a product. Such a program has the added element of home appeal, plot, perhaps a little characterization. Its appeal is more definite. The characters might be a young girl and an elderly woman, giving the idea that both ages find use for the product. Among the more common themes are mother love, fastidiousness of dress, catering to a man through his stomach. These plays are often quite sentimental. The plot usually revolves around the product. The characters find themselves in uncomfortable or dangerous situations, from which they emerge successfully to a happy life through the aid of the sponsored product.

Radio plays are no dramatic masterpieces. Their messages are "plugged" rather heavily. The plots, while interesting to the extent that they treat of human values which are experienced by the great mass of people in their everyday lives, and have a certain glamour of romance, are sometimes far-fetched in the extreme.

Housekeeping, the Industry

Radio programs devoted to the interests of women have changed the entire complexion of household work. From being an entirely personal form of work, household duties have become scientifically regulated. Efficient household management has taken

the place of a haphazard, tedious grind. Certain hours have been set aside for marketing, cleaning, cooking, sewing, etc. By studying the conditions of housekeeping in thousands of homes the radio has been able to give the average woman, who has no chance of seeing how other women run their homes, a survey of conditions answering such questions as where and what to buy, the problem of seasonable menus, and at what seasons the various articles of household use, especially food, are cheapest and most preferable. The most efficient methods of housekeeping, varied menus, recipes, figures on household expenses, how large a percentage of income should be spent for food, clothing, furnishings, are problems that the radio meets. If more is spent, the housewife recognizes poor management somewhere. She learns how to correct faults, save time, take household duties out of the category of drudgery, place them in the category of a scientific business. In these ways has radio placed housekeeping on a par with other businesses or industries, given the women of America a goal toward which to strive and the information with which to reach that goal.

With women entering the professions wherever possible the housewife would have felt herself out of the economic picture had she not with the aid of radio fashioned her own work along the same lines as that of her husband. Radio has raised the running of a household to a position of one of the most important industries in the world, an industry the executives of which are women.

Mrs. John D. Sherman, Chairman of the Women's Activities Committee of the Advisory Council of the National Broadcasting Company, in the report of her committee at the fourth meeting (1930) of the Council, made several suggestions in regard to women's programs, the most interesting of which concerned women in industry. Mrs. Sherman suggested that talks on women in industry, under the direction of the Women's Bureau of the United States Department of Labor, would prove most valuable. Not only are there eight or nine million women wage earners in the country, but the overwhelming majority of these are parts of families, each of which is vitally concerned with the welfare

of its woman wage earner, the realization of which fact heightens the interest in women's programs.

Among the topics suggested by Mrs. Sherman for a series of talks on women in industry are Woman's Changing Economic Status, What the Home Maker as Wage Earner Means, How High Standards of Employment for Women React, Changing Standards of Living and the Woman Worker, The Woman Worker and the Machine Age, Why the Married Woman Worker?, The Modern Woman's Double Job, Types of Women Wage Earners and Their Responsibilities to Home and Family, What Wage Earning Women Contribute to Family Support, The Vicious Circle of the Double Wage Standard, Chivalry and the Woman Worker, The Responsibility of the Woman in the Home to the Woman with a Job, and Daughters and Their Future Jobs.

The Melting Pot

We have treated of radio as a business help to women during their working day, as the trade paper of the home. It has aided women also in their cultural and worldly lives. Before woman suffrage came, the great argument against such a move was that woman's place was in the home. A corollary of that statement is that in the home the woman is isolated from the happenings of the world—politics, business, the arts, culture in general. Many women strenuously objected, not only to the corollary but to the statement of opinion as to the woman's place as well. Some had no families, others employed enough nurses, maids, and cooks to be able to afford going out into the world, to Europe, to parties, concerts, recitals, lectures. They looked down upon their sisters who were tied by apron strings, housewives, drudges, the "slaves of man." But through radio these housewives have become independent. No longer are they ashamed to be workers in the home. Theirs is one of the most interesting of all vocations. And since radio came, their sisters in luxury can no longer consider themselves a class apart.

The most hard-working woman, spending her day over the tubs and the kitchen sink (though most of them have been taught by radio to accept the economies of the electric washer and the auto-

matic cooker) has now a chance to catch up with the events of the world. Turning on the radio while she irons the sheets or boils the potatoes she learns French by air, brushes up her games, listens to the same concert or recital as her once more fortunate sister who is free from household duties, and in a dozen other ways relaxes, learns, broadens the scope of her activities and interests.

Radio Raising the Birth Rate?

One of the offshots of this development may be the raising of larger families. Of recent years the modern girl, longing for the freedom of single life, or a childless home, fearing the drudgeries and burdens of home making has approved a marked lowering of the birthrate. Unfortunately, most of these women were of the wealthy class, who could best afford to rear a family. But they knew nothing of housekeeping, cared less, and felt that they would be cut off from the many activities to which they were accustomed. Now it is largely changed. Anyone can learn to keep house by radio; doing so has become a fascinating endeavor; it no longer means the foregoing of all the pleasures and interests of pre-marital days. Realizing this, thoughtful women are considering marriage, the bearing of children, and the maintaining of a home as less a step to obscurity and drudgery than before.

Because woman's lot was the hardest before radio, hers has been the greatest gain since. And because she is at home with the receiver more hours of the day than her spouse, its influence on her life and its many activities is the greatest. Not only as an instrument for pure entertainment does she look upon radio, but also as a practical help in running her business—the house, and as a means by which she can keep in constant contact with her many interests beyond her own front door. Women are looking to radio as their especial benefactor. And toward women radio looks to exert its greatest influence in creating a better home life and a finer American citizenry.

CHAPTER XVI

RADIO AND EDUCATION

THE telephone bell rang that evening and the following day forty children learned little new at school. Dick Collier, traveling salesman, was passing through town and 'phoned Miss O'Brien, the school teacher. They went to the movies in the evening. The movies were most enjoyable. They came back to Miss O'Brien's home and sat about listening to the radio. Of course, when the telephone first rang, before supper, the young lady at the receiving end made excuses. They often do. In this instance Miss O'Brien said that she had to study tomorrow's lesson. "That's how it is with some of us teachers," she remarked. "We're not so much smarter than our pupils. Just keep one day ahead of the lesson, that's all." But the lure of Dick and the movies was too much.

When a student fails to study a lesson, his is the only loss. But when Miss O'Brien missed real classroom preparation, the entire class lost practically a day. As the delightfully delinquent teacher sat with her friend, listening to the radio, one of them remarked, "You know, the Board of Education ought to put the following day's lesson on the radio in the evening. Then you could learn the subject and at the same time entertain and educate your friends."

"That wouldn't do at all," came the reply. "The students would soon catch on and study them also. I couldn't keep ahead of them. It sounds funny, I know, but some of them actually do study. Sometimes I wish they wouldn't. It makes it harder for me. I tell you what, how about teaching the kids by radio? Then I wouldn't have to learn the lesson at all."

"And be out of a job," answered the salesman. Which abruptly ended what was beginning to be an analytical discussion.

Making Students Think

Back in the fourth century B.C. there lived a famous Greek by the name of Socrates, whose fame as a teacher has come down through the ages even to the present day. Tens of millions throughout this period have known him, millions have been familiar with his work and his pedagogical methods. Still, we cannot help wondering how many received the advantages of his teaching. Sitting in the Square with a few faithful students, drawing diagrams in the sand with the end of a stick or his toe, he asked pertinent questions to make his students think. Throughout his long life he may have taught several thousands of pupils. That his influence upon his pupils was great there can be no doubt. Were Plato his only student the world might be grateful. But supposing the ancient Greeks had had the advantages of radio. Millions might have heard his thought-provoking questions. And many of them might have become intellectual torch-bearers.

In 1920 A.D. the first commercial broadcasting station was opened. Uppermost in the minds of many was the notion that this youthful science and art and infant industry should be used to serve youth. And what service greater than education? No sooner said than the branches of trees labeled "Problems" grew as if by magic and, as on so many previous occasions, sought to choke that youth named Radio who was pushing his way into every phase of man's existence. As in the case of women's programs, so long as they appealed to the populace in general they were easy enough to "get across." But as soon as they sought to gain for themselves a special public by an appeal other than that of pure entertainment, dials were tuned to other stations.

Teaching Entertainingly

Broadly speaking, the primary purpose of radio programs is to entertain. The purpose of school lessons is to teach. Of course, the good teacher tries to make his or her lessons entertaining, or at least interesting. Teaching is an honorable profession. It is thousands of years old. And yet, how well it has succeeded

in making school work interesting or entertaining, can be judged by all who have been students themselves. In "As You Like It" Shakespeare spoke of

". . . the whining schoolboy with his satchel,
And shining morning face, creeping like snail
Unwillingly to school."

And even today, most youngsters show a certain reluctance when exposed to instruction of a serious sort. The problem of reconciling the necessity of entertainment in radio programs with the real difficulty of making lessons entertaining seems very far from simple solution. And there are other difficulties.

Teaching is becoming ever more personal. The child is gaining in importance, the actual facts of the curriculum decreasing in emphasis. The child must grasp one step before being given the next. How is the broadcaster to know if the student understands the lesson? Many subjects require personal contact. It would seem most difficult to learn such subjects as arithmetic, physics or chemistry by radio.

Personality Plus

And above all, many teachers have opposed teaching by radio. They believe, and rightly, that the influence of the teacher's personality and methods is at least as important as the subject matter taught. This too is a view gaining in popularity. Surely those of us who have been out of school for more years than we like to contemplate remember our instructors more vividly than the formula they taught us. The subject matter is comparatively soon forgotten, but the character of the teacher may leave its impress for life. He may instil a spirit of thoughtful inquisitiveness that leads the student toward the ardent pursuit of knowledge. To the impressionable young student the character of his instructor may be a guiding light throughout his years. The importance of the teacher in the educational scheme of things can hardly be exaggerated. To the young mind he may be almost a devil incarnate, or the sublime hero of his young

life. Poor substitute indeed would be the impersonal radio lesson for the living example of a noble mind.

Moreover, all children are different, having various capacities for the assimilation of knowledge. One of the more modern trends in education is the segregation of the rapid from the slow students. In addition to the conventional grades, there are special groups in each grade and the students who learn rapidly are given more advanced lessons than the slow ones. The latter may by no means be dullards. Sometimes their abilities lie more in the direction of depth than width of knowledge. The more specialized the segregation the more futile is education by radio, which is predicated on reaching a vast number of pupils at the same time and with the same message. Radio education must cater to the average student rather than take account of the individual ability of the students who listen in. And the average is always far below the maximum, and sometimes not so far from the minimum. Every day teachers are more assured of the unfairness of holding back the more capable student merely because his fellows cannot keep up with him. And it is equally unfair to the slow person to feed him that which he cannot assimilate because he has not yet grasped what precedes. An unfirm foundation will breed havoc for the student throughout the remainder of his education.

"Doth Make the Night Joint-labourer with the Day"

From time to time we read of a University of the Air. It has been attempted since the dawn of broadcasting, but so far with only limited success. Those who would desire a degree from such an institution would be, for the most part, men and women who work during the day. Their studies would have to be pursued during the evening. Such limited time would necessitate a long course, to be followed with undivided attention and without interruption. This procedure calls for discipline beyond the ability of the average student, to say nothing of the business man who is tired after his day's work or who may desire social or other recreation. The radio student would have little time to himself. He would have to work all day and study by radio

at night. If he missed a single radio lecture he might be handicapped in the understanding of all the lectures to follow on the same subject, which would at least in part be predicated on the lecture missed. Many students, in their first flush of ambition, would attempt to master subjects for which they had not the prerequisites. After a time they would be hopelessly lost. Disappointed in their lack of progress, they would give up the course. It would be too late to start another series of lectures having failed to attend the earlier presentations. And where would be found the time for outside work, laboratory experiments, field trips, independent research? Or the inclination? An A.B. via the air seems hopelessly beyond the scope of human discipline, organization of study or physical endurance.

"A Weariness of the Flesh"

It would seem as though information, rather than education, is the field in which radio may be most useful. Objective, cold information may be disseminated without loss of clarity or appeal by radio, to be used educationally by individuals or under individual supervision. In a speech delivered before the alumni of Columbia University on February 12, 1930, Professor John Erskine, press agent for ancient heroes, spoke on the subject, "The Inconvenience of an Education." He stressed the fact that unlike active pursuits, such as business and study of so-called practical subjects which might be actively applied, education (in the strict sense of the word) is a purely intellectual process, and as such, contrary to the realm of nature. The impulse to act is natural; to give birth to an idea in cold blood, unnatural. To interest people in education is therefore a most difficult task. It may be accomplished best by personal contact. Radio should generally be content to cater to an interest or taste already so created—it can scarcely create such an interest itself.

From the foregoing it might appear that education is almost an alien subject so far as radio is concerned. The reader will probably point out many educational features of radio, the Damosch concerts for instance. Music is, of course, the ideal subject

for radio presentation. According to Professor Erskine's definition of education as a purely intellectual process, music would not come under the category of an educational pursuit since it caters to the emotions more than to the intellect. In fact, in his speech already referred to, he spoke of sitting in a movie theatre and feeling perfectly safe in seeing the image of a bull running straight toward the spectators. The audience is safe and at the same time can enjoy the emotions of being rushed upon by a bull. Just so in music. The listener may feel the thrill of a martial air without the danger of being killed by a shell. But forgetting Professor Erskine's example, we may well include music in the school curriculum, where it has reposed without danger of dispossession for many years.

A Prophecy Come True

As early as 1920 KDKA undertook plans for education. In New York, Haaren High School is credited with being the first school to have been used in educational tests. Lessons in accounting were broadcast to its classes from WJZ in 1923. In the same year experiments were carried on in California's rural schools in coöperation with Station KGO. Another series of programs, called the "Little Red School House Programs" were originated by WLS and approved by the State Superintendent of Schools of Michigan, T. E. Johnson. In 1924 The Smithsonian Institution went on the air to carry out its motto: "For the Increase and Diffusion of Knowledge Among Men," in the belief that radio broadcasting was the most efficient means of disseminating information. Until that time the chief means of bringing scientific and general knowledge before the public had been through the publication of reports and the display of exhibits of the National Museum, a branch of the Institution famed throughout the world. In September the Institution undertook a definite program of weekly scientific talks over the radio from Station WRC, covering practically every branch of science, so presented as to appeal to lay listeners as well as those better informed. Dr. Austin H. Clark of the National Museum directed

the programs with the coöperation of the Carnegie Institution and several scientific bureaus of the Government.

Several months before, in November, 1923, Dr. Charles G. Abbott, Director of the Astrophysical Observatory of the Smithsonian Institution, spoke over the radio on the heat of the sun's rays and his experiments with a solar cooker. This initial talk by a member of the Smithsonian staff was so successful that the following spring other authorities with a flair for popular presentation took to the air. Among them were Dr. Clark, who spoke on "Giants in the Animal World;" Superintendent Hollister of the Zoological Park, who spoke of keeping and feeding wild animals; and Dr. Merrill, who discussed shooting stars. Other subjects covered in eighteen Smithsonian lectures included "Children of Greenland," "American Plants," "Dinosaurs, the Terrors of Past Ages," "The Non-Magnetic Ship, Carnegie," and "Big Game of North America." In addition, real Indian music rendered by natives, was broadcast and listened to by the Smithsonian officials over a receiver placed in the main building. Dr. Mauchly of the Carnegie Institution spoke on "Atmospheric Electricity" for the benefit of those radio fans who were annoyed by static.

Although James Smithson, the English founder of the Institution bearing his name, probably never thought of transmitting speech through the ether, Joseph Henry, the Institution's first secretary, in a speech, 81 years ago, voiced the opinion that even the best copper wire was an impediment in the transmission of electric currents. He admitted ignorance as to how electrical communication over wires might be dispensed with, but thought that men in his audience would live to see wireless telegraphy. Perhaps some aged reader of this book may recollect the occasion of this speech and feel the thrill of pride in the realization that 75 years after this radical prophecy the Institution with which he was identified broadcast its information to the country by radio.

In May 1925 thousands of classrooms in New York, New Jersey, and Connecticut Junior High Schools were given lectures by radio. A committee of educational leaders of West-

chester County, New York, with the coöperation of the Radio Corporation of America, arranged the first week's schedule. Current events, civics, history, book reviews, literature, vocational advice, industrial instruction, travel talks and geography, scientific lectures, and hygiene, were among the subjects treated. Experiments along this line were carried out in the classrooms until the end of the school term in June.

College Leaves Campus

In 1923 New York University, one of the pioneer educational institutions in home study courses, sought to augment this branch of its work by broadcasting lectures. During the second year of its activity on the air such interest was shown that an "Air College" department was formed under the direction of Professor Henry Cook Hathaway, director of the Bureau of Broadcasting. In October 1925 New York University commenced its third year on the air. Chancellor Elmer Ellsworth Brown opened the semester with a short address to over a million people. Outstanding features of the 1925-1926 course included a lecture on Greek and Roman classics and their influence on modern life; a systematic program of lectures following standard university practice, and the adoption of a policy calling for the consideration of how radio courses may be made to supplement work toward meeting the formal requirements for a university degree.

The first semester of the "Air College" consisted of fourteen weeks of lectures by seven members of the University faculty. The curriculum included philosophy, psychology, physics, the classics and the economic organization of the United States. Emphasis was placed on subjects which are fundamental parts of a liberal education. Three lectures were given each week in each of five courses, corresponding to classroom routine.

The faculty lecturers spoke from their classrooms at the same time as they were presenting their subject to a group of classroom students. The classroom atmosphere was retained as far as possible for the student outside the campus.

The lectures for the first semester follow. Their wide range and cultural character are at once notable.

MONDAY EVENING—PHILOSOPHY.

Professor Charles Gray Shaw, head of the Department of Philosophy.

- Oct. 19, 1925—The Problem of Philosophy or Deep Stuff.
- Oct. 26, 1925—The Problem of Life or What's Your Pleasure?
- Nov. 2, 1925—The Problem of Knowledge or Just Think.
- Nov. 9, 1925—The Problem of Beauty, not the Beauty Shoppe.
- Nov. 16, 1925—The Problem of Religion or Would You Believe It?
- Nov. 23, 1925—The Philosophy of Radio.

Professor Herman H. Horne, first Professor to broadcast from classroom.

- Nov. 30, 1925—Who is the Patriot?
- Dec. 7, 1925—How to be Happy.
- Dec. 14, 1925—Do All Things Change?
- Dec. 21, 1925—What is Pragmatism?
- Dec. 28, 1925—Is Consciousness Behaviour?
- Jan. 4, 1926—Is Man Free?
- Jan. 11, 1926—Is Man Immortal?
- Jan. 18, 1926—Who is God?

TUESDAY EVENING—PURE SCIENCES.

Professor H. Horton Sheldon.

- Oct. 20, 1925—Molecules and Atoms.
- Oct. 27, 1925—The Electron and the Vacuum Tube.
- Nov. 3, 1925—Inside the Atom.
- Nov. 10, 1925—The Nature of Sound and Light.
- Nov. 17, 1925—The X-Ray.
- Nov. 24, 1925—Ultra-Violet and Polarized Light.
- Dec. 1, 1925—Light and Color.
- Dec. 8, 1925—Heat and Temperature.
- Dec. 15, 1925—Resonance and Radio Reception.
- Dec. 22, 1925—The Nature of Energy.
- Dec. 29, 1925—Sound, the Voice and Musical Instruments.

Professor John Charles Hubbard, head of the Department of Physics.

- Jan. 5, 1926—Physics.
- Jan. 12, 1926—Physics.
- Jan. 19, 1926—Physics.

WEDNESDAY EVENING—PSYCHOLOGY.

Professor James E. Lough, Extra-Mural Division.

- Oct. 21, 1925—The Nature of the Mind. What is it?
- Oct. 28, 1925—How the Mind Develops.
- Nov. 4, 1925—Mental Levels and the Limits of Ability at Each Level.
- Nov. 11, 1925—Mental Ability and Skills Necessary for Success in Various Professions.
- Nov. 18, 1925—Psychology of Advertising.
- Nov. 25, 1925—Psychology of Selling.
- Dec. 2, 1925—Psychology of Management.
- Dec. 9, 1925—Psychology of Study.
- Dec. 16, 1925—Character and the Unconscious.
- Dec. 23, 1925—Character and Physique.
- Dec. 30, 1925—Control of Emotions.
- Jan. 6, 1926—The Use and Misuse of Memory.
- Jan. 13, 1926—Individual Differences and Adjustments.
- Jan. 30, 1926—The Mind of the Future.

THURSDAY EVENING—GREEK AND ROMAN CLASSICS.

Professor Ralph V. D. Magoffin, Head Professor of Classics.

- Oct. 22, 1925—The Live Classics—And Why They Live.
- Oct. 29, 1925—Archeology in its Relations to Latin and Greek.
- Nov. 5, 1925—The Value of Greek and Latin for Culture and Discipline.
- Nov. 12, 1925—How Much Greek Can be Learned Over the Radio.
- Nov. 19, 1925—Greek and Roman History in Their Relation to Modern Times.
- Nov. 26, 1925—Roman Architecture, Science and Engineering.
- Dec. 3, 1925—The Poetry and Philosophy of Greece.
- Dec. 10, 1925—Roman Writers of Comedy.
- Dec. 17, 1925—Greek and Roman Life and Manners.
- Dec. 24, 1925—Greek and Roman Money and What It Tells.
- Dec. 31, 1925—The Roman Epic.
- Jan. 7, 1926—The Greek Theatre and Modern Representation of Greek Plays.
- Jan. 14, 1926—A Glance at the Cæsars.
- Jan. 21, 1926—Greek and Roman Literature as an Influence on Subsequent Literature.

FRIDAY EVENING—OUR ECONOMIC ORGANIZATION.

Professor Reid L. McClung, Associate Professor of Economics.

- Oct. 23, 1925—Characteristics of Our Economic Organization.
- Oct. 30, 1925—Economic Development of the United States.
- Nov. 6, 1925—Market Price Making.
- Nov. 13, 1925—Money.
- Nov. 20, 1925—Banking.
- Nov. 27, 1925—Business Cycle.
- Dec. 4, 1925—Foreign Trade.
- Dec. 11, 1925—Tariff Problems.
- Dec. 18, 1925—The Trust Problem.
- Dec. 25, 1925—The Labor Problem.
- Jan. 1, 1926—The Railroad Problem.
- Jan. 8, 1926—Immigration.
- Jan. 15, 1926—Taxation.
- Jan. 22, 1926—Social Unrest.

Public Schools Participate

The week of November 15, 1925, being American Education Week, Station WJZ coöperated with the Board of Education by loaning its facilities every day, during which entire classes and recitations were held in the studios so that outsiders might see just how they are conducted in the thousands of classrooms in which the children of New York are educated. In the same year Sam Pickard, now an executive of the CBS, opened the famous Kansas School of the Air with lectures on many cultural subjects. A notable feature of this experiment was the equipping of schools and individuals with radio sets built by schoolboys under instructions from university headquarters. A public school of the air was established in 1926 in Atlanta, Ga., with a thirty-minute period set aside for the use of radio instruction in those classrooms which were equipped with receivers.

Other schools and colleges instituted educational programs over the air, many of them owning their own broadcast transmitters. Spokane, Washington; Toledo, Ohio; and Omaha, Nebraska, were towns so equipped. A tribute to the value of broadcasting in schools was paid by the National Committee

for the Training of Teachers in Scotland when they decided to instal wireless sets in the demonstration schools at the four main Scotch Training Centres under their jurisdiction.

In 1928 the Radio Commission granted permission to the Pacific-Western Broadcasting Federation for the construction of a 50,000-watt broadcasting station, to be built at a cost of \$2,000,000 for educational purposes. At the time, George W. Alexander, manager of the Federation, said, "It (the Federation) has brought about the integration of various organizations of education, idealism and culture, including colleges, universities, federations of women's clubs, parent-teacher congresses, State Boards of Education, community chests, library associations and civic groups." The Board of Directors included Dr. Ray Lyman Wilbur, then of Stanford University, and now Secretary of the Interior. The station was to be endowed and to go into operation within a year.

What Price Oil?

Also in 1928 another program of educational character was instituted, consisting of thirty-six weeks of combined lectures and concerts. In the morning a lecture was given concerning the program to follow that evening. It was planned to have the lectures picked up by schools through the NBC network. In the evening accompanying concert illustrated the morning lecture. And who, you may ask, was in back of this educational feature? None other than The Standard Oil Company. *Mirabile dictu!* What is radio broadcasting coming to, when a commercial concern dealing with petroleum products broadcasts at great expense an entire series of lectures and programs dealing with music? Today the Standard Oil Educational Program is a Pacific Coast favorite.

Governmental Recognition

One of the most interesting experiments in radio education was that recently conducted by the Ohio School of the Air. Guided by suggestions received from hundreds of school superintendents and teachers, the Ohio School of the Air formulated

a syllabus to educate not only the inhabitants of its own, but also those of surrounding states in coöperation with Stations WLW and WEAO. The estimated cost to the State of Ohio for reaching each of its 300,000 pupils of the air for an entire school year, was 0.000412 cent. The broadcasts were sponsored by the State.

One of the first moves of Herbert Hoover on being elected President was the formation of his cabinet. He is most interested in radio. One of his sons is a radio engineer. Looking about him he chose for the post of Secretary of the Interior Ray Lyman Wilbur, former classmate of Hoover at Stanford University, and at the time of his cabinet appointment President of that institution. As previously stated, Dr. Wilbur had taken an active part in education by radio. The new cabinet member surrounded himself with an advisory committee on Education by Radio.

This committee was organized at a meeting in the Stevens Hotel in Chicago on June 13, 1929. Four sub-committees were created: the committee on Ways and Means, charged with the responsibilities of securing and administering funds; a committee on Fact Finding, to canvass the field with a view of discovering every experiment in educational broadcasting; a committee on Research, which was to develop technique for evaluating the effectiveness of educational radio programs, and an executive committee to coördinate the work of the other committees.

Grants were soon made by the Payne Fund, the Carnegie Foundation, the J. C. Penney Fund, and individual donors. The Fact Finding Committee found widespread interest in educational broadcasts, as evidenced by magazine articles, press clippings, and the like to the extent of 1,200 items; 150 surveys or reports on experiments by 120 organizations; copies of or extracts from radio speeches totaling 1,441 items furnished by 60 organizations and an exceedingly high percentage of returns of questionnaires sent by the committee to interested parties and organizations. This bare summary of evidence, proving interest in educational broadcasts, is itself staggering.

Furthermore, the committee learned that 77 of the 627 licensed broadcasting stations are owned and operated by educational



THE THEATRE SPECIALIZED FOR TELEVISION: THE FIRST DRAMATIC PROGRAM

First television drama, from WGY. Three transmitters are used, one for each character, one for the hands. The play is J. Hartley Manners' "The Queen's Messenger." The hands, using revolvers, cigarettes, keys, rings, etc., are being "shot."

institutions, while 271 commercial stations report 13 per cent of their broadcasting time devoted to educational programs. Furthermore, schools are well equipped with radio receivers. Fifty-seven of Massachusetts' 253 schools are so equipped, North Carolina reaches most of its 142 high school vocational departments by radio, while South Dakota reports 22 rural schools and Iowa 46 such schools so equipped. Nashville reports all schools equipped with receivers and Cincinnati has a school board order requiring all new schools to be "completely wired for radio."

The other committees have also made thorough studies of their fields, the problems of educational broadcasts, the kinds of programs best suited to radio, the question of having the programs prepared by educators or radio authorities. The problem of reconciling educators and commercial broadcasters has been studied, as well as research problems. And finally, the committee recommended certain actions, some of which are now being followed through.

Columbia Contributes

On February 4, 1930, the Columbia Broadcasting System opened the American School of the Air, an experimental project to determine the feasibility of employing radio as a means of disseminating education. The school gives courses in music, art, civics, nature study, health, literature, history and other subjects. Fifty-four stations of the Columbia System are broadcasting these lessons, which have been prepared by some of the best known educators and program experts, and are being presented by teachers equally famed in their respective fields. The Grigsby-Grunow Company, a Chicago radio firm, is cooperating in the broadcasts. Radio sets have been made available to schools desiring to pick up the programs. Many parents partake in the courses. The first program was a dramatization of Columbus' discovery and his trip. The second program dealt with myths and folk tales. The programs continued twice a week, the term ending with a good-will program on May 15, 1930. This activity parallels those of the advisory committee on education by radio

which Secretary Wilbur appointed last summer, as well as those of the Carnegie Corporation.

The first session of the American School of the Air has been a success. Its semi-weekly programs, lasting for 15 weeks, were carried by more than fifty stations of the Columbia network, directly to the classrooms of some 20,000 schools. In point of numbers reached, size of directing staff, educators participating and money involved, The American School of the Air represents a large and influential educational program. Much assistance was given the schools, and many available sources of authoritative information tapped to make the programs representative of our established system of education. A teachers' manual and classroom guide was prepared and sent to all instructors. This booklet contains a complete outline of the courses, dates of programs, subject matter, speakers and a list of stations and time schedules. Also included is a bibliography of supplementary reading, suggestions for project work, and advice as to the best method of securing good reception and student participation. Within two weeks of its publication, the booklet was in its third printing.

The success of the initial series of the American School of the Air has been the incentive for plans for this year's presentation of the series on an enlarged basis, including more than twice as many broadcasts and embracing all grades from primary to junior high school. The course, too, is now expanded, both as to subjects treated and the number of authorities who will appear before the microphone.

And the CBS fosters many other individual educational broadcasts, including talks by Assistant Secretary of Commerce, Dr. Julius Klein, H. V. Kaltenborn, and others.

And there are still other plans for similar broadcasts, including the activities of the National Education Association, which contemplates the use of radio by providing equipment in their new building.

The Torchbearer

"All men desire knowledge," said Plato. Radio is interested not so much in the predicate as in the subject of that sentence, and in the verb. For radio reaches *all* men better than any other

medium. What all men want, radio will give them. True, it may be hard to find a form of presentation. Success is as yet but partial. However, radio is striving, itself desiring knowledge as to the best means of purveying knowledge to others. The time will come when knowledge, if not the personality of the teacher, may be put into ideal form for presentation to millions via the air. Mayhap television will greatly help. When that time comes no man will be so poor as not to be able to afford an education. When that time comes, surely the world will be able truthfully to say, "Here is an Enlightened People."

CHAPTER XVII

RADIO AND THE FARMER

"HI there, Rube, did ye come down to town to take in the sights?" The city slick baits the rural visitor. That he is able to pick him out as a farmer is no wonder. All the difference in the world exists between him who walks the solid pavement and him who trudges through mucky roads. That the farmer shows himself to be such by his dress is apparent from the next taunt. "Gal dang it, Reuben, ye ought to pull your shoes up, your pants are too short." He to whom these words are spoken looks disconsolately about him, wants to retort, but can think of nothing to say. "Smart Aleck," he blurts, but the remark carries no spleen. He too wishes he could be one. "Well," he muses to himself, "I guess I am a hick. Always was and always will be. Too late to change now." A typical scene a few years ago.

There was the keynote of the situation. That word "change." For years, for centuries, from time immemorial, the farmer has been a man apart, different, a peculiar animal. Other professions were also apart from the ordinary run of mortals, the clergy for instance. But the clergy were above the ordinary run. The farmer was supposedly below. He couldn't help it. Didn't know any better. Otherwise he wouldn't be a farmer.

"Barren Ground"

Now take the clever farmer, for instance—does he stay on the farm? Not by a long shot. He packs his carpet bag and flat-foots it to the city. You read in the papers all about how this and that big executive and industrial leader and political high light started life as a farmer. Lincoln splitting rail posts. General Harbord, up from Kansas farmer to Chairman of the Board of the Radio Corporation of America. Henry Ford learnin'

readin', writin', an' 'rithmetic in the little red schoolhouse. President Hoover born on a farm in Iowa. The farmers hook their thumbs in their overall straps, spit out a wad of tobacco and with pride reckon that these here farm lads make out purty well after all—but not on the farm. Sure, they make out well, after they move away. They were the clever gentry who knew enough to leave the farm. But where was the clever farm hand who made out well on the farm? The very fact that farm lads made out well in the cities showed that they were smart enough to move away. From which observation it was easy to draw the conclusion that by staying on the farm a man showed himself to be a dullard, lazy, stupid, or all three. And by so doing he was giving up all chance of success. Who ever heard of a successful farmer?

Stage people begin all their jokes with the observation, "Two people were walking down the street. One was an actor and the other was broke also." The same might have been applied to the farmer. Farmer was synonymous with poverty. And what is more, the life of a farmer *was* deadly dull. In the past quarter of a century the world has progressed rapidly. Life has become more pleasant, more easy, more comfortable, more cultured, more exciting—in the city. The country has remained virtually the same. For which reasons, besides many others, Reubens have been moving into town by the hundreds of thousands.

"And Then Came Ford"

The Ford came along and to some extent emancipated the farmer. But even the Ford could not travel with any degree of comfort through forests, bogs, snow, and mud roads. It was a long time before adequate highways freed the farmer from his isolated situation. And even then his freedom was limited. His physical isolation was relieved by the coming of the cheap automobile. He could visit his friends on neighboring farms, he could go into town and chat with other farmers who had congregated at one of the town bars, the general store, or the barber shop. But their lives were just as dull as his. They had the same limited interests, the crops, the weather, the prices of hog on the hoof,

the pay of harvest hands. It was indeed a pleasure just to be able to be physically near other souls. Or rather other bodies. For their souls were still lonely.

The movies came and their souls began to find a sort of freedom. Now they could come to town, not only for the expression of their gregarious instincts, to be near and among their fellow creatures, but also to be emotionally and imaginatively stimulated. Pictures of beautiful women; life in the big city, gaiety, wealth, all the things of which they had only dreamed. And things of which they had long since forgotten how to dream came back again in the moving picture. As the Ford broke physical isolation for the farmer, so did the motion pictures break the emotional isolation. The man in the country could now hate with the villain, fear with the heroine, be brave and noble and love with the hero.

They Descend upon the City

And the sum total effect of the Ford and the movies was to cause a greater migration than ever to the cities. It was thought at first by the city folk who wanted the farmer to stay on the farm, that the Ford and the movies would satisfy his wants and keep the younger generation on the farm. In reality, they only stimulated the farm boy to want the wonders that he saw in the pictures and that he experienced in a limited way in his small travels in the family Ford. They made him the more eager to take huge draughts of the sweet life he saw pictured in the movies and tasted in a small measure. On they marched to the city.

In the meantime, the growing industry of the nation demanded more labor. The cities assimilated the farmers as they came into its jaws. At benches in factories they worked. In dark tenements they lived. Life was hard and poverty-stricken. But it was exciting—at times. And there was always the chance around the corner, the break that would come tomorrow. These breaks did come and the farmers, some of them, made good in the city, as mentioned before. The small town paper would publish an article, headed "Local Boy Makes Good." The rest of the town wondered,

and spoke in awe of "knowing him when—." And the younger element of the neighborhood saw themselves also making good and followed to the city. The farm continued to lose ground. More people moved to the city. The population of the nation grew. And every year there were fewer farmers to care for the needs of the increased population. The problem became serious.

Figures Don't Lie

Then came radio. "Those who knew" said it was a fad. When it turned out to be an industry they said it would affect only the city. The automobile and the movies were for the nation, the radio was only for the metropolitans. Again they were wrong. When they saw the farmer take hold of the radio they said that like the Ford and the movies it would only stimulate further emigration to the cities. Well, it has not exactly caused a multitude of city folk to sell out their stores and offices and move to the farm. But it has decreased the farm to city movement. In 1900 the rural population of 45,197,390 represented 57.4 per cent of the total population of the country. By 1910 the rural population increased numerically to 49,806,146. But since the total population of the country also grew, and more rapidly, the proportion of rural to urban population dropped to 54.2 per cent. By 1920 the rural population had grown to 51,406,017 but again the percentage shows a loss, this time the rural population amounting to only 48.6 per cent of the total. As to those who professed agriculture as their occupation in 1910, 12,659,082 or 33.1 per cent of all people in the country gainfully employed were farmers. In 1920 both the number and the percentage dropped, there being but 10,953,158 or 26.3 per cent farmers. And still more people earn their living as farmers than in any other industry. All of which ought to prove something or other, though just what, is hard to say, except that whereas in the decade between 1900 and 1910 the proportion of rural to urban population decreased 3.2 per cent, the decline in the following ten years was 5.6 per cent. At the same acceleration, the decline between 1920 and 1930 should be 8 per cent and this is not so. We attribute the slowing of the decline partly to radio.

"And I'll Tell Yer Why"

Already in 1925 General Harbord, then President of the Radio Corporation of America, spoke of radio as the farmer's friend in an address before the Advertising Club of New York. By ending the isolation of farm life radio will be the greatest factor of modern times in keeping young men on the farms, according to this authority. Recalling the days when he was a boy on a Kansas farm, General Harbord recounted the hardships of farm life forty years ago. "Yet it has not been the physical hardships," he said, "but the dullness of life, the utter monotony and the lack of recreation that have caused the farm boy or girl, as well as the paid farm laborer, to desert the old farm and seek the city.

"Through radio the farmer receives the advice of agricultural authorities. It is a friend in the time of the farmer's need. Be it insect plague, animal epidemic, threatening weather, or other adverse conditions, the radio brings the information necessary to meet the problem. With these utilitarian benefits there comes a wealth of entertainment. The great men of the nation, the President himself, will speak in the farmer's home.

"The city listeners, tuning in on a station only to hear a voice reeling off the price of white leghorn eggs, fancy cabbage, red onions and pork, where he had hoped to hear jazz, may not be much impressed with the value of market reports. But at that very moment there are thousands of men on farms who have laid aside everything else in order to listen in on what is to them business information, a matter of dollars and cents.

"But in the long run perhaps the greatest utility of radio to the farmer is in tying in with the extension work of agricultural colleges and schools. The agricultural colleges enroll but 150,000 students. Radio should bring the advantages of scientific schooling to millions of farmers. It will enable the college student whose course has been interrupted to continue it, often with the same instructors.

"Of all that may be said of radio the best is that it will tend to keep the young people on the farm. There is the true independence, there is the real throne of the American sovereign.

Entertainment, culture and the throbbing life of the metropolis, carried to the farm by radio, helping to make rural life more attractive, will sustain that class which is the very backbone of our national existence."

In the highly competitive entertainment field existing in the cities, radio grew to be their equal and in some instances surpassed in consumer interest the older stage, vaudeville, and movie entertainments. Imagine then, how radio must have grown on the farm, with no other amusements with which to compete, and accessible to nearly all, regardless of distance or the geographical difficulties that might confront the traveling road show! By 1927 radio was the accepted friend in the homes of millions of farmers.

Peculiarly enough, while other entertainment fields followed the trend of business in specializing in one form of entertainment, radio never did, and it still has failed to follow suit. We none of us think of one station in terms of classical music, another as a jazz station, a third as a lecture platform, and so forth. Catering to such vast numbers of people with such divergent interests, radio was afraid of losing some of its public if it failed to cater to all the tastes of all the people.

The Specialist

By 1927, however, the farm population of America had given sufficient evidence of its wholehearted support of radio that Station KFKX of Hastings, Nebraska, decided to cater exclusively to farmers. Owned by Westinghouse, KFKX came under the management of the National Broadcasting Company on January 10, 1927. Immediately, NBC decided that the farmers should have a station of their own and began to make KFKX the farmers' station. In outlining the scope and policies of KFKX, M. H. Aylesworth, President of NBC, said, on taking over the station, "The Nebraska station will be made the experimental center of a service especially adapted to the needs of the great farming communities of the United States. . . . The National Broadcasting Company proposes to make an exhaustive study of the farmer's needs in so far as broadcasting service

is concerned. To the city dweller radio may be almost wholly an entertainment feature. . . . To the farmer, however, radio is both a vital service to the home and to the farming industry.

"Beyond the fact that broadcasting can bring the city to the farm, its mission is to destroy the isolation which formerly shrouded the lonely farmhouse, as well as to bring a service of weather, market, and other information which will enable the individual farmer to take advantage of market conditions."

Frank E. Mullen, a graduate of Iowa State College, possessing extensive experience in agriculture, had instituted the agricultural broadcasting service of KDKA, which was recognized by the United States government as the most complete ever rendered up to that time. It was only natural, therefore, that Mr. Mullen should be appointed manager of KFKX.

Ideally located in the heart of a great farming district, KFKX was able to cater to vast numbers of people without interference which naturally affects stations situated in densely populated cities.

Six separate informational services designed especially to help farmers in their every day problems were inaugurated shortly after January 10, 1927, as regular features. Many authorities on various farm subjects presented talks on special phases of agriculture, and a leased wire was installed between the station and the Bureau of Economics, U. S. Department of Agriculture, with an operator always on duty.

KFKX was at the time the only broadcasting station to possess this close tie-up with the Department of Agriculture, giving its listeners a most efficient service. On Monday, Wednesday, and Friday nights of every week the Government Farm Radio School held sessions on KFKX's wave.

Later other farm services grew in numbers to such an extent that KFKX was discontinued in favor of NBC's Farmers' Network.

"Ask the Man Who Owns One"

Farmers were quick to take advantage of this service, making the radio pay dividends right from the start. By May, 1927, ten thousand letters were received by the Department of Agriculture,

commenting on the service. Taking advantage of market quotations as they came in over the radio, farmers realized a greater profit from timely sales, and some of them by regulating shipments of crops and live stock in this way secured top prices. Others planned their work in accordance to radioed weather reports, harvesting and planting according to the forecasts. One farmer regulated the ventilators in his poultry house by the reports. Radio taught farmers how to make better rations for dairy cows, poultry, feeder cattle, hogs, horses, and sheep. Radio has given tips on crop rotation systems, farm buildings, cultivation methods. It has taught the cotton planter how to get more per acre; it has taught his wife to prepare new dishes. Broadcasting encouraged farmers to organize for coöperative buying. Letters testify that radio "brought church services to our home," "helped out in the back country," "brought me out of the dark," "made it possible for us to hear a President speak and opera stars sing," "interested my wife in more efficient means of running the home," "makes me content to stay at home, now I don't run around so much," "taught us a number of new wrinkles." And so it goes.

Gratified by the wide acceptance of radio by the farmer, the broadcasts were extended until in short order the Department of Agriculture became the largest user of radio for informational purposes in the world, with daily educational programs, market news reports, and weather forecasts. By October, 1927, 22 comprehensive farm programs had been inaugurated over 100 stations. Between 4,000 and 8,000 letters poured into the Department of Agriculture each week. Farmers learned to do things "the radio way." Of all the programs Aunt Sammy's Chats proved the most popular. One old couple, Aunt Liz and Uncle John, wrote a letter to the Department of Agriculture contrasting radio with covered wagon days. Formerly they would run to the window to see every passer-by and talk about it for a week. Now they get all the important events of the world. They hear all the sports they missed when they were young. They used to play a wheezy organ or drive 18 miles to a camp meeting to participate in the singing. Now they listen to the finest

symphonies. They also learn how to kill rats. "Learn and earn" is the way they put it.

The Radio Farm School was another popular feature, teaching farmers how to do things in other than the conventional way. The lack of unity which had been manifest in agricultural thought and action was counteracted by radio, tending to the more equal sharing by all agricultural interests of correct knowledge of production and marketing principles.

"The Growth of the Soil"

By January, 1928, 116 representative commercial and agricultural college radio stations were broadcasting farm radio programs prepared by the Radio Service of the U. S. Department of Agriculture.

There seemed to be no bounds to the enthusiasm of rural radio. It grew and grew. By October 1928 some of the more popular features, corresponding to the best known programs of the East, included the Housekeeper's Chat, a 10-minute talk conducted by Aunt Sammy; two five-day-a-week program features, the Farm Flashes, answering questions and giving timely tips for each section of the country; the U. S. Radio Farm Forum, taking up on successive days of each week the major production problems of all branches of Agriculture; Outdoors with the Scientist; The Primer for Town Farmers; and Farm Science Snapshots. In addition the Agricultural Situation Review gave at the beginning of each month a national view of the farm outlook. And farm playlets dramatized rural community life, endeavoring to stress the beauty of rural existence.

"—So Shall They Reap"

The various State Agricultural Extension Services conducted numerous surveys, which showed the tremendous interest of the farmers in radio. The Pennsylvania Department of Agriculture made a survey in 1928 which showed that:

Of 352 farm radio owners—

275 made a special effort to tune in on special farm programs.

199 depended on market radio reports in buying and selling. 274 replied that radio weather reports helped them in planning their farm work.

333 were sure that their families would not be satisfied without a radio.

Dr. Daniel Starch, consultant in commercial research, in 1928 made a survey for the National Broadcasting Company, in which 17,099 families were questioned by the "personal interview" method. The tenth question put to them was, "Do you enjoy talks on agricultural subjects?" Dr. Starch sums up the answers as follows:

"Nearly three-fourths of the farmers (72.12%), representing approximately one-fourth of the population of the United States, one-third (31.44%) of the families in small towns, one-fourth (18.19%) of the families in large cities, over one-third (36.03%) of all families—including farmers—enjoy talks on agricultural subjects.

"There are slight differences between the preferences of farm, town and city families in respect to several types of programs. Semi-classical and classical music and grand opera are preferred more by city than by town and farm families; whereas religious services, crop and market reports and children's programs are preferred more by farm than by city families."

To the question, "If you had to give up one or the other, which would you prefer to have left, talk or music?" 2,358 preferred talk, and 1,538 preferred music. This jars somewhat our preconceived notion that music had a wider appeal than talks.

From October 1928 to July 1929 the Department of Agriculture supplied a 15-minute daily program through a network of 17 stations associated with the National Broadcasting Company. In July the network was expanded to 32 stations for five days a week and 39 on Saturdays. The NBC undertook to provide 25 minutes of entertainment, and in coöperation with the *United States Daily*, 4 minutes of agricultural news each day, while the Department of Agriculture provided 16 minutes of information. This program has continued under the name of the National Farm and Home Hour, the Saturday programs being open to the national farm organizations, the Land Grant

Colleges and the 4-H Clubs. In addition, the Department of Agriculture is cooperating with 13 radio stations in the presentation of one or more of the syndicated programs supplied to stations in manuscript form to be presented by announcers.

"The Reaper"

These figures will give the reader a general idea of the scope of work now being done to aid the farmer by radio. The farmer, well informed on those issues which bear on his business, is now better able to farm efficiently. He makes more money and has more leisure to spend it. The news of the world and its entertainment is his for the turning of a knob. Business-like, well informed, educated, the farmer of 1930 comes to town to attend the conference of grain growers. He attends the concert by the same orchestra that he hears weekly in his own home. Neither the orchestra nor the selections are less familiar to him than to the urban residents attending. He stays at the foremost hotels, listening while at dinner to the same fine orchestras that broadcast daily. He talks of the stock market, discusses the grain export prospects of the coming year, the latest developments in farm machinery. Spending a few hours in the vast department stores of the city, he purchases refinements for his home, perhaps the latest model radio receiver. Perhaps he goes to the World Series baseball game. If so he knows the players and the team records as well as many other fans.

And now, as the farmer walks down the street of the city, smooth-shaven, neatly dressed, self-possessed—nobody turns to stare. He is no different from anyone else. His hands are clean. Machinery does much of the work. The style of his clothes is no different than that of the city. Perhaps a Southern drawl or a Mid-Western twang shows him to be the inhabitant of those sections. But he might come from Birmingham or St. Louis. Nothing "hick" about him. No need to change. His business is different from that of the city dwellers. But his broad interests, his business acumen and knowledge, his wealth, his education, make him no longer a Rube but a man of the world, sympathetic with his fellow men, be they rural dwellers like himself or

cooped up in two-room apartments on Monoxide Lane. No longer is the farmer a man apart. Due in part to the automobile and the movie, due as much to the widespread influence of radio on all cultural and financial aspects of his daily life, he is truly a citizen of the world.

CHAPTER XVIII

RADIO AND THE CHURCH

TIME was when almost all were church goers. The Sunday mingling of the chimes from the city's denominational steeples found answering footsteps—footsteps that led to church doors. That was the time when church attendance was as much a part of the weekly life of nearly every person as the traditional weekly bath. Since then, the baths have increased, but church attendance appears to have decreased in many parts of the country. No longer are the clanging bells an ever-answered invitation to divine service. To some they are rather an interruption in the Sunday morning's sleep. Or if awake, the American citizen may frequently be found on the golf course or tinkering about his automobile.

In former days there was a difference between week-day clothes and Sunday clothes. The latter were the best. Nowadays the business man or woman often wears the finer part of the wardrobe to work, in the office. Sunday has become a day for knickerbockers and sweater, old flannel pants and slippers, clothes unfit for attendance at church.

Many have been the reasons given by the clergy for the falling off of church attendance. And many the reasons given for attending. But whom could the clergyman exhort to attendance? Only those who were already in church to hear. Those whom he wanted to reach were at home. Many were the excuses given by the layman for not attending church. True, all of them, but in themselves unimportant. Behind the many petty reasons for the lessening of church attendance is a new psychology, a psychology hinted at in the foregoing reference to the reversed attitude concerning Sunday clothes. There is more to it than just a matter of clothes.

The Ritual of the Righteous

Time was when work was a dirty matter, at most a disagreeable occupation, carried on in dingy places. Of time for physical play there was apparently plenty. But not so much time for intellectual play, for the social recreations, those gatherings at which people exchanged views. Sunday church-going served such a purpose. It was a ceremony that started long before the bells began to chime. It really started with the Saturday evening bath and the laying out of the fresh Sunday raiment. It continued the following morning with a leisurely, careful grooming and dressing. People had something for which to dress. And they liked that. People would be observed and they knew it. They took pains to be at their best. The Sunday dressing had the same thrill that is the joy of a boy when dressing for his first Tuxedo party, the same happy anticipation. The ceremony continued with the walk or ride in the polished carriage to the church. During the walk they conversed with neighbors whom they met, also groomed and going to church. Arriving a few minutes before service, they stopped in front of the church lawn and chatted. Everyone was united in a common bond; they all had a common interest. They had the same purpose: they would hear and, what is more important, participate in the same service. The knowledge of all this, perhaps not conscious, created a feeling of well being, a brotherly affection.

Those who came by horse and carriage showed off their vehicles and animals. Horses were never standardized like Fords. Gallantly they clop-clopped down the avenue, rolled up to the curb and came to a majestic halt in front of the church. Those standing about on the walk and lawn gazed, as the proud owners descended. Those unfortunate enough to have to walk to church took heart at seeing their fellow parishioners enter the doors. It was a day and age when rank and station were respected. The thought that even the most arrogant for six days of the week bowed down in humble humility before the Lord on Sunday made all the world one. People took pride in the knowledge that several prominent citizens of the town were of the same congregation as they. All told, it was a pleasant matter, going

to church, hearing the gossip, seeing, and being seen. Most pleasant, indeed.

Mammon Competes with Religion

With the Industrial Revolution and the rise of the factory system, came a decided change, affecting all, rich and poor alike; affecting them in respect to their working conditions, their material possessions, their habits of life and thought.

The working man became for six days of the week something of an automaton. On the seventh he needed recreation. The business man worked in a beautiful office, dressed neatly to suit his surroundings, immaculate, clean, manicured. On Sundays he had the desire to be a boy again, dress sloppily, get his hands dirty, be a craftsman.

Materially, people possessed standardized goods. Fords were not Packards, but all Fords were alike, and all Packards were alike. Personal pride in possession diminished to a large degree.

Their habits of life changed. Going to the movies, dances, affairs, meetings, the common interest and pride of seeing and being seen was catered to so much that church lost its monopoly on this incentive. Nor do people look up with beaming faces at their "betters." Far from it! Gone too is much of the good old incentive of being respected or respecting.

The growing popularity of the automobile took people away from home on Sundays, out into the country, on picnics, week-end parties, to the country club, to the seashore. Communities were no longer unified entities, they commingled, changed places, overflowed, lost their identities. A multitude of divergent interests arose to do battle with the church for the people's interest. Sunday movies competed for attendance with churches. Gas stations and even entertainment resorts with their hot dog stands rivalled the cathedral in stature and importance to the public welfare. Night clubs, late Saturday night parties, imparted their influence to the following day's activities, requiring more sleep, less opportunity to attend church. In short, so varied was the field of man's activities, so wide his interests, that six days of the week were insufficient. To put aside one-seventh of the week for re-

ligious service, when there were so many other things to do—to many it seemed out of all proportion.

And with it all, the ever-growing scientific attitude toward life's problems threatened the older teachings of many churches. Partly it was the fault of the clergy, who failed to adapt themselves to the changing needs of their parishioners, who failed to reconcile what their congregations saw and experienced in life with what the church had been teaching in the past. People found in their daily contacts the need for coöperation. An ever-growing complexity in life necessitated better understanding. And it paid. The tremendous prosperity of the new era was a tribute to mutual understanding, coördination, and coöperation. Why, then, should the churches fight one another? To large numbers of people they appeared to be fighting a losing battle, and they gained only the disrespect of men who were bigger than the quarreling clergy, men of broader outlook, men who had learned the lesson of mutual understanding and aid, and men who were prospering. The church was losing out badly in these quarters.

Then, just as the decline of church-going was growing more rapid than ever before, when it had sunk to new low levels, when some churches were nearly desperate, came radio. This was the last blow; this was "the most unkindest cut of all." So thought the church fathers. Here came a new force to keep the parishioners at home on Sunday. For the radio stations operated seven days a week.

"Hark, the Herald Angels Sing"

It was the radio and not the church that started religious broadcasting. Installing microphones in various churches, their services were heard in the home. Clerical opinion was divided. Some thought that it hurt the churches, making it easier to attend service in the home, taking away all incentive for attending church. What was there to gain by going to church when the church came to the home? Others saw in these programs the bringing of religion to those who would never find it in the church, perhaps the conversion of people who had not been inside a church for years, into regular attendants.

The broadcasting stations had problems of their own. What service ought they to broadcast? Or should they rotate, first the service of one denomination, then another? A study of the subject revealed the fact that church services as they were conducted were not at all ideal for radio. Perhaps there could be prepared some non-denominational service suitable for broadcasting. They tried both morning services, including reading from the Bible and sermons, and vesper services, devoted chiefly to music. Both were successful.

In February 1927 the Greater New York Federation of Churches, in collaboration with the National Broadcasting Company, broadened the scope of its religious services. The National Advisory Committee was enlarged to include men of affairs to act in an advisory capacity. The Waldorf-Astoria Hotel placed at the disposal of the committee its Empire Room, from which to broadcast programs through the Red and Blue Networks. From three to four each Sunday afternoon the Young People's Conference would be sent out on the air for the youth of the country through WEAf, and from 5.30 to 6.30 the People's Radio Vespers was to be broadcast through WJZ. Both features proved vastly successful.

"Marching As to War"

So successful were the religious hours that other stations began to use such programs. Little by little they took sides, devoted their Sunday programs to services of different sects. Sermons heard by hundreds of thousands were broadcast. Preachers competed for attention. Sermons changed from exposition to argument. Stations represented denominations. That which started so beautifully was falling into the same backbiting as had many of the churches themselves. Fortunately, the Federal Radio Commission stepped in before too much damage was done. WHAP was called before the Board. Its manager, Franklin Ford explained. According to the records, Mr. Ford described his opposition to the "political activities of the Roman Catholic Church, . . . Mr. Smith's ambition for the presidency" and those Jews responsible for "night clubs, cabarets, and some of the sex plays."

According to Mr. Ford, Mrs. Augusta Stetson, leader of Chris-

tian Science, had established the station, and gave talks over it. Later she caused a split in her church. Asked by Commissioner Bellows what other talks were given over WHAP, Mr. Ford said the station broadcast speakers on "causes in which we believe, such as anti-vivisection, the suppression of cigarette smoking by children, and opposition to the political programs of the Roman Catholic Church." Seemingly, one station at least was taking on the heretical attitude so often associated with and detrimental to the church. Asked if the other side of these questions were ever given opportunity to refute the arguments broadcast by WHAP, Mr. Ford answered, "No, sir, we only stand for our own side of every question. We feel that WLWL, which belongs to the Paulist Fathers, gives the other side."

It began to look as though radio were not uplifting the spirit and creating loving-kindness. But the Federal Radio Commission straightened the matter out fairly well. By the end of the year things were pretty well settled, radio was back to broadcasting music and non-denominational talks.

The Clergy Speak

The most noted divines, the ones whose congregations were numbered by the thousands, whose churches were always filled to overflowing, who (if selfishly inclined) might be expected to oppose broadcasting since they could not possibly add to their congregations or their own national repute, came out strongly and disinterestedly for broadcasting of radio services.

Rev. Dr. Daniel A. Poling, president of the Greater New York Federation of Churches and Pastor of Marble Collegiate Church, New York, in a statement for the New York *Telegram*, said in part, "The radio has reintroduced religion in hundreds of thousands of American homes.

"There are, of course . . . objections to certain details of the radio programs. Many companies are discontinuing the practice of putting the Sunday morning services on the air; they do not think that great city churches fortunate enough to have musical programs or superlative quality should allow themselves to come into competition with less fortunate congregations. . . . But in

the large, radio is a universal and beneficent ministry. . . . It is a tool, not an automatic machine. It is an instrument. It must be used to be useful, and it may be abused."

Gone is the thought that radio would lessen still more the attendance at church services. On the other hand, the effect was found to be just the opposite. Rev. Dr. Karl Reiland, rector of St. George's Church of New York, in a statement to the same newspaper, remarks, "It has been said that the broadcasting of religious services would interfere with church attendance. . . . It may be that on account of the broadcasting some people have given up attending church, but, on the whole, it seems true to say that the radio has helped rather than hindered attendance upon divine worship. . . . My wonder is that in this commercial age there are institutions like broadcasting companies which go to such great pains to make this vehicle of the radio possible for the sake of the good that in their judgment it can bring to the listeners."

Perhaps the greatest benefit bestowed on religious thought by radio is the mutual understanding that has been brought about. On this subject Rev. Dr. Harry Emerson Fosdick, then pastor of Park Avenue Baptist Church, New York, in speaking for the New York *Telegram*, says, "It is particularly valuable just now because of necessity the message of the radio overleaps all sectarian lines. Protestants listen to Catholic speakers, and Catholics listen to both Protestants and Jews.

"We would not naturally hear each other in our separate conventicles of worship, but we do most naturally hear each other speak as we sit in our homes and turn on the radio. We are, therefore, getting better acquainted with each other, and multitudes of people are being surprised to learn what good sense, sound religion, solid devotion, and high-mindedness are to be discovered in people against whom they once held very hide-bound prejudices.

"As the years pass . . . the radio should tend to dissolve the asperities that have so largely characterized the religious life of America, and cause mutual respect and understanding between those who belong to different churches.

"Moreover, there are many people outside the churches,

alienated from them by things they heard and believed in their youth, who now have an opportunity, perhaps for the first time in many years, to listen to teachings they did not suppose were actually going on in the churches.

"They discover that at least some of our religious teachers, of all sects, are talking a type of spiritually minded religion which they themselves would gladly have a share in. . . . The general effect of radio preaching is to increase greatly the attendance at churches."

Not only has radio broadcasting unified religious thought among the lay gentry, it has also shown the churches the error of their ways. Says Rev. Dr. James Hardy Bennett, pastor of St. Andrew's Methodist Episcopal Church, New York, in a statement to the *Telegram*, "The radio has gone far to achieve that interdenominational unity of the 'church of the air' for which churches in wood and stone are still striving, at odds over petty inconsequentialities. Certain features of religious broadcasting, such as the inter-denominational service, the People's Radio Vespers and the Young People's Conference, broadcast under the auspices of the Greater New York Federation of Churches, over National Broadcasting Company circuits, WEA and WJZ, are providing young and old with new images of magnificence in sermon and song."

"How Firm a Foundation"

Which brings us once again to that organization, the Greater New York Federation of Churches, of which we spoke before. Then it was just planning its broadcast activities. Now, the end of 1927, it was in full swing. Encouraged by the J. C. Penney Foundation, the Young People's Conference was broadcast under the auspices of the G.N.Y.F.C. through WEA and associated stations, on Sunday afternoons under Dr. Poling. According to Frank C. Goodman, director of religious broadcasting of the G.N.Y.F.C., "The high interest and enthusiasm of the conference contradicts beliefs expressed . . . in pulpit and press throughout the country that we are rapidly becoming a godless nation."

Especially have these broadcasts aided the vocational work of the Penney Foundation. Problems of the home and the shop,

social life, domestic troubles, all are brought toward solution under analytical discussion by experts who know these fields and have a warm and sincere devotion toward solving the problems that so many must face alone.

Putting aside the trivialities that have so long contributed toward keeping churches apart, both from one another and from the lay world, the Greater New York Federation of Churches worked hand in hand with the National Broadcasting Company for the fostering of religious thought in this country, not the thought of one religion or one sect, but religious and spiritual thought in general. It was an inspiration to witness men and women of churches split wide apart by theological dissension, working side by side with the same generous ideals. And the National Broadcasting Company, aided by these workers, united by a common bond of public service, gave of its resources, its time, its stations, nay, entire networks, for the propagation of religion in an era of science.

The science of radio come to do battle for religion. Religion, since the days of Darwin and in fact for many years before, at loggerheads with science—religion fighting against the march of science which it thought detrimental to its own welfare—this same religion was now being aided by science. Those clergymen and doctrinaires who squabble over the supposed argument of religion versus science should be shown the absolute collapse of that entire problem. The problem is only built of straw. It has been so proved. Radio and the church, science and religion have combined, coöperated, collaborated for the spiritual benefit of mankind. The systematic study of the universe, which is science, is working with the spiritual consciousness of life and its surroundings, which is religion.

Dr. S. Parkes Cadman, pastor of the Central Congregational Church of Brooklyn, was also on the air. Already in 1924 he broadcast the meetings of the Bedford branch of the Y.M.C.A., Brooklyn. They had proved very popular, and Dr. Cadman was found to be in possession of an excellent radio personality; that is to say, his personality flowed through his voice to such an extent that it was quite as effective as though he addressed his audience in person. He continued these broadcasts.



Courtesy Saturday Evening Post and F. M. Follett

"Now put 'em up, Buddy! Quick!"
"Sh-sh-h-h-HUT up! I think I got Cuba!"



Courtesy Saturday Evening Post and Walter de Maria

"Henry, take that pipe out of your mouth and set up straight! That ain't no way to listen to a church service."

W. de Maria



In the fall of 1928 Frank C. Goodman, secretary of the Radio Committee of the Federal Council of Churches of Christ in America, announced the invitation extended to Dr. Cadman to engage in radio religious work exclusively, over nation-wide radio networks. In respect to the proposed plan, Mr. Goodman said, "Through the generosity of the National Broadcasting Company, Dr. Cadman is to be enabled to carry on and extend his radio work to greater and greater audiences. The Federal Council of the Churches of Christ in America feels a deep gratitude to the broadcasting company for the donation of its powerful service to further this great project."

Dr. Cadman's broad courageous treatment of basic religious problems, his striking personality, sympathetic understanding of the problems of addressing a vast invisible audience, had made him the logical person to be inducted as the first radio preacher.

"We Gather Together"

On Sunday, October 14, 1928, there was broadcast to the country the first of a series of religious programs designed to meet all the needs that can be satisfied by exhortation, discussion, and music. Under the leadership of three of the most widely known ministers, Drs. Cadman, Fosdick, and Poling, an audience of approximately 25,000,000 was brought help and comfort on a scale and in a manner that no single church could hope to undertake. These broadcasts came over the stations of the National Broadcasting Company. In addition, the Tenth Presbyterian Church of Philadelphia, of which the Rev. Dr. Donald G. Barnhouse was pastor, began a series of broadcasts over station WABC and associated stations of the Columbia System. Beginning at 4 in the afternoon, Dr. Cadman spoke on "Radio and Religion" in the WEA studio. At 5.30 P.M. Dr. Fosdick went on the air over the WJZ network in what was termed the "National Religious Service." And prior to these, Dr. Poling was heard from the National Youth Radio Conference over WJZ's chain from 3 to 4. This program, similar to the one that had been broadcast from the Waldorf, was made purely a radio event, coming from the studios of the National Broadcasting Company.

For Jews and Catholics Too

But these were not the only religious broadcast programs. For some years programs sponsored by the United Synagogue of America and its Women's Auxiliary had been broadcast by WEAf, and during 1929 other branches of Jewish religious thought sought the facilities of NBC.

Under the circumstances the Committee on Religious Activities of the National Broadcasting Company called a meeting to consider the entire question of Jewish programs. The meeting was attended by a considerable group of Jewish laymen and rabbis affiliated with many different schools of Jewish religious thought and welfare activities. Out of the meeting grew the General Committee on Jewish Religious Radio Programmes, which began the sponsorship of the Jewish Hour, the first program being broadcast on Sunday, November 3, 1929.

These programs, which have continued since that date, consist of music, both vocal and instrumental, selected from liturgical, oratorical, and folk music of Jewish composers or on Jewish subjects, and short addresses by prominent rabbis and laymen. Occasionally a short dramatic sketch of an Old Testament historical event is introduced instead of an address to teach a moral lesson. The speakers have included Rabbi Samuel M. Cohen, David N. Mosessohn, Dr. Nathan Krass, Dr. David de Sola Pool, Dr. Elias Margolis, Sol M. Stroock, Hon. Albert Ottinger, Dr. Solomon Lowenstein, Felix M. Warburg, Jonah J. Goldstein, and Prof. Adele Bildersee.

The general aim of the Jewish Hour is to bring out the religious and cultural values of Jewish life of the present and the past, and to produce programs which will be of general interest to both Jews and non-Jews. As in the case of Protestant programs, the sponsoring Committee underwrites the program and the administrative expense, and undertakes to follow the same program policies. The radio programs are introduced with the statement that they are "dedicated to the enrichment of life and increase of happiness."

The National Broadcasting Company, in pursuance of its general policy of serving the three great faiths, Protestant; Roman

Catholic, and Jewish, had long sought effective contact with some central or national agency of the Roman Catholic organization. During 1929 circumstances so shaped themselves that such an arrangement was brought about with the National Council of Catholic Men of the National Catholic Welfare Conference. Through this channel arrangements were made for the production of religious radio programs under Roman Catholic sponsorship during 1930.

Radio and Religion

It is interesting to note that the National Broadcasting Company has insisted from the beginning that only studio programs, designed for the radio, and not church services, should go on the air under its auspices. Frank C. Goodman of the Federal Council of Churches, the Greater New York Federation of Churches, and the Cadman, Fosdick, and Poling religious hours, have all shared this sentiment.

"To broadcast a sectarian or denominational service," declared Mr. Goodman in a statement for the *Review of Reviews*, "is neither democratic nor American. A church conducts services for its own little group—as is right in a land of religious liberty. But when it broadcasts that service, it is sending out to the nation something far better suited to its own people than to the heterogeneous audience it reaches. Its own audience is friendly. The wider radio audience is likely to be critical; it demands a different approach." For these reasons special programs were and still are prepared for radio use.

That the various services might not conflict in subject matter, appeal, or interest, each of the three ministers devotes his services to different matters. Dr. Poling devotes his hour to the problems of youth. At 4 Dr. Cadman commences his service, which centers about an address by him on current problems of the world, and his answers to selected questions which pour in by the thousands from his listeners throughout the country. Already he has collected more than 100,000 letters. At 5.30 comes Dr. Fosdick, with a more purely religious service, in which music plays an important part.

Dr. Cadman has received such wholehearted response to his radio work that he has practically given up his pastorate, even though it numbered several thousand members. It may be said in a very broad sense that he is the "radio pastor" of the National Broadcasting Company. And why not? Many special groups have their chaplains, for example, military units, churches, colleges, ships. Surely broadcasting companies who cater to millions of people, broadcasting companies whose interest in reaching far beyond the limits of entertainment and entering the fields of education, business, sports, culture, politics, the home, have a need for religious leaders among their number. Though to be marvelled at from a standpoint of the great benefits received by the unseen congregation, it is the most natural thing in the world that radio should enter the field of religion, influencing society and the individual in spiritual as well as material and intellectual things. And for such work, what better torchbearers and leaders can we find than the clergy?

Once more radio has come to the aid of mankind, as the disseminator of religion. May it be used in the future as it has in the past, to break down religious barriers, prejudices built on ignorance. May it continue to work toward a living, breathing brotherhood of man, worthy of the Fatherhood of God.

CHAPTER XIX
THE BUSINESS OF BROADCASTING

Wanted!
Somebody
To tell
Everybody
Something.

Strict qualifications. Applicant must be versatile, personable, ventriloquist, actor of any and all parts male and female, singer in all voices with repertory including classical and popular numbers, able to play any and all musical instruments, sometimes as many as 150 simultaneously, reporter and possessor of a voice that can imitate any sound known or unknown to the human ear. Good salary for qualifying applicant. Write, phone or call AMERICAN INDUSTRY AND BUSINESS.

Broadcasting got the job. In fact, there was not much choice. Broadcasting had been graduated from school in 1920 and emerged into the commercial world. It had looked about for odd jobs, picked up a few cents here, a cup of coffee and bowl of soup there, and might have been seen any Sunday afternoon sitting forlorn and bedraggled on a park bench. But Broadcasting answered the above ad, qualified, and since then has found a most lucrative position. Broadcasting's part-time employer, Big Business, is appreciating his services more every day, and Broadcasting is adding more tricks to his many present accomplishments. Broadcasting is the big brother of the radio industry. He earns a lot of money and also supports the manufacture and sale of radio receivers. He said in a recent interview, "I tie in radio with life in 17,000,000 homes for 50,000,000 people."

Why Sponsored?

In England there are no sponsored programs. The owner of a receiver is taxed, the money collected being given (in part only,

however) to the broadcasting companies to defray the expenses of broadcasting. In this country Big Business found that broadcasting had something to offer. That something was good will. And so we arrived at the sponsored program, or broadcast paid for by a commercial organization the name or product of which is announced to the radio audience whose thanks for the entertainment offered by the sponsor takes the concrete and pleasant form of purchasing his goods.

Radio may be called an advertising medium, such as are newspaper or magazine advertising, billboards or direct mail. It is advertising in that its aim is the same—to sell. But in another and more subtle sense it is not advertising at all, since it cannot directly sell, as can the other media. Broadcasting creates good will: that intangible subconscious something that makes a person want to buy a certain product aside from its intrinsic merit alone; that peculiar quality of mind that business is beginning to realize is at least as important as “reason why” copy.

It all comes down to this. We think we act rationally, on decisions reached by purely logical reasoning and conclusions drawn solely from facts. But in truth we act in considerable measure from prejudice aroused by subtle sense impressions. Broadcasting creates some of those impressions and the consequent prejudices. Coming down to cases, the fact that the Seiberling Singers offer a fine musical program is in itself no reason to buy Seiberling tires. Because the Seiberling Singers can sing, it does not follow that Seiberling tires wear well. And still, figures show that people do buy Seiberling tires partly because they enjoy the Seiberling Singers. Peculiar, isn't it? And yet very comprehensible on second thought and, in a way, justifiable.

Reversion to Type

Broadcasting is a unique medium for reaching people. Back in the “good old days,” way back before the dawn of civilization, before the alphabet, before hieroglyphics, man communicated with man by word of mouth. Even with the advent of the written word, speech was the accepted way to draw attention. Then came the printing press and ever since, mass communication has been

through the eye. With broadcasting came the return of the ear as a means of mass communication, as a means of drawing attention. The properties of the ear and of the eye are vastly dissimilar. What comes to the mind via the eye is largely impersonal, objective, outside. The ear produces a sense of nearness, proximity, aliveness. Especially is a person impressed with the spoken word. That which is read is taken at its face value. That which is spoken rings with sincerity, with human authority, the subtle meanings of intonation, pronunciation, and inflection. It is this appeal which Big Business has capitalized in the sponsored program.

A Different Breed of Cats

Radio stands in great contrast to the usual media of advertising, such as magazines and newspapers. The newspaper advertiser hopes that his insertion will be noticed. But he knows that if it is, it will be an intruder into the mind of the reader. A man generally buys a newspaper for the reading matter, not for the advertisements. Unless he is already interested in the subject of the advertisement, the advertising copy comes between him and the news he is perusing. It may be noted subconsciously. Or it may place itself in the reader's way as he turns a page or reads down a column. However it reaches the reader's mind, comparatively rarely does it do so with the deliberate intention of the reader. How different from radio sponsorship! Men and women throughout the country turn on the radio to the Palmolive Hour, La Palina, Majestic, Amos 'n' Andy, and other leading features. They tune the dial to the station broadcasting their favorite "hour" and *wait* for it. They *look forward* to it. Of course, they are not seeking the commercial credits or advertising messages, but they are glad to accept the message in return for the program. Not only do they accept the message but they write letters and send telegrams and telephone messages to the sponsor or his stations. Both space and radio advertising influence the public. But only in radio has the sponsor sufficient courage to ask the listener to write in and tell him how much he enjoyed being influenced. And the astounding thing is that the public actually does write, even spends money for telegraph messages and 'phone calls. And

in so doing, they not only thank the sponsor for influencing them, but by the very writing or wiring or phoning intensify that influence and at the same time give the sponsor a mass judgment of his program. Nor does it end there. The public suggests means by which to increase that influence, through request numbers or programs. Where is the space advertiser whose readers write in by the thousands stating their appreciation for the ad, and asking for bigger and better copy, suggesting text and illustrations? The influence of radio is one of participation. It makes the audience partake of its own enthusiasm.

O'erstepping the Bounds

But even broadcasting has its impalpable bounds, and very strict they are too. Many a thing that a space advertisement may say, is expected to say, the radio sponsor dares not utter. For, as we have said before, space advertising may sell directly, may talk shop, while the radio program may not. The reason for this is that whereas the space advertisement is an intruder and may act as such, the radio program is an invited guest to the American fireside, intentionally asked in during the leisure hours to assist in the passing of a pleasant evening. The broadcast program must have company manners. It may talk business in general, but it should not stoop to talk shop, to gabble crass advertising or to mention or stress price, addresses of dealers, specifications, and the like. On occasions the sponsored program may be genially intrusive, in a purely good humored way, if done rightly. But until it has been adopted as a friend it must behave as an acquaintance.

Of late, we are sorry to say, many sponsors have abused their privilege. There have been instances, more prevalent in the lesser stations though also occurring in a few of the large network programs, of the sponsor, once admitted into the home, taking possession thereof, pounding himself on the chest, interrupting the members of the household, boasting, ranting, and generally paying a most unpleasant visit. But fortunately, the head of the house can and does quickly eject the intruder and finds himself a more

congenial companion. No man likes to be talked to like a naughty school boy in his own home.

This wave of crass and blatant advertising is but natural. Broadcasting is so new. One sponsor says something. The next goes him one better, or one minute longer. The other retaliates. So it goes. Fortunately, there is a brighter side to the picture. Sponsors whose attention is called to the fact that their object is to sell, and shown that such radio advertising creates ill will instead of good will, that it tends toward tuning out the program and the purchase of competitor's products, are realizing their folly and correcting the error of their ways. They took a chance. They are being shown the futility of misguided efforts. They are returning to programs and announcements that will create and hold good will.

But the Twain Do Meet

How is this done? The answer would take more space than we are warranted in using. Suffice it to say for the purposes of this chapter that whereas the printed advertisement links the name of the advertiser with his product or some attribute of his product, the successful radio program links the sponsor's name not with his product but with the high quality of the program. It is the program that the audience enjoys. Then link the name with that enjoyment, associating the sponsor's name with the pleasurable sensation derived from the program.

The sponsored program, aside from its own intrinsic merit as a good will builder, may be advantageously linked with other forms of advertising. A particular program having become well known, window displays may be designed on the basis of the programs, to be placed in the dealers' show windows. A cardboard of the Seiberling Singers, breezing along the "high winding highway" in a car equipped with Seiberling tires, the quartet singing in a care-free manner to denote absence of worry over tire troubles, may not be a bad idea for a window display. The Ipana Troubadours in their yellow and red costumes would remind the passerby of the red and yellow tube in which the tooth paste comes.

Not only does broadcasting aid in window displays, but it in-

fluences the dealer quite as much as the consumer. For the dealer is a radio listener too. He enjoys the same "hours." And it is more true of the sponsored program than of space advertising that the dealer considers himself a part of the sponsor's organization. Listening to a program sponsored by a firm whose goods he handles, the dealer at once enjoys the offering and takes personal pride in the thought "we (the sponsor and I) are putting this on."

Another value in the sponsored program lies in the personification of impersonal objects. Generally speaking, that which is or seems to be alive is more interesting than the inanimate. The imaginations of the listeners are stimulated, cloaking with a living personality and all the associated pleasurable emotions the products represented by the Happiness Boys, The Armstrong Quakers, Olive Palmer, the Smith Brothers ("Trade & Mark"), the Happy Wonder Bakers, La Palina, Graybar Mr. and Mrs., the Michelin Tire Men and the Flit Soldiers.

Even space advertising is greatly increased in value. The space advertising of a radio sponsor is read more sympathetically than it would be were the advertiser unknown on the air, for the sponsor is a friend. If the same appeal runs through the printed advertisement as in the broadcast program, the promotional effect of each is tremendously heightened. Thousands think as they see an RCA Victor ad, "Here is a message from one who entertained me last evening," or "So this is the organization that brought to my home those great concert and operatic stars." And of course a line or two of the printed advertisement may remind the reader of the advertiser's program which will be on the air at a particular time.

Souvenir advertising may easily follow in the path of radio programs. Amos 'n' Andy taxis have already been the vogue. More than 200,000 pictures of these black-face comedians have already been requested. Autographed pictures of the Seiberling Singers may be given away.

The Price of the Gavel

Just what does this peculiarly advantageous form of advertising cost? Plenty! As we go along the road in our automobiles we notice

signs at the gas stations, FREE AIR. This is for tires. We find air not quite so free at the broadcasting stations. But after all, radio air is surcharged with the merchandising health tonic of good will.

We find, for instance, that over the Columbia System the Basic Network of 20 stations in the East costs \$4,715 per hour in the evening and \$2,948 in the daytime. WABC of New York, the key station of this network, is worth \$600 per evening hour and \$375 by day. WNAC of Boston costs \$300 per night hour, Chicago \$425, and WCAU of Philadelphia \$400.

The National Broadcasting Company charges correspondingly more. One hour on WEAF of New York between 6 P.M. and midnight is worth a new Ford, fully equipped and delivered, or \$750. The Red Network, comprising 20 stations in the East, headed by WEAF, will cost the sponsor for one evening hour more than his stenographer's yearly salary. The price is \$4,890. Sponsors clamor for the privilege of using the Blue Network, comprising fewer stations with WJZ as the key station at the per hour cost of \$3,350. One evening hour on the Pacific Network after sun-down is worth \$1,100. For shorter periods we need but point to the \$1,903.96, charged per 15 minutes on the Red Network.

One may build a modest house with the price of one hour's evening broadcast from a coast-to-coast chain using the Blue Network. For this service the National Broadcasting Company asks (and gets) \$7,690. And if he would use the Red Network on a coast-to-coast hook-up, the sponsor must pay at the rate of almost \$154 every minute (or more than \$2.50 per second!) he is on the air, or a total of \$9,230 for an hour. And all these figures exclude program costs.

At first glance it might appear that a sponsor of a radio program over a large network would have to cancel all his space advertising to pay the bill. But experience has proven otherwise. Radio advertising pays for itself, as evidenced in the renewal contracts among national advertisers. For example, the National Carbon Company is now in its seventh continuous year of broadcasting. The Great Atlantic & Pacific Tea Company has been broadcasting continually for nearly six years, while the Metropolitan Life Insurance Company and Bristol-Myers Company have each nearly completed five consecutive years. The Clicquot

Club Ginger Ale Company is about to enter its fifth year. The U. S. Playing Card Company has broadcast its bridge games for the past five winters. Apart from these early pioneers many advertisers have been on the air since 1926, and 1930 is marked by the renewals from many advertisers whose initial contracts became effective two years ago. This applies with equal force to certain features broadcast over the CBS network, which have become accepted institutions because of their year-in and year-out presentation.

Broadcasting pays for itself. And its aid to other advertising media is such that sponsors have even increased their advertising budgets for newspapers and magazines. Radio advertising has been found so worth while by itself and in conjunction with other media that more and more money has been spent in all media.

Of course, the growth of broadcast advertising has been more rapid than that of other advertising. Magazine advertising being much older than radio sponsorship, its yearly growth is less steep than during its years of greatest expansion. The following table is significant in that it shows both the phenomenal rise in broadcast advertising and at the same time a normal slight rise in magazine advertising. Two items are worthy of special notice. Of the 23 branches of products listed, only two show a decline in radio advertising from 1927 to 1928, whereas nine show a decrease in magazine space. But by no means can it be said that the nine losers of magazine advertising have been the nine largest gainers in radio time, while of the two losers in radio time, schools likewise lost in space, and office equipment, while losing on the air, gained only \$12,000 in a \$2,705,000 advertising campaign.

Moreover, sponsored programs actually contribute to the welfare of the press. They keep broadcasting alive. And while broadcasting persists, people will buy daily papers to learn the programs for the day, they will buy newspapers to read criticisms of last night's programs and the news of their favorite announcers, actors, musicians and vocalists. In other words, broadcasting, dependent on sponsored programs, contributes to newspaper circulation.

It also contributes to space advertising. The entire radio industry in its many branches is dependent on broadcasting. No

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broadcasting, no sets or tubes or accessories, all of which branches of the industry advertise heavily in the public prints.

The table follows:

	<i>Broadcast</i>		<i>Advertising in Magazines</i>	
	<i>Advertising in the air</i>	<i>Advertising in the air</i>	<i>Advertising in Magazines</i>	<i>Advertising in Magazines</i>
	1928	1927	1928	1927
Radio, Phonograph and				
Musical instruments...	\$2,082,000	\$1,103,000	\$ 5,384,000	\$ 7,065,000
Automobiles	1,249,000	423,000	22,937,000	24,524,000
Drugs and toilet.....	978,000	300,000	30,032,000	27,190,000
Foods and beverages....	773,000	428,000	27,284,000	25,603,000
Confectionery and soft				
drinks	701,000	260,000	3,722,000	4,226,000
Financial and insurance.	656,000	471,000	2,969,000	2,803,000
Stationery and books....	602,000	171,000	5,676,000	5,450,000
Furnishings	410,000	206,000	17,999,000	17,630,000
Tobacco	387,000	37,000	5,220,000	4,722,000
Petroleum products	311,000	22,000	3,317,000	2,863,000
Shoes and baggage	190,000	33,000	3,503,000	3,450,000
Soaps and house supplies	182,000	91,000	8,721,000	7,471,000
Travel and amusement ..	99,000	23,000	6,231,000	7,094,000
Clothing and dry goods..	62,000	12,000	7,534,000	9,015,000
Jewelry and silverware..	47,000	27,000	4,950,000	4,802,000
Sports	45,000	2,000	3,886,000	3,646,000
Building material	42,000	30,000	9,816,000	9,895,000
Paint and hardware.....	28,000	18,000	3,675,000	4,087,000
Office equipment	23,000	79,000	2,705,000	2,693,000
Machinery	14,000	10,000	2,309,000	2,416,000
Garden	5,000	1,268,000	1,090,000
Schools	6,000	3,272,000	3,345,000
Miscellaneous	1,407,000	7,000	2,791,000	2,519,000
	\$10,252,000	\$3,760,000	\$185,205,000	\$183,390,000

Compiled from National Advertising Records.

More Figures

The growth of the sponsored program has been most remarkable. In 1922 the total advertising income of station WEA— at that time the only station which had resorted to sponsored programs—was about \$5,000. In 1926, the first year in which network broadcasting became a more or less regular occurrence, the advertising of this station and those associated with it was about \$1,300,000, including the cost of artists and musicians for the programs. In 1927, during which year the Columbia Broadcasting System entered the field, the total cost of broadcast advertising on all networks jumped to \$3,760,010. And this tremendous up-

ward trend became even more steep in 1928 in which the total revenue for all networks reached the astonishing figure of \$10,252,497. The figures for 1929 are not yet complete, but through September of that year \$12,904,134 had been spent, exclusive of artists', musicians' and general program fees, for which several millions had been paid. A remarkable representation of great national advertisers has characterized the list of NBC clients during these years, as well as that of the company's contemporaries. By October, 1929, 144 national advertisers were using the facilities of the National Broadcasting Company alone. Aside from the enormous sums paid for time the costs of talent and program preparation are steadily mounting as companies vie with each other for superlative program quality with which to draw listener attention. There are so many good programs on the air that the fair-to-middling is almost out of the running altogether.

"So I Took the \$50,000"

Early in 1928 the famous Victory Six program, sponsored by the Dodge Brothers Automobile Company, at that time the most costly program ever put on the air, cost \$25,000 in artists' fees alone. The program was much publicized in advance. It was broadcast over a coast-to-coast hook-up, the program originating at various points. Will Rogers spoke a few words and introduced the features from California. Fred and Dorothy Stone performed from their dressing rooms in a Chicago theatre. Al Jolson sang from New Orleans and Paul Whiteman's orchestra played from New York. Extravagant? It paid for itself many times over in good will and sales. Amos 'n' Andy, one of the most popular features on the air, are paid a sum greater even than Babe Ruth's new salary.

The huge salaries for which the Hollywood motion picture industry is famous are being met and surpassed by those paid for radio performances. Hard-hearted business men, looking for a return of capital plus interest on every penny they spend, must be convinced of the soundness of their investments. They have been convinced. The Shell Gasoline Company has been convinced that it is worth paying Hugh Barrett Dobbs \$300,000 to conduct

the Shell Happytime Hour on the Pacific coast every morning for three years. The Fleischmann Yeast Company pays Rudy Vallée and his orchestra \$2,500 per week to play for the Fleischmann Sunshine Hour. Vincent Lopez is said to receive the same sum. Franklyn Baur, the Firestone Tenor, writes his name on the back of a \$1,000 check every week. Jessica Dragonette makes more than \$700 weekly, and Graham McNamee finds more than \$1,000 in his weekly pay envelope.

The programs for which these sums are paid are no flashes in the pan. They continue week after week, year after year. The record for single or occasional broadcasts, as far as we can find, is held by Harry Lauder, who received \$15,000 for his first 15 minutes on the air. He sang three songs at \$5,000 per song, and then sang another quarter hour on another program for the same amount, making a grand total of \$30,000 for 30 minutes. And that, gentle reader, *is* money. But it is gladly paid in return for the publicity, good will, and sales accruing therefrom. Of course, a small town, single-chair barber shop would be foolish to go on the air with such a program (even if it could). But the concern the product of which is nationally known and widely distributed reaps huge profits from even so vast an expenditure, if it be rightly exploited.

Preservation of Programs

Admittedly large sums are spent for program talent and preparation and naturally the question has arisen in the minds of some: Is all this money spent for but one performance? And cannot these high grade performances be given again, perhaps from different stations? In an attempt to answer these questions there have been established in this country a considerable number of program-recording agencies. These concerns are prepared to record a program or a series of programs for an advertising sponsor and to arrange, directly or indirectly, for a group of stations to broadcast the records in question at assigned and agreed-upon times.

There are a number of varying possibilities, the effects of which are quite different. An ambitious program-recording studio will endeavor to secure as its customers national advertisers and

will attempt to place its records in stations on the great national networks during times which the network would normally use, for example, the evening hours. If such a plan were successful, it would be extraordinarily damaging to broadcasting as we now know it for a rather simple reason.

Broadcasting over networks on a national scale is an expensive proposition. It involves setting up wire lines to connect many stations in all corners of the country. These lines are leased from the Telephone Company on a permanent basis in general, and therefore at what might be termed "wholesale rates." In other words, if these lines had to be purchased on a retail basis (that is, set up each time the program was started and disconnected each time it was over), the cost of operation would go up to a point quite beyond the financial limitations of the situation.

Yet it is universally conceded that radio, like every other new art, should particularly and preferably do that which cannot be done, or as well done by any other existing agency. And certainly the major function of radio is to provide *instantaneous mass communication*. Those who have most carefully analyzed the significance of radio in the life of the peoples of the world cannot satisfy themselves that a radio receiver is only a self-winding phonograph. They admit the excellence of the phonograph so far as quality of musical reproduction is concerned, and they believe that no home containing musically inclined people should be without a phonograph and a good record library. However, they do not conceive of radio as only a means for the replacement of the phonograph on a non-selective program basis. After all, the phonograph enables the best of whatever program one may desire at whatever time one desires it; and radio is by its very nature not a selective form of entertainment of this type.

But radio can do some things which nothing else in the world can accomplish. It can place millions of people in direct touch with the living, vibrant personality of a speaker; it can bring the most interesting event instantaneously into the home; it can translate the very individuality of a great artist or the inspired performance of an orchestra into instant contact with the people of a nation. It can connect continent to continent with the speed of light. These things radio can do—and radio alone. Eliminate

these things, say the analysts, and radio changes from a thrilling personality-contacting, nation-binding agency into something which rather resembles its older brother the phonograph, perhaps more readily controlled by lazy people but not offering the advantage of selective entertainment which the phonograph can so well provide. There seems to be universal agreement that the special instantaneous event is necessary to radio.

The national networks are the only economic means of supplying these events to the people in the world. If you would listen to Floyd Gibbons tell the events of the day before the day is done, to the crowds on Broadway cheering Lindbergh, Byrd, or Coste and Bellonte, to a Presidential nominee accepting the nomination, or to the momentary changes in a hard-fought baseball game—and if you would share in the thrill of that which is sent you—you must know it comes to you at the instant of occurrence so that you are indeed a part of the audience that sees and hears with human eyes and ears, forgetting that radio is the extension of your own vision and hearing.

Station owners have found that in some cases they can secure a higher payment per hour for broadcasting a recorded program than for broadcasting a network program from an advertising sponsor. But, included in and a part of each payment made to a network station for broadcasting a sponsored hour containing advertising is the intangible but very real element of payment in the form of the other instantaneous events which it broadcasts and which it can receive only over the network which serves it. Its popularity—and popularity is the life blood of a broadcasting station—depends on the instantaneous network events in large measure.

As may be gathered, we do not regard as helpful to the present progress of radio broadcasting the substitution of recorded programs for network programs sponsored by national advertisers and placed on the stations of the national network. If national advertisers desire to use the stations now on the national networks, the agency for so doing, namely, the wire connections, already exist and should be used. If they are not so used, the maintenance of program quality over the networks and, above all, the broadcasting of the instantaneous event which is the very

essence of radio broadcasting, become alike impossible. It has been suggested, indeed, that those stations which broadcast recorded programs may band together and lease lines for special instantaneous events only. Why, however, lease lines occasionally at extremely high costs (which must be subtracted from the apparent profit of broadcasting recorded programs) when the same lines can be leased more economically on a long-term basis?

Some thoughtful people, in considering the proper sphere for recorded program broadcasting, have reached the conclusion that at this time the only desirable utilization of records is by other than national advertisers and by stations not on the national networks. There is something to be said for this viewpoint.

There are some advertisers who may want to reach a section of the State or a limited portion of the country which does not correspond in fact with any national network or with any regional section of such a network. The national networks might not be prepared economically to serve such clients. There are local stations, not on the networks, to be found who would broadcast recorded programs for such local or regional clients. Such an arrangement might be beneficial to the client and the broadcasting station alike and would presumably not affect prejudicially the major structure of broadcasting and its chief points of interest to the people.

An interesting statement has been made by A. J. Kendrick, well-known authority on recorded broadcast programs and president of an organization which prepares such NBC network features as the Palmolive, Edison, Chase & Sanborn Choral Orchestra, and the Johnson & Johnson features: "The recorded program is not intended as a substitute for the network program any more than radio broadcasting is a substitute for space advertising. The recorded program supplements the network, tying in with the network and reaching territories untouched by it."

The evolution of the recorded program should be a subject of keen interest to the public. In its proper sphere it might substantially assist certain phases of broadcasting, particularly the economic problem of certain of the outlying stations. Incorrectly utilized, it might prove an unfortunate and deadening element in

radio, depriving the listeners of some of the finest capabilities of radio broadcasting.

Home-preserved Programs

Recently there has appeared on the market a receiving set produced by the RCA-Victor Company which contains a novel feature that may have real significance in connection with program production and preservation. This receiver provides home recording. Special pre-grooved record blanks are furnished which are placed on the phonograph turntable of the receiver (which is necessarily a combination radio and electric phonograph outfit). A switch is set to the "radio recording" position and the turntable is started, the phonograph pickup being lowered into the blank groove of the record. The machine then automatically records the program for a length of time determined by the dimensions of the record blank. (It is also possible to record one's own voice or music in the home by a simple switching change, and the use of a home microphone which can be plugged into the receiver.)

Such a receiver offers the fascinating capability of selecting choice morsels of air entertainment and preserving them for any desired length of time. While the quality of the records will not equal that of the commercial pressings which are made by the great phonograph companies, yet the home recorded radio programs will serve as an excellent way of bringing back, to a fair extent, the enjoyment of any radio program of outstanding merit.

Radio receivers which can be arranged to tune in any desired stations at any particular time will also doubtless appear on the market in various forms. Such a receiver, if provided with the home recording feature, would enable the user to record at least a portion of a program during his absence. Perhaps in the not too distant future the broadcast listener, desiring to hear a particular fifteen-minute program, but necessarily absent from his home during that particular period, may nevertheless find a record of this program available on his return and enjoy the repetition of the program in its recorded form.

It is too early to judge the reaction of the listeners to these various devices, and it is difficult to gauge their place in broadcast

development. Certain it is, however, that broadcast reception becomes ever more flexible; that every possible desire of the listener will be increasingly met by the ingenious receivers of the present and future; and that the taste of the public will be free to develop along any natural lines untrammelled by engineering limitations.

Entertainment from the Lamp Socket

From time to time there has been seriously proposed by various engineers and at least one commercial organization (Wired Radio, Inc., a subsidiary of the North American Corporation, which is a large electric power company) that entertainment be sent to the listeners over the electric light and power lines which go directly into their homes. Although it is not generally known that such is the case, it is possible to place at the power house so-called "carrier current transmitters" (more popularly termed "wired radio transmitters") which can send one or more programs over the light and power lines into each home.

The entire system briefly described is as follows: A program is originated in a central studio of a given city, or reaches that city over a wire line from some distant city where it originates. It is then distributed to a number of the power houses or sub-stations in various sections of the city, again by wire lines. At each of these points the program is fed into a wired radio transmitter which sends it out into the underground power and light wires of the entire surrounding section.

The users of electric light are then invited to subscribe to wired radio service at a certain monthly rental which will appear on their electric light bill. Those not subscribing may have "blocking devices" placed in their power lines to prevent them from picking up the program without paying for it, if there is any reason to believe that they will resort to such improper measures. Those subscribing to the service are supplied with a wired radio program selector (which is really a tuning device containing also, if required, protective devices to prevent wire line disturbances from being mixed in with the programs). The subscribers are also supplied with a wired radio receiver or permitted to connect a wired radio receiver to the program selector.

It is understood that three programs would be simultaneously sent into the home of each subscriber. One of these programs would be speech and two would be predominantly musical. And, most interesting of all, *all three programs would be entirely free from advertising.*

It is assumed that the wired radio company or the power company would service the equipment in the home so that the user would not have any expense beyond his monthly rental. The economics of this system of entertainment are entirely different from those of radio broadcasting since the listener pays directly for his entertainment, and advertising, it is understood, would be totally excluded. It has been stated that a commercial installation of this sort is planned for the city of Cleveland, Ohio.

The service of wired radio is primarily one for cities and towns. It is doubtful whether its scope could be effectively and economically extended into the rural portions of the country and, in this respect, it is at a disadvantage relative to radio broadcasting. It is also not known—and it cannot be known without trial—whether the public would prefer to pay for its entertainment on a monthly rental basis or to pay for it through good will and the conscious direction of the public purchasing power. Numerous questions could only be answered by experiment; for example, whether three programs afford sufficient choice and whether most people would care to add a wired radio receiver to a space radio receiver in their homes. We have also the great question to answer as to whether the elimination of advertising in the wired radio programs will prove as attractive a feature to the public as has been anticipated. Advertising in radio has, in fact, always been a matter for considerable discussion.

Elastic Yardsticks

Just how much good does radio advertising do? This is not even a question. It is the beginning of a dispute, and as impossible of an absolute answer as the question: What is Mona Lisa thinking about? The exact value of radio advertising will only be computable when psychologists have answered the question: What are the factors which influence human behavior and how great is each

factor? This much, however, can be said. We buy more from prejudice than most of us suspect. Logic, reason, and fact play less than the major part in our purchasing habits. We form opinions on hearsay; we buy on factors other than those concerning the article's use; we are easily influenced. One influence is soft whisperings in the ear. Another is the pleasant sensation of being entertained, and feeling a sense of participation in the entertainment. A third is the emotion created by music. In these ways does radio influence the sale of products directly. But there are so many other factors and so many indirect ways in which radio affects sales that an exact answer is impossible.

A concern contracts for a half-hour weekly program over a period of a year. It maintains the same space advertising as for the previous year. The price and quality of the article remain constant. Sales increase 50 per cent. To whom should the credit go? On first thought it might seem that the only variable factor was radio. But was it? Perhaps the national per capita income for the year increased, making possible the purchase of more units of the article. Perhaps competing articles deteriorated in quality, or lessened their sales effort. Perhaps a new device has come into use during the year which necessitated or increased the use of the article in question. Perhaps, even though the space advertising budget remained the same, the copy and art work were better. Perhaps weather, crop or market conditions influenced the sale of the product; perhaps styles changed; perhaps advertising in an associated field had something to do with the matter; perhaps and perhaps for a dozen pages. And in what proportions?

All we can say, and all that need be said to show the effectiveness of broadcast advertising, is that those firms which have sponsored broadcast programs note an increase of sales the equivalent of which could not, according to their experience and knowledge, have been attained without radio or by the expenditure of the radio budget in any other manner. And when hundreds and hundreds of firms in all sorts of lines say that, it means something.

Of course, fan mail is an indication, though by no means an accurate one. Some sponsors go after fan mail, perhaps blatantly by asking those who enjoyed the program to write the sponsor, whose address is given, or to the station. Other sponsors offer

booklets or premiums of various ingenious kinds to those writing in for them. Sometimes sponsors offer to answer questions received through the mail. On the other hand, some sponsors announce only their names, being, or at least appearing to be, uninterested in receiving comment.

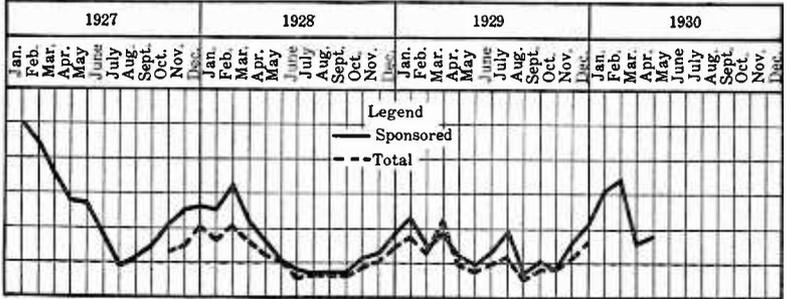
As each sponsor's fan mail comes to the network it is tabulated each day showing increases and decreases, from which seasonal trends, growing program acceptance and other information may be garnered. A representative NBC client, for instance, producing a quality program and offering average inducement for mail response started broadcasting in April, 1928. While the volume of mail to this client does not rank with the leaders, it gives an indication of the trend. The first month brought only 4 letters, the next, 32. In September this sponsor's fan mail rose to 2,367 letters, the following month, as the program caught hold, it became 5,363, and in November, 6,135. From December through March, 1929, there was a slight falling off, despite the fact that these months are usually the best for fan mail. But in April the letters reached a monthly total of 7,466. Altogether, 40,033 letters were received by this sponsor during 1929. And this represents only those which came for the sponsor addressed to the stations and NBC. In addition, many letters were sent to the sponsor direct. These the network could not tabulate. And still other letters were received by the program announcer, commenting on his announcements of this sponsor's presentation, and to particular artists performing therein. As we said, this program is not among the leaders. Sometimes as many as 38,000 letters pour in for one sponsor in a single week.

The letters received by the network are classified according to letters of approval, suggestion, and adverse criticism. All the letters flowing into NBC are likewise tabulated according to the types of program responded to. Needless to say, but worth saying anyway, many people spend their days opening, reading, and sorting letters.

Charts are kept, showing the number of letters per sponsored program hour throughout the network, as well as for all programs. Naturally, the sponsored programs receive more mail than the

sustaining, due somewhat to the larger networks broadcasting such programs. Let us briefly examine such a chart.

Trend by Months of N.B.C. AUDIENCE MAIL RESPONSE PER STATION HOUR 1927 through 1930



The one reproduced here shows a decided seasonal change from the high mark of about January to the low about July. January, 1927. Broadcasting was still a novelty for many listeners. Programs were becoming intricate, varied, of wide appeal. Winter. Therefore the abnormally high number of letters per sponsored program hour for the month. In July the fan mail takes a decided drop, the next peak being reached in February 1928 not so high as the preceding peak, but more nearly normal. Again the July drop, followed by the climb to a January, 1929, peak. The low 1929 peak may be attributed to several causes plus, in all likelihood, factors beyond the comprehension even of fan mail students. Not only was this crest low, but the trough, coming in August, fell below preceding troughs. One thing was sure, radio had ceased to be a novelty, people were no longer writing in because of the thrill radio gave them. Letters were becoming more significant, motivated by appreciation of the programs themselves. Maybe the "wave of 1929 prosperity" had something to do with it. But following last August, mail again picked up, reaching in February, 1930, a peak higher than any since 1927.

The yearly averages show 26.4 in 1927, 14.7 in 1928 and 14.8 in 1929. In the interpretation of these figures, however, several matters must be kept in mind. The ever-increasing radio audience, the widening networks, the growing number of hours of sponsored programs—all tended to raise the number of letters required to

increase the average one point. Many more letters are needed to raise the average one point today than three years ago. And so it is not at all surprising to find that although the average fell almost 50 per cent from 1927 to 1928, the total number of letters received by NBC increased from 550,013 in 1927 to 781,837 in 1928, while the following year's average increase of one tenth of one per cent represents an actual increase in letters during 1929 of 498,009 or an increase almost equal to the total number received in 1927 when the average was very much higher. In 1929 NBC received 1,279,846 fan letters.

What we may expect of the future is hard to say. The sponsored program has grown rapidly. It cannot continue to do so forever. But the continued trend towards mergers, amalgamations, and corporate concerns generally bodes well for the sponsored program, which can so well serve trade names and products known nationally and part of the national existence. Unfortunately, wave lengths are limited. The number of stations which may operate in this country and in the world, under present technical limitations, is limited. The number of hours per day is limited, quite unlike the number of pages which a magazine may incorporate to carry the amount of advertising it receives. But there still remains plenty of excellent time to be used by sponsors. Those hours which are now of least value may jump in value when the firm that can best use them sees fit to do so. And the sponsors now on the air will gain even greater results from their programs as the art of creating programs and commercial credits widens in scope, becomes more subtle, more effective.

CHAPTER XX

TEARING DOWN THE SOCIAL BARRIERS

IN India there are four castes, from top to bottom, the Brahman, the Kshatriya, the Vaiya, and the Sudra. Each is distinct and separate from the rest. Life is hard in India. They believe in reincarnation. It is not a happy thought, to have to be born again, and struggle through another life. But such will be the case until such a time as one becomes a Brahman. If in his life as such, he is good, then he passes out of life. He no longer has to toil on this earth. No class is jealous of any other. If a man finds himself in the humble serf caste, or Sudra, he knows it is because he lived an evil life in his previous incarnation, unless he had previously been an animal, in which case the present life is a rise in position. If he lives righteously as a Sudra, he will, after death, return to earth as a Vaiya. And so on up the scale. And the higher he gets, the nearer the end of life. Since death is looked forward to (that is, everlasting death), those in the higher castes do their best not to fail and return to lower levels. In India the caste system naturally rules supreme.

They Know Their Places

In England, too, the caste system had been in vogue, not as a religious or philosophical institution, but as a great social influence. People "knew their places," respected their "betters" and were willing largely to remain in their own classes. "Class will tell," was an axiom. It was very pleasant in a way, for those of the higher classes of society. They were respected and well treated. None of this American attitude of "I'm as good as you are." No uncouth *nouveau riche* trying to force their way into society with the dollar sign as an entering wedge. They could not, as a general thing, "arrive socially," and they knew it. There-

fore, they tried to be happy in their own class. They would try to rise to the topmost position in their own class, but step out of that class, never! Plays were written on the theme that he who tries to enter a class of society not his own brings troubles on his head. It can not be done. And it was obnoxious to right-minded folk to try it.

From News Boy to President

America has always considered itself free from the bonds of caste or class. This is the land of liberty. People pride themselves on the fact that here the newsboy can become President. "We have no restraining or upper classes here," they say. But until recently, that was not true. It is true that the existence of classes has never been officially admitted in this country. That is what has made them all the more insidious. In England, where they were openly acknowledged, they could be borne with more fortitude. But here a person sees all about him the signs of class while in his ears rings the perpetual echo of "there are no classes." In England, classes were openly recognized. Wherefore it was possible to appraise a man's qualities on their own merits without having to accept him as a member of any but his own class.

In this country it is different. Since classes are not openly recognized here, it is difficult to classify them. But there is a distinct class snobbishness as between money and brains, material and spiritual qualities, success and failure. Probably nowhere else in the world is the man of intellect or artistic power with no money or other material assets looked down upon as here. Inbred culture counts for little if a man has nothing to show for it. It would almost seem to have no value in itself. It must bring results to be worth anything.

Likewise, there has been no such thing in this country as a noble failure. If a man is a success he is respected, with slight regard to how that success was attained, whom it hurt, or at what cost in other matters to the successful person. And the failure has no excuses, and no alternative qualities to offer. The chances for material success in America have been great. Opti-

mism is the order of the day. Success is in the air. He who fails—well, he is just not a success, and that is all there is to that.

The Great Leveler

At least so it was until radio came along, *radio* the great leveler. And still, not exactly a leveler. For a leveler brushes the crests into the troughs, lowering the heights, raising the depths, averaging. Radio leaves the peaks alone, and, filling in the troughs, brings all to the heights and raises the average. The mutual distrust and enmity of laborer and executive, one for the other, are being swept away. Business man and artist, scientist and cleric, the tenement dweller and the estate owner, the hovel and mansion—all begin to lose the prejudices they have so carefully built up toward the other and see each other in the true light. These prejudices had been built up by reading, by hearing others speak about people from unsound information, as defense mechanisms against their own shortcomings.

But over the radio, people meet each other face to face. And the great characteristic of all people, the world over, that characteristic which has almost been forgotten in the rush and turmoil of making a living, of slander and hatred, comes to the fore, the characteristic of *humanness*. The laborer learns that the man in the office is not a Simon Legree, with nothing to do all day but smoke big black cigars and boss his men or fire them. He has problems of his own, just as difficult—more so in fact. And the executive gets the proper view of the "man with the hoe." Scientific men see that science is a means, not an end. And artists see science as a means for furthering their work. The "smart aleck" on the street corner, the farmers around the apple barrel in the general store—gone are their assertive, dogmatic statements about all people and all things and all opinions.

On the wings of radio have come truer impressions and opinions of men and matters. Formerly in the heat of a political campaign a man would look upon his favorite candidate as a hero much maligned and his adversary as the devil incarnate. Hearing both candidates speak over the radio the same man today realizes that they are two very human beings with pretty much

the same feelings, emotions, thoughts, prejudices, just brought up in different political parties. The same is true as concerns those myriads of things, ideas, institutions, and people of which we learn by radio. Socially, economically, politically, artistically, people have learned more nearly the truth. Let none lightly disregard or dismiss the claims of radio as a great democratizer. Mass communication leads to mass communion, to social unity of purpose and broader sympathy and understanding.

Viewing from Beneath

What is perhaps as important, no longer are the authorities—the prominent, the great persons—mere names and far-away imaginings up to which we must look as from the base of a pedestal. That was the great trouble in the past. Man has too much false respect for that which he does not know; false, because it is based on fears, exaggerations. He hears vague rumors about the prowess of some man in some field of human endeavor. His mind exaggerates the man's accomplishments and their significance. That man is placed on a pedestal, from which he is viewed from below. The pedestal is high. The average mortal passing beneath can read only the name. To see the figure that the name represents, he must strain his neck. And even then, all he sees is the bottom of his hero's shoes, sticking beyond the base of the pedestal, and the lower side of his jaw if he can look that high. Viewed from a bad perspective, the figure on the pedestal is distorted.

That sort of thing happens all the time. Poor Will Shakespeare has been placed on such a high pedestal that most people cannot see him. They respect him because they have learned that he was great, not because they have any knowledge of his work. And since their respect is based on tradition, not on sincere belief of his greatness, they dislike him. If they knew his work they would not *kowtow* so much, but their respect would be on a higher plane.

In modern life the outstanding figures, which before the days of radio were looked upon as people belonging to a different world, are now being respected for their true worth. Of course

the faker dislikes the radio. It helps to bring out the fact that he is not all he proclaims himself to be. But the converse is also true.

Mutual Entertainment

The great symphony orchestra is playing over the air tonight. To many it is a mysterious thing of which they know little. But all tune in, rich and poor alike. They come to know the orchestra and its work at first hand. The bond of men, bound together by emotions felt together, grows stronger with their common appreciation of the same spiritual, intellectual, or emotional stimulus. The President of these United States addresses the country through the microphone. All people can listen, whether their sets be in a smoky, smelly kitchen of a tenement house the little windows of which face bleak walls, or in a spacious mansion. The listeners-in at each instrument hear the same voice, the same words, and at the same time. The next morning they pass each other on the street. Each knows what the President said—knows from the same source. Each spent his evening in the same way, forgetting his surroundings in listening to the speech.

We're Having Guests

Banquets, dinners, meetings of notables, concerts, opera stars, sporting events, museums, foreign lands, customs and manners—the humblest citizen visits them all in his own home; and the great personalities of the day pay personal visits in a real sense to his dwelling place. No longer must the lowly and the poor consider himself an outcast. He is spoken to by the great and the near great. He can applaud or criticize at will. His are the enjoyments of the rich, the cultured—enjoyments catering to tastes and standards higher than those of his everyday, previously monotonous existence. He who works amid drab surroundings, lives in a drab dwelling, and comes home from work to know that he can find his evening's pleasure only in the equal drabness of some backroom pool parlor has true cause for righteous indignation. Cramping the souls of men is worse than injuring

their bodies. But the man living in such an outdoor prison no longer need exist.

On Dress Parade

O. Henry wrote a short story called "Lost on Dress Parade." It dealt with a worker in the big city, who lived in a cold, dark, hall bedroom. Every week he put aside a dollar and at the end of ten weeks he pressed his blue suit, sauntered up the Avenue, dined at a fashionable restaurant, smoked a good cigar, and took a hansom cab home; in other words, he played the cultured gentleman one evening out of every seventy. That same man now plays the gentleman every evening. And not only plays the part, but actually *is* a cultured gentleman. It goes beyond the surface matters of dressing, strolling, dining, smoking, and riding. O. Henry's hero did all of these, but, as the story goes on to relate, the one thing he missed in these evening excursions was company fitting to the part he was playing. This is the great advantage of the radio. You can hear the actual voices of the personalities, their messages to *you* as you sit in your own home. Or hear the greatest music rendered by virtuosi.

The social barriers in this regard have been torn down and it is well. More people spend their leisure in the same way now than ever before, listening to the radio. There are no box seats, orchestra, balcony, and gallery. Everyone has a box seat. Everyone has the same unobstructed view of the theatre of the air. And if he cannot talk to the leaders of the world and make himself known to them, at least they do the talking and make themselves known to him. Indirectly he can influence and direct, for an enlightened people is the best guarantee of human progress.

I Am King of All I Tune In

Life for the individual has widened. The automobile has taken him from his doorstep to the neighboring town. The movies have taken him to foreign lands and strange places, amid beautiful heroines and daring heroes. Radio has brought to his home the most stirring events, the keenest minds, the most striking personalities of the world. Man's greatest illness is loneliness, a

feeling that he is out of the stream of life. And in the necessarily mechanized and specialized life of today, that feeling of smallness, of inability to take part in the happenings of the world, to associate with people of standing and achievements, is multiplied. But with a turn of a knob there troops by radio into the home of every man a host of friends, good friends, of various temperaments, and achievements, prepared to be with him during an evening of human contact. And brightening the hours by permitting him to listen to music, attend a sporting event, a debate, a dance orchestra in a fine hotel, a glorious concert. The outstanding figures of the world march through his room, speak to him on matters of mutual interest. After their first visits, these same personalities become better known to the host; he greets them with increasing warmth as he learns to know their personalities and idiosyncrasies. They may become good friends. Every man has an engagement for every evening. Tonight he is going to the concert. Tomorrow President Hoover is dropping in to see him because he wants to speak to him on a certain subject. The next evening he is out at a prize fight. And the fourth night he is going to dance to Paul Whiteman's orchestra.

The cultural ideals of the world are expressed to him by the ardent workers in their respective fields; the real personalities are brought home for supper and to spend the evening. The host cannot help but be influenced by his guests. A man is known by the company he keeps. The company he keeps over the air is, if he so chooses, of the highest type. He numbers among his radio friends those with whom he spends his evenings. Prejudices are weakened or lost, true values replace them. Men learn to think straight, to consider fairly both sides of the question. Tolerance and kindness grow. The horizon of life is widened. Man really lives. The intangible mantle of radio sweeps around humanity and draws all together in a new brotherhood of man.

CHAPTER XXI

RADIO THE HOBBY

THE world must have its hobbies. Whether it be that the other man's occupation always seems so much better than our own that we must indulge in it during spare moments, or whether it be a much-needed form of mental and physical relaxation, the fact remains that the world must have its hobbies.

In the case of the American people, the use of tools has ever been a national hobby. The Yankee inventive ability, the Yankee mechanic, the Yankee whittler, the Yankee handy-man—the world has come to look upon our American stock as being essentially mechanical rather than artistic. While the older peoples of Europe have cultivated fine literature, art, languages, history, the conversational arts and the like, we have mastered the jigsaw, jack-knife, and lathe. The fact that so many mechanical inventions have originated, or at least had their real development, in the United States, simply confirms the idea that tinkering is our national trait. We are a young people—and perhaps it is fortunate that this is so.

The Flivver Fan

Just about the time that the jigsaw, jack-knife, and lathe hobbies were losing their proponents through the passing of their generation, the automobile came along. Nothing much happened at first, even though the pioneer automobile gave trouble enough to delight the possessor of insatiable American mechanical ability. But the first automobiles were limited to the wealthy. The average man had little or nothing to do with the gas buggy or devil wagon, except to stand on the side lines and offer the kindly advice of "Get a Horse!"

Along in 1905, one Henry Ford of Detroit embarked on the wild idea of providing an automobile at a price within reach of

every American family. Year after year he came nearer his chosen goal, as his factories grew in expanse, efficiency, and volume. Ten years later, the Ford had changed from a vehicle to a national institution. Catering essentially to the average man with none too much money, and particularly to the farmer who must needs depend upon his own ingenuity in keeping his equipment going, the Ford became more than a means of transportation: it became a mechanical hobby. Ford owners delved into the mysteries of carburetion, compression, ignition, storage batteries, magnetos. The old Yankee mechanical urge found ample expression in keeping the family flivver on the road long past the time when it should, according to the rules of automobile merchandising, be relegated to the scrap heap. And so, through the tuition of Professor Flivver, we became a nation of automobile experts in varying degree. Sunday morning finds the city clerk and the rock farmer washing or greasing or oiling the family buggy. As cars have improved in design, the tinkering has lessened. Today there is little to adjust or repair or change. We must be satisfied with perfunctory and slight duties about the car.

Radio Romance

Radio, too, came at an opportune time. Electrical interest was at a somewhat low ebb as a hobby. The experimental era, with its simple wet batteries, magnets, door bells, toy motors, static machines, and other devices had passed with the advent of electric lights in most homes. Likewise with toy telegraphs and telephones. Both authors of this work can look back to boyhood days when they had private telegraph lines strung throughout their respective neighborhoods, getting from them the supreme thrill of a simple age. But the rapid introduction of the telephone killed the telegraph and telegraph hobby, for who cares to make a hobby out of the commonplace?

Came 1907. Marconi's company exhibited the wonder of wonders, wireless telegraphy, at the first Electrical Exposition held in the old Madison Square Garden. A dignified wireless operator, dressed in immaculate evening clothes as only the English can wear them, sat with ear-phones and wise demeanor,

at a small table with a huge spark coil, key, and a handsome cabinet with glass top through which appeared a couple of horse-shoe magnets and a belt of spiral wire running between two ebonite pulleys, this mysterious device being known as the magnetic detector. Taking a message scribbled on a Marconigram blank, the dignified operator threw a switch and pounded the key. Dazzling sparks crashed across the gap. Immediately there was a rush of men and boys to that booth or to the companion booth at the other end of the Garden. And amateur wireless was born.

Thereafter, a certain *genus homo* appeared on the American continent. He was a retiring chap, who preferred the cellar or basement or shack in the backyard to the more conventional rooms of the house. He kept to himself. Among his eccentricities was the gathering of wire, cardboard tubes, metal filings, insulators, old batteries, odd tables, and chairs. Neighborhood electric companies and the telephone company complained that supplies were frequently missing. When this queer individual secured small sums of money by fair means or foul, these would promptly disappear by mail. And by mail would come packages from various firms, which, upon being opened, would disclose head-phones, mysterious minerals and crystals, spools of wire, insulators, spark coils, batteries, and even complete coils with sliders. As the flow of packages became more frequent, the electric light and telephone companies reported a stoppage of their erstwhile losses, probably due in large part to their greater vigilance.

Eureka!

But one day the queer one would rush out of his den and announce to the startled family that he had something to show them—or rather to have them hear. Fearing almost anything, the family timidly approached the den, only to be exhorted to tip-toe to the table on which were piled the coils, minerals, and loose wires. Donning the head-phones, the queer one, with a smile, would remove them and pass them on to each member in turn. What was this great cause of excitement? Merely a series of long

and short buzzes heard in the ear-phones. But to the queer one it meant success at last. EUREKA! He had mastered wireless!

And so the wireless amateur came to be recognized. At first he satisfied himself with constructing his own apparatus and intercepting the sparse messages flashing through space between ships and shore, and between various land stations. Later came the crude transmitting efforts. Again the wireless amateur constructed his own apparatus. The transformer or coil might be purchased or painstakingly made by winding miles of wire on well-insulated spools. Neighborhood photographers were besieged for the old glass negatives to serve in transmitting condensers. The family was kept awake at night by the incessant crash of the spark.

For a time, amateur wireless had a happy-go-lucky existence. Anyone could build or buy the receiving and the transmitting apparatus. No license was required to operate the transmitter. One didn't have to know a thing about the code, and so the air itself became the great proving ground. Incidentally, the early amateur transmitters were simply spark coils emitting terrifying sparks and equally terrifying signals in the immediate neighborhood, but with little carrying power.

You Will, Will You?

A certain doctor in Harlem, New York City, had been "stung" with a block of stock of a questionable wireless communication company. Repeated demands by the doctor for the return of his investment were of no avail. Presumably the company needed the money more than he did, for the doctor was financially comfortable which is more than can be said for the company.

And so the doctor worked out his own solution. He installed an X-ray equipment in his apartment, and arranged it as a wireless transmitter. He had mechanics erect a large flat-top aerial on his roof. The doctor did not know the code extra well. But he soon found plenty of boys in the neighborhood, who had 1-inch and 2-inch coils for their transmitters, and were only too glad to come in and operate the transmitter. And so, hour after hour, that transmitter was on the air. When there was

nothing else to do, the boys would practice code sending, using a magazine or newspaper article for the "copy."

The plot was deep. No one knew just what it was all about except the doctor. But the staff of the wireless station some five miles away, owned by the questionable wireless company and operated mainly to impress the public with wireless investment opportunities, knew plenty. Its operators could not receive messages because of the interference. Something had to be done. Suddenly, one day, the doctor dismantled his wireless transmitter. He never explained the reason. However, it was learned later that the doctor had obtained a satisfactory settlement from the company in question. The wireless amateurs' paradise of Harlem went into the discard.

Uncle Sam Dons Ear-phones

By 1912 it became obvious that radio communication was a serious matter. Hundreds of ships were now equipped with radio apparatus. The Army and Navy were employing radio communication. A transatlantic commercial service was in operation between Glace Bay, Nova Scotia, and Clifden, Ireland, by high-power radio. Thousands of amateurs were on the air. The air had to be untangled.

And so the Government Regulations came into being, requiring persons engaged in the transmission of radio signals to pass an examination before qualifying for a commercial or amateur radio license, and requiring every transmitter to be licensed. Radio inspection districts, nine for the entire country, were inaugurated.

The radio amateurs were by no means discouraged. Rather, they hastened to take the examinations and passed them with ample margin. Likewise, their transmitters were licensed, being found highly efficient in some cases. Amateur radio gathered momentum. Thousands of amateur radio messages were exchanged each day. Acquaintanceships were established over the air, and these ripened into warm friendships. A vast fraternity grew up among these amateurs or "hams" such as the world has never seen before nor since. Soon a nation-wide radio relay

system was fostered by none other than Hiram Percy Maxim, inventor of the gun silencer and a member of that famous Maxim family that has given us the machine gun and smokeless powder, not forgetting scores of lesser inventions. The system became known as the American Radio Relay League. Today it is world-wide in scope.

Attaining Professional Status

The entrance of the United States into the World War dismayed the amateur ranks. The Government clamped the lid on amateur radio activities. But shortly after, these self-same amateurs found a new outlet for their radio appetites. The Army and Navy were in need of radio operators. Thousands of amateurs rushed to the defense of their country. The United States, having fostered amateur radio in marked contrast with most other nations which discouraged experimental radio, was rewarded by having ample potential radio personnel to fight the battle of its history. Many amateurs set a high record during the War. Edwin Howard Armstrong, for instance. This radio amateur became Major Armstrong, in charge of the Signal Corps radio laboratory in Paris, where he evolved the super-heterodyne circuit now found in the RCA Radiolas for broadcast reception.

Following the War, amateur wireless, now come to be known as "radio," resumed its sway. What with the knowledge gained during the conflict, amateur radio took still faster strides.

Roll Your Own

1920. Conrad. KDKA. Broadcasting. The need for receiving equipment.

Overnight, radio programs were flashed over the air. It was physically impossible to supply the necessary equipment for the American public to listen in. And so the next best thing—build your own. Radio parts began to appear. Magazines devoted to the art of building radio sets came into existence. At one time there were over a hundred periodicals dedicated to the radio set

builder. Newspapers published radio sections containing page after page of instructions on how to build radio sets.

But was all this radio building interest only for the sake of listening to radio programs? Certainly not! It was the recurrence of that old American national trait—the scientific hobby. Here was a new opportunity to experiment. Here was something which played up to the ego of every man and boy—and even some women. For by means of a simple wiring diagram, and a handful of parts, together with such tools as soldering iron, pliers, and screwdriver, anyone could become a full-fledged radio expert. And it was fun, this business of assembling and wiring many components, always faced with the sporting uncertainty as to whether the finished assembly would work.

Diagrams, and specifications; specifications, and diagrams—without end. This week it was the cuckoodyne four; next week it was the supertone five; the week after the excelsior six; followed by the superiodyne seven and after that the cuckoodyne eight, back again for another try at the title. The howloflex nine was a hot contestant. The public began to consider radio technique about as stable as oil stocks. Sets were bought with great hesitation, for fear the next day would find them obsolete. Manufacturers made sets with great caution, preferring to employ skilled radio men to assemble the sets and wire them one by one, rather than rush into mass production, because of the uncertainty of the technique.

Radio-conscious America

No money could pay for the remarkable experience and knowledge which the American public secured as the result of the hobby days of radio. Just as the flivver made us a nation of practical mechanics, so radio made us a nation of practical electricians. Business men began speaking about wave lengths, frequencies, condensers, impedances, transformers. Boys spoke of reflexing, amplifying, regeneration. Radio diagrams were read with that same facility and interest for which we envy the Chinaman as he scans his ideographic newspaper.

But little by little it became increasingly evident that the

public was simply fooling itself. There were, after all, just a handful of basic radio principles, and these were being dished up over and over again just as a skilled chef has many ways of presenting the commonplace omelet. Radio engineers took heart. They began standardizing the circuits. Soon certain circuits became accepted as definite staples. Radio set manufacturers took courage and began mass production. The number of tubes rose as the public demanded simple and positive tuning. Soon the five-tube radio set made its appearance, selling at \$150.00 and up, for the plain table type. Batteries, loud-speakers, and wiring were extra. Of course a radio set could be built for less than that from radio parts, so the roll-your-own tendency went right on rolling. The manufacturers redoubled their efforts, confident that they could safely produce with the standardized circuits then known. Soon a five-tube set became available for \$60.00. The public gasped. Here was a complete set practically at the price of just the bare components. Another year and the price dropped to \$39.50. No longer could the home-made set compete on cost. Yet there were many who felt that a better home-made set could be built. The experimental mind still thrived.

Rise and Shine for Standardized Design—and the Assembly Line

The Radio Corporation of America, together with its associated companies, General Electric and Westinghouse, was all the while building up a large research and development organization. Radio principles were being reduced to basic facts. Various circuits were developed and checked and improved. Finally, with the radio tubes on the one hand, and the necessary circuits on the other, this organization offered radio set manufacturers the necessary rights to operate on the basic and detail patents owned by the Radio Corporation of America and its associated companies. The outstanding set manufacturers hastened to enter into a license agreement. In this manner, practically complete standardization of technique soon obtained in the industry. The manufacturers could safely go ahead with production plans with the assurance that their sets would not be obsolete before they could reach the consumer, yet each

manufacturer had full freedom in the matter of working out his own version and variation. Instead of skilled radio workers to assemble, wire, and test the sets one by one, the assembly line came in existence. Girl workers, each assigned to one specific operation on the radio chassis passing down the assembly line, came to take the place of the men, who, relieved from such routine tasks, could go on to testing and trouble-shooting operations.

By 1928 the standardized mass-production receiver could actually be purchased for far less than the corresponding radio components, let alone the work of assembling and testing the home receiver. Furthermore, the engineering involved in the average manufactured receiver was far ahead of what could be expected from a home-made receiver. In most homes the manufactured receiver appeared, and it became obvious that the home-made receiver was out of style. Thus the hobby of rolling one's own, confronted by the far better manufactured product on all sides, died a natural death. Today there is just a handful of radio set builders who still care for radio mainly because of the means rather than the end.

"DX" the Fish Story of Radio

While radio was developing along technical lines from an experiment to a musical instrument, it underwent, like man, the proverbial Seven Ages. At first the mere thrill—snatching and heaving sounds from out the air. It mattered little what the sounds might be.

Then the whine of distance. The sounds from the farthest points were the most fascinating, irrespective of how clear or how interesting they might be with regard to subject matter. And so radio entered the "DX" age and developed, incidentally, greater liars than the fish story. The number of fish caught in one day was changed to the number of stations picked up in one night. And the distance of the stations was substituted for the size of the fish. It became a matter of common conversation, during 1922 and 1923, to talk about distant or "DX" reception. Fortunately, there were a limited number of radio stations

in those days, and whatever they might lack in power was more than compensated for by the relative freedom which their signals enjoyed in the virgin ether. Good old WOC, at Davenport, Ia., for instance, filtered into New York City with little difficulty. Stations as far as Fort Worth, Texas, were by no means rare. The radio devotee would stay up half the night tuning in one signal after another from distant points. The ideal station of those days was one which did little more than repeat its call letters over and over again. Its programs were of secondary interest.

In 1923 and 1924 the loud-speaker, or noise era, made its appearance, ushering in the third age of radio—volume. No longer was distance the main criterion. Now it was sound—and plenty of it. The man with the loudest loud-speaker was the pride of his neighborhood. Opening his windows, turning his radio set up full, he could proclaim his championship to the world at large. The thrill of hearing an orchestra, band, prize fight and even a man's voice bursting out of a horn was something worth living for. And so began the battle of the loud-speakers, which ended several years later in certain legislation in various communities, calling a halt to excessively loud speakers and insisting on soft speakers.

With the advent of 1925 the power radiotron or big amplifying tube was introduced, capable of handling more energy for the loud-speaker without sign of distortion due to overloading. This was a big step in advance, marking the fourth age of radio development. The evening that one of the authors presented the new line of RCA Radiolas to an impressive gathering of radio merchandisers and engineers and journalists, in September, 1925, will long be remembered. Having been accustomed to the raucous rendition of horn loud-speakers, operating with underfed and overworked vacuum tubes, the audience was suddenly astounded to hear a full orchestra, rendered with a good approximation to full volume and correct tone, by the Radiola 104 Loud-speaker then introduced for the first time. It was a revelation. Everyone was overwhelmed.

During 1926 and 1927 the fifth age or tone quality era came along. No longer was volume the main consideration, but rather

the faithful rendition of music and voice. The cone loud-speaker came to replace the horn, first in the form of the simple and low-power magnetic type, and later the powerful dynamic type.

Those "B" Battery Blues

Meanwhile, the radio habit was taking a firm hold on the public. The average set was being operated several hours each day, with a heavy drain on the "B" batteries and a consequent drain on the family budget. Obviously, the electric light socket, charged with so many other tasks about the household, should be harnessed to radio entertainment. Many workers occupied their minds with the problem of socket-power radio operation. It was in 1925 that the Radio Corporation of America introduced the first practical socket-power radio receiver in the form of the Radiola 25 and 28 super-heterodyne receivers, with the 104 Loud-speaker. These sets originally made use of dry-battery tubes, wired in series, for operation on rectified or direct filament current from the power pack of the 104.

There followed the "B-eliminator," which came to replace the "B" batteries in the usual battery type set. But the storage battery still held forth, and it constituted the greatest nuisance in the operation of the radio set, because of the necessity of charging and watching the water. Later came the trickle charger and even the "A" battery eliminator, but still the arrangement was unsatisfactory from the standpoint of convenience.

By 1928 the sixth age shifts into the perfected A-C radiotron, or radio tube that can be operated on raw alternating current. Soon the simple, practical, economical, and convenient socket-power radio set made its appearance. The battery-operated set disappeared.

Transmitting stations crowded on the air, using ever higher power. "Last scene of all that ends this strange eventful history" is that of maximum selectivity, fidelity, and positive reception of good programs. The marked increase in transmitting power brought about a more or less complete mastery of static within the service area of any transmitter. The introduction of the screen-grid radiotron introduced a marked gain in sensitivity,

bringing back a touch of the old "DX" days despite the marked simplicity of present-day sets.

Oh, Noble Hobby!

Today the hobby of radio is to be found in the enjoyment of its programs. Certain entertainers come to be intimately known as the result of their frequent reception. People look forward to certain features week after week. The program is the hobby.

But looking back over the various ages of radio development, nothing has been lost by the present-day standardization and relative perfection. We have become a nation of practical electrical men and women, through taking part in radio development. Those sets we threw together in the early days have served to leave us with a greater appreciation and understanding of the radio art. We have lived through the trials and tribulations of radio. We have pioneered. Which is the reason why we old-timers can sit back and enjoy the present-day perfection with a thrill that is sadly lacking in most of the latter-day radio devotees.

CHAPTER XXII

RADIO SETS BY THE MILLION

A SINGLE radio broadcast receiver would be worth the proverbial king's ransom and a single vacuum tube would be worth several times its weight in gold. But fortunately, persistent research, capable engineering, ingenious design, mass production and widespread merchandising have enabled the distribution of millions of radio sets and tens of millions of vacuum tubes each year, thereby bringing the costs well within reach of every pocket-book throughout the land. The democracy of radio broadcasting is a monument to industrial achievement of the highest order.

The Goose-step of Standardization

America owes many of the good things of life now enjoyed by the vast majority of its citizens to mass production. While the European may rebel at the thought of the Ford plant with its assembly line and workers each trained for some specific operation on the steady flow of automobiles in the making, or again the RCA-Victor plant with hundreds of girl operators along an assembly line, each contributing some component to the steadily growing radio chassis which emerges as a complete radio set after an hour's trip on the conveyor belt, the fact remains that the average American worker enjoys his Ford and his Radiola while the European worker must, on the average, be content with a duller and less rich existence. A mechanical age has, to be sure, its compensations not only by way of a fuller life in leisure hours but also by way of more leisure hours in which to enjoy the better things of life.

However, just so long as radio receiving equipment was treated as purely experimental apparatus, there was no reasonable excuse for mass production. In fact, no manufacturer, however rash, would be justified in setting up a shop for mass production when

there was every indication that the radio science might suddenly make a complete right about face with the next change of the moon. Therefore, while radio was experimenting and improving itself in a thousand ways at once, and continually changing during the first few years of broadcasting, the number of sets placed in production was decidedly limited in spite of the great number of opportunists who flocked into the radio orchard for the purpose of easy pickings.

During the period of home-made radio sets, when so many preferred to make their own, radio prices were high, because of the relatively small productions. Even radio tubes, which had to be factory-made, were high in cost as judged by present-day standards. For instance, the first WD-11, or dry-cell tubes sold for \$8.00 each. And so limited was the supply that the merchandisers insisted on the return of an old WD-11 tube before a new one could be obtained for another \$8.00. Today, a far better and much more intricate radio tube may be had for \$1.50.

In the meantime, however, various things have happened. For one thing, there has come about a standardization of radio production methods. Many sets have been produced calling for certain types of radio tubes. The demand for such tubes has made it possible to plan production schedules of millions of radio tubes annually. And radio tube manufacturers have found it possible to instal every conceivable form of automatic machinery, thereby producing the millions of radio tubes at unbelievably low prices.

Through a credulity readily excusable in a matter so technical as radio, the public for several years firmly believed that new radio circuits appeared at the rate of one an hour, as faithfully and dependably as the hydraulic outbursts of Old Faithful, the Yellowstone geyser. Radio periodicals, deriving their main revenue at the time from radio parts manufacturers, published no end of so-called "new" radio circuits prepared by so-called radio experts and radio engineers. Yet the engineering of these so-called new radio circuits ran about like this:

The radio writer, anxious to make some of the easy money purported to be abundant in radio circuits, approached a number of radio parts manufacturers with a publicity proposition. For the small sum of say \$75.00 per manufacturer, said radio writer would

include the radio parts manufacturer's products in a proposed "new" circuit. The passing of the hat usually resulted in a generous round of donations, often reaching a thousand dollars. Whereupon said radio expert would sit down and, with paper and pencil, lay out a circuit incorporating every last radio part represented by the donations. The circuit was as carefully engineered as if a writer, amply supplied with retainers in return for featuring certain electrical products, were to start out designing an electrical power house featuring every last product. Obviously, the engineering in each case would be decidedly novel, to say the least. Little wonder that there appeared such a wide variety of "new" radio circuits.

All the while there remained at most a half dozen fundamental circuits known to radio science. The many so-called "new" radio circuits were simply representations of those fundamentals, expressed in such different components as best suited the publicity urge. Whether the so-called "new" circuits worked or not is a rather embarrassing question to answer, except to state that millions upon millions of dollars were expended in this direction which might better have been invested in sound industrial progress.

Lifting Themselves by Their Bootstraps

Gradually the truth dawned upon the public. It became evident that the "new" circuits were simply disguised advertising of radio parts manufacturers. To make matters worse, the various parts specified in the articles and religiously insisted upon could not be carried by radio dealers. Imagine a single radio dealer called upon to carry two dozen makes of rheostats, eight makes of audio transformers, five makes of resistors, nine makes of tube sockets, and so on! The specifications called for definite brands of parts, while the mechanical and wiring layouts were drawn for specific parts. The reader might well fear the substitution of a single part not according to specifications. Therefore, instead of helping the radio dealer to do more business, the rigid specifications, together with the lack of standardization among radio parts, caused the dealers to lose, rather than make, many sales. Finally, the practice blew up. The public was through. The dealer was through.

The jobber was through. And the radio industry, fully awakened to its folly, washed its hands of this youthful adventure.

With a realization that, after all, there were just a handful of radio fundamentals around which good radio receivers might be designed, the radio industry as well as the public was ready for standardization. At this particular stage in the history of radio development, the Radio Corporation of America, which controls many of both the basic patents and the important detail patents of the radio industry, decided upon a course which has done more to place the radio industry on a sound basis than any other contribution. Briefly, it offered patent rights to the serious radio manufacturers whereby they might design the best possible broadcast sets without incurring liability for infringement of its patents, and in return for specified royalties on the products made and sold under such patent rights.

One for All and All for One

Intensely interested in broadcasting, on the one hand, through the National Broadcasting Company and its associated radio stations, as well as in tubes and in circuits, the Radio Corporation of America might well serve as a clearing house for the coördination of the three basic factors for a successful radio industry. This coördination of efforts insured the proper signals on the air, the correct radio tubes, and the proper radio circuits, all carefully balanced for the best possible results.

And so standardization made its début in the progress of radio, bringing order out of chaos. At last the industry had a firm foundation upon which to erect, with all due safety and positive assurance, a structure of mass production and widespread merchandising as a guarantee of the complete democratization of broadcasting.

The rest of the story is too well known to be covered at length. Suffice it to state that radio manufacturers, with positive certainty that their radio fundamentals would not be overturned from one day to the next, and with assurance that tubes would match their circuits, and that broadcasting signals would continue to be propagated in a given form, now planned to engage in mass pro-

duction. The situation is not unlike that which might have obtained had the automobile industry originally been quite uncertain of the quality of the gas available, of the kind of roads that would be laid, and the tire manufacturers equally uncertain of the standard wheel measurements. They would have received positive guarantees that a given standard of gas would be maintained, roads properly paved, with an absolute minimum of poor roads in most sections of the country, and standard sized rims maintained on the basis of which the tire manufacturers might produce.

Perfecting His Master's Voice

With standardized principles to build upon, the making of a new radio set is an interesting study in collaboration. In the case of the RCA-Victor receivers, which represent the modern combination of thorough engineering and mass production, the various available circuits are the subjects of considerable experimentation in the laboratory. These circuits take the form of so-called bread-board layouts, or general assemblies of components on a plain board, entirely exposed, with temporary wiring. Many tests are conducted as regards tubes, tube performance, electrical measurements of various parts of the circuit, tone quality, volume, sensitivity, selectivity, simplicity of operation, and so on. This is the "haywire" stage of a new radio set. The observations are duly recorded and presented to the design engineers, and made the basis of their designs for the forthcoming season.

The design engineers now go to work on a model, incorporating the desired principles as well as the various refinements which may be available at the time. The model becomes known as a bench model, and is submitted to the engineering board for inspection, tests, and criticism. Subsequent models follow, each an improvement over the preceding model, until the ultimate degree of perfection is obtained. Every part and wire is studied in detail. This model is presented to the sales organization, which, considering the set purely on the basis of merchandising possibilities, either accepts or rejects the model, with appropriate criticisms or suggestions.

If approved, the model is turned over to the production engi-

neers, who proceed to tear down the model and redesign it from the standpoint of production. Certain parts are changed to simplify production. Materials may be changed. The resulting production model is then "road tested." The specifications and designs are voluminous, to say the least. In fact, a young library of bound specifications may cover a given radio set, even to such details as the kind of wood to use, how it is to be finished, the kind of nails and screws to be used, the design of the joints, and so on.

Going a'Journey

Production staffs lose no time. The various materials and components are ordered. The necessary production space is made available, together with machinery, benches, seats, belts, lathes, chutes, elevators, punch presses and so on to expedite production. The production of radio sets is roughly divided into three main phases, namely: the fabrication or production of the numerous small pieces and larger components which go into the final assembly; the assembly of components into each complete chassis; and lastly, the testing of the final assemblies just prior to shipment.

In the case of larger radio manufacturing plants, such as the RCA-Victor plant at Camden, N. J., and such concerns as have an outlet for parts other than their own radio receivers, among which Stromberg-Carlson, Atwater Kent, and American Bosch Magneto are examples, most radio parts and components are made by the set manufacturer. Usually the parts are made by a separate department, and sent to the assembly department. Here the parts are made up into components, or small assemblies, and these components in turn are made up into the final assembly.

The assembly of most radio sets is handled on a continuous assembly line. The frame of the chassis starts its journey down a long moving belt or roller conveyor, passing through the hands of hundreds of workers, mostly skilled girls. Each girl is assigned to a specific operation. Thus the components are mounted one by one, and the wiring is likewise applied wire by wire. The wires are of different colors for ready assembly and servicing, cut to proper lengths and often provided with the necessary tips. The assembly grows, so to speak, as it takes on more and more components and

wiring, finally emerging from the end of the assembly line as a complete chassis. Soldering is usually the slowest operation on the assembly line, and the rate of the entire line is governed by the soldering positions. Operators must keep up with the steady flow of chassis. If, however, the operator falls behind, the necessary number of sets are placed aside, to be finished later by the operator, who may perhaps be replaced by a speedier worker.

"—They Know Not What They Do"

It is an anomaly of latter-day radio development that the very workers who produce such splendid radio sets know nothing about radio. A girl worker may wire this part or that part, yet know absolutely nothing regarding the nature of her achievement. To her, it is simply handling detail number so-and-so along the assembly line. It is this supreme efficiency which permits the most intricate radio set, such as a super-heterodyne, to be assembled complete, from a standing start, in an hour, and at a relatively low cost. Compare this practice with that of half a dozen years ago, when radio experts, with screw driver, loose wire and soldering iron, had to assemble and wire sets one after the other, complete, and at considerable cost in time and money. Furthermore, the present-day method practically precludes errors, for the components as well as the wires are arranged to fit just one way—the right way. There is no alternative.

The Radio Clinic

The various components are fully tested before incorporation in the radio assembly. Indeed, the object of modern radio production is to detect faulty or incorrect parts as early as possible in the process, so as to discard them with the least loss of time and money.

For example, the single-control tuning which we now accept as a matter of course represents an epic in modern testing. Each condenser to be included in a gang condenser assembly, for single-control tuning, must be tested throughout its range, and the readings carefully recorded. It thus becomes possible to group the

condensers in matched sets, so that they will maintain perfect electrical step throughout the swing of the dial.

Inductance coils must be likewise matched. Measuring instruments are used which simplify the matching of these inductances. Some measuring instruments are so uncanny in their precision that they actually indicate the number of turns of wire wound on a spool, so that the operator may know how many turns to remove or add to obtain the perfect balance.

Test follows test at every step in the production of the better grade radio sets. Imperfections must be discovered at the earliest possible moment, in keeping production costs at a minimum.

As the assemblies come off the line, they are tested usually by skilled radio men who not only know trouble when they see it by means of testing instruments, but also know where to locate that trouble and clear it up. Elaborate tests are provided over the full range of broadcast frequencies or wave lengths, to make certain that the radio set operates satisfactorily. Tone tests are also included. The sets that pass muster are now on their way to the packing room, there to be packed with consummate care and shipped out to the distributor, who in turn ships to the dealer. Finally the set reaches its permanent owner and home.

Examined with Surprise

And still such concerns as RCA-Victor Company are not satisfied to call their production problems completed. A careful check is maintained on all radio sets shipped out. From the plant, as well as from various warehouses, sample radio sets, radio tubes and accessories are taken and brought back to the technical and testing staff. Here the samples are unpacked, any damage in transit noted, the samples given a thorough mechanical and electrical examination, and a certain proportion perhaps subjected to life tests, the last-mentioned phase applying mainly to radio tubes. In this manner the organization is fully informed as to the condition in which its products reach the trade and consumer, and can immediately detect and rectify any shortcomings. In the case of the radiotrons particularly, which have hitherto been produced in several scattered plants, the tests have served to insure positive

uniformity of all tubes of a given type, and to detect any possible weakness or flaw which has been soon corrected by the plant involved.

Eliminating Orphans

One step further has been taken by the largest and most conscientious radio manufacturers in the form of servicing, or maintaining radio sets in proper operation after they have reached the public. It is generally realized today that the radio buyer is not, in the final analysis, buying so much cabinet or metal or wiring as he is buying a seat in the radio audience. Therefore, the radio set manufacturer is under a certain obligation to see that the radio buyer obtains satisfactory radio entertainment, so far as the normal performance of the radio receiver is concerned, over a reasonable length of time.

To this end, the best radio set manufacturers maintain training schools or classes for service men. Skilled radio men are sent out by the factory to the distributors and dealers, for the purpose of helping those out in the field with their service problems. In many instances special testing and repair equipment and tools are provided to distributors and dealers. Voluminous service notes or literature on service are supplied to the men in the field.

What is more, the largest radio set manufacturers carry spare parts in stock over a reasonable period after the introduction of a given radio model. Complete spare parts catalogs are issued. There is every assurance that the buyer's investment will be protected, irrespective of breakage or breakdown of any component. Thus the owner is assured that he will not be buying a possible radio orphan when he buys a reliable make of receiver.

And so we have the modern radio set—a masterpiece of electrical achievement, a handsome piece of furniture, a veritable Pandora's Box from which flows a steady stream of entertainment. Worth many a king's ransom, to be sure, yet now enjoyed by laborer and millionaire alike. Built ingeniously, sold efficiently, and serviced conscientiously.

CHAPTER XXIII

CHILDREN OF RADIO

FEW sciences can boast of a family tree as far-reaching and impressive as that of radio. While it is true that the family tree of the coal tar derivative technology is more elaborate, covering everything from rare perfumes and flavoring extracts to delicate dyes and military explosives, and again to road dressings and headache cures, that of radio reaches out far beyond the confines of even the many ramifications of the radio art and into the affairs of many other industries. The roots of radio have taken firm hold in the fertile soil of communications, but the branches today are reaching out into the sunshine of many industries reborn through the aid of radio technique.

The Radio and Phonograph Feud

The first toddling steps of broadcasting brought radio into the home as a new means of entertainment and enlightenment. There it found two older and well established musical instruments, namely, the phonograph and the automatic piano. Both had enjoyed a long career of popularity. Both were well established.

What was this young upstart? At first radio broadcasting, with its uncertain crystal detector and troublesome head-phones, was hardly considered a serious competitor. The phonograph industry even made fun of the radio set, for surely its weak chirping heard through tightly clamped ear-phones could not be considered in the same breath as the splendid music supplied by the phonograph. Presumably, the phonograph industry was short on memory and long on ego, for it did not recall its own feeble beginnings of two decades before, when crude wax cylinders and morning-glory horns made all renditions sound more or less alike.

A few years passed. Vacuum tubes became commonplace, as the crystal detector was cast aside. The first loud-speakers came

into use, doing away with the tightly clamped head-phones which had characterized the "selfish" or one-man age of broadcasting development. Still, the squawk of the pioneer loud-speakers was hardly a challenge to the mechanical phonograph. Also, the radio programs, for the most part featuring amateur talent, failed to compete with the impressive array of professional talent represented in phonograph record libraries.

By 1925, however, things took a sudden turn for broadcasting. Overnight the power tube was introduced and also the refined cone speaker. Better amplifiers removed the hitherto objectionable "radio accent" from renditions. Radio programs could be rendered with a volume and a fidelity far surpassing the best performance of conventional home mechanical phonographs. The infant had suddenly become a serious competitor. The phonograph industry was thunder-struck. And yet it fought on. It still had a trump card in its control of the best professional musical talent, which it prevented or attempted to prevent from appearing before the broadcast microphones. If the public wanted to hear good music, there was only one medium available: the phonograph records.

Pretty soon the public became tone conscious. The phonograph standard of fidelity, compressing the entire musical world within the narrow confines of a few octaves, now seemed ludicrous in view of the greater number of octaves spanned by the improved radio rendition. The mechanical phonograph versus radio situation was very much as though all songs, heretofore sung by a child, ranging from "Asleep in the Deep" to "Twinkle, Twinkle, Little Star," were now rendered for the first time by a six-foot basso for the former and a youthful soprano for the latter.

The public lost interest in the phonograph of that time, with its falsetto voice. Meanwhile, the automatic piano also lost ground, since it could only produce a limited repertoire of strictly piano music, as contrasted with the growing versatility of the radio. Still crude from the artistic standpoint, radio nevertheless had won on the home battlefield.

Radio: the Good Samaritan

Then a strange thing happened—a thing quite out of keeping with business of the old days, when a competitor was always to be treated as such, with no quarter asked or given.

The radio industry offered a helping hand to the ailing phonograph industry. Radio engineers were set to work on phonograph technique. Here was a field in which little real progress had been scored for a decade. Records were still being made mechanically, with the brute strength of singer or orchestra driving the sound waves down a horn and actuating a diaphragm which, in turn, drove the engraving tool into the soft wax master. Records were still being reproduced by means of a needle or stylus driven from side to side by the waves in the spiral grooves, and in turn driving a diaphragm to generate the air waves at the small end of a flared horn.

With the Aladdin's Lamp prosaically known as the vacuum tube at their command, the radio engineers soon revised the recording end. Instead of depending on brute physical strength drawn from the overworked sound waves to engrave the master record, the radio engineers substituted a delicate electrical ear or microphone, feeding a powerful amplifier so as to operate a precise electromagnetic engraving tool on the soft wax master. Now the most delicate sounds could be gathered by means of the microphone, and amplified to any desired degree in preparing a suitable record. Instead of having to group the musical ensemble about the huge fibre horn as in the former mechanical recording, the microphone permitted the musicians to be comfortably seated about the studio for electrical recording. Records of exquisite depth and musical richness were soon available, as the result of the borrowed radio technique.

The engineers now turned their attention to the reproducing end, in order to capitalize the improvement in records. Applying correct engineering principles to the sound box and sound chamber, there was developed a highly refined mechanical or orthophonic phonograph which could convert the phonograph grooves into relatively rich, deep, mellow and altogether charming music. The world was amazed! All the difference between day and night

in comparing the old-style phonograph with the new orthophonic! The phonograph industry, with its vast repertoire of splendid music from which to draw, much of which was being recorded electrically in keeping with the new standards, once more regained a foothold in the average household.

In return for the technical aid, the phonograph industry gave artistic aid to the radio industry. Noted phonograph artists began to appear before the microphone. Well-known orchestras and bands came to be featured on broadcast programs. Art as well as science was at work in radio.

But radio progress continued unabated. Soon a new and marked discrepancy appeared between even the improved mechanical phonograph and the latest radio set with more powerful amplifier and dynamic loud-speaker. Once more radio engineers went to the succor of the phonograph industry. Having developed the mechanical design to the limit, the engineers now decided upon electrical reproduction of records. The mechanical sound box or reproducer was replaced by the electromagnetic pick-up, comprising a miniature dynamo or alternator actuated by the vibration of the needle. The needle causes an armature or steel bar to vibrate in a powerful magnetic field created by a horseshoe magnet, while electrical coils detect the vibrations and translate them into corresponding electrical sound values. Only an amplifier and a suitable loud-speaker are required to complete the electrical phonograph.

An Electrical Chorus Girl

The amplifier, like the microscope, magnifies things to any desired degree within practical limits. And so the electrical phonograph could be employed to amplify conventional records to sufficient volume to fill the largest theatre, stadium, or the great open spaces. Shortly after the appearance of the electrical phonograph, the Victor Orthophonic Sloop appeared off the boardwalk at Atlantic City, N. J. The myriads of visitors at "The World's Playground" heard the enticing strains of "Valencia" coming seemingly from nowhere, yet filling the air with realistic dance music. At the Sesqui-Centennial Exposition held in Philadelphia during 1926, the Victor organization provided music for the

multitudes by means of huge loud-speakers and electrically reproduced phonograph records. But the climax was conceived by none other than that glorifier of American beauty, Florenz Ziegfeld.

It came about this way: Flo was putting on a typical Ziegfeldian revue. He sought the prettiest, most graceful, and sweetest-voiced girls. However, it soon dawned on him that his specifications were too rigid. Pretty girls, yes; graceful girls, yes; sweetest-voiced girls, yes: but to expect each and every girl in his chorus to represent all these superlative features combined was asking entirely too much of American womanhood. And yet this revue had to stand out as a musical masterpiece. What was to be done?

But Flo is resourceful if nothing else. He summoned the engineers of the RCA staff. Soon they had ready for him a giant electric phonograph. Two powerful cone speakers were installed in the apron of the stage. Beneath the stage, a cabinet with two turntables, controls and power amplifiers, was installed. The best obtainable voices were mobilized to record under ideal recording studio conditions, the same selections as those in the forthcoming revue. And then, utilizing the electrical voice to back up his chorus of prettiest and most graceful girls, Flo Ziegfeld sprang the greatest chorus ever heard in his revues. So ingeniously was the electric voice worked into the stage action by the orchestra leader, that the audience never suspected the illusion. Apparently, the girls on the stage were, each and everyone of them, of prima donna calibre. Only the hard-working press agents told the startling truth to the public at the appropriate time.

New Life for the Old Talking Pictures

With the development of realistic sound recording and reproduction, not only for home use but even available for theatres, it was but a logical step for radio technique to enter the motion picture field. At first, it was believed that recorded music, accompanying the films, might serve as a means of scoring feature pictures and making the musical accompaniment approximate the screen presentation in the matter of artistic attainment. Certainly

the marked discrepancy between the 100-piece orchestra of the Broadway picture palace, and the hard-working pianist of the small-town theatre, did much to work a grave injustice on the motion picture. The incidental music, providing the proper atmosphere for the screen presentation, should not be beyond the control of the motion picture producer whose efforts were at stake. And so the possibilities of electrical music came to be considered.

There is nothing new about the idea of talking pictures. As far back as 1910 talking pictures, as developed by none other than Thomas A. Edison, were shown. However, the earlier attempts simply made use of a motion picture projector and mechanical phonograph, properly timed so as to keep picture and sound in step. The crudity of the sound accompaniment, all the more evident because of the desperate mechanical amplification measures, together with the frequent falling out of step of picture and sound, served to discourage the commercialization of talking pictures. Many of us will never forget the quarrel scene from "Julius Cæsar," when fiery Cassius sheathed his sword a second or two before the more placid Brutus begged him to. Little things of that sort were commonplace. Talkies, therefore, became a joke, and remained so until they received the magic touch of radio technique.

A number of years ago radio engineers, believing they could contribute substantially to the motion picture industry, began to study the problems of talking pictures in the light of present developments. Making use of their amplifiers and loud-speakers as the basis of a sound system, the engineers soon developed a suitable synchronizing means for operating disc records in step with corresponding films. The electro-magnetic pick-up was employed to translate the record grooves into sounds which, by means of electrical amplification, could fill the largest theatre. Thus the feature photoplay could be made with sound accompaniment, and shipped to the Broadway picture palace or Main Street theatre complete, for a standardized performance of highest quality.

But the radio engineers looked ahead to an even greater development in the form of self-contained sound films. In time, they developed a photographic means of recording the sound

values on the film itself, so that the film would carry its own sound accompaniment. Thus the RCA Photophone system came into existence, as the result of the combined research and engineering efforts of the Radio Corporation of America, General Electric, and Westinghouse organizations. In this system, the sound track, as it is called, is simply a saw-toothed black band about 1/10 inch wide, at one side of the "frames" or pictures. This sound track is recorded on film at the time the pictures are being filmed, or, if preferred, as in the case of incidental music or a lecture, at any time and quite independently of the action. To reproduce the sounds, the sound track passes between a powerful light source and a sensitive photo-electric cell or electric eye. Because of the varying width of the black band, more or less light reaches the photo-electric cell, which controls an electric current accordingly. The power of this current is amplified millions of times and fed to loud-speakers, which in turn translate the variations into corresponding sound values. The sound head, as it is called, is made an integral part of the modern motion picture projector. Another form of sound track is of uniform width, but, instead of being plain black and white, varies in density throughout its length. This method, which is widely used despite some practical limitations, is known as the *variable density*, as distinguished from the RCA Photophone *variable width* method.

The Country Goes "Talkie"

And so radio once more has made a partner out of a former rival. Today, the motion picture industry accepts the talking picture or sound picture as essential. Only a negligibly small percentage of the total production represents the erstwhile silent pictures.

At first, so-called "talkies" were mainly limited to incidental music, with the hero or heroine saying only a few words for the climax of the action, or again singing a theme song. This was due to the difficulties of recording sound out on location. The novelty of a speaking part or a theme song was considered sufficient to hold the public's interest. However, so well did the public receive the "talkie" idea that soon the producers felt called upon to pro-

duce 100 per cent talkies. Today most pictures are written and produced from beginning to end as talking pictures.

The sound-recording equipment, in a motor truck, goes out on location along with the cameras. Ingenious booms or "fishing poles" as they are known in talkie vernacular, serve to swing the microphones over the heads of the actors, out of range of the cameras. Sound-recording experts, hitherto radio workers, operate side by side with photographic experts.

Motion picture technique has had to be revamped to take care of the sound end. Having developed for itself an independent technique involving pantomime to the *nth* degree, the moving picture art has had to scrap almost all its previous experience and start again from scratch. In view of the fact that the silent pictures were almost the last remaining vestige of the art of pantomime, and were attaining virtual perfection at the hands of such artists as Charlie Chaplin and Emil Jannings, their downfall at the hands of the talkies is a sad *ave atque vale*. Chaplin has refused, and rightly so, to spoil his perfected art with talk. It would be an attempt to paint the lily. Other actors have had to turn to, or return to, speaking parts. The talkies have created a run on the Broadway legitimate market. But in the long run it is a step ahead. The talkies are by no means perfected artistically. They do not compare in general with the best silent pictures so far as artistic technique is concerned. But they hold more promise, if only the producers are wise enough to develop a specialized, appropriate, and inspired technique of their own.

In the early days many difficulties were encountered in the reproduction of sound. One instance will suffice. Came a scene wherein the heroine sobbed upon the hero's breast. The microphone, which had heretofore been placed behind pictures, curtains, drapes, in books and bookends, could not catch the faint sobbings. A brilliant assistant director suggested placing the microphone under the hero's coat as he reclined on the sofa. A fine idea! It was done and the picture taken. When it was projected the actress's sobs were beautifully reproduced—along with the hammer-like blows of the hero's heart beats. The scene had to be refilmed and the "mike" reset.

These and other difficulties have now been overcome. It remains

only for the talkies to develop a technique. As yet they have only begun to do so. They have relied upon legitimate plays and the technique of vaudeville, the revue, musical comedy, and the legitimate stage. The "shorts" are taken direct from vaudeville. Plays, such as "The Letter," are taken from the legitimate productions. "Sally" was lifted bodily from musical comedy, and the "Hollywood Revue" denotes its source. Such copying will be a stop-gap only. The imitation often is inferior to the original in any field, and the more so since the original must be specially adapted to its new medium.

In the early days the silent films copied the legitimate stage. Their real success came with a technique of their own, independent of the stage from which they sprang. So too with the talkies. An imitation of other art forms is only a very limited reason for their existence, no matter how good the imitation. The principal reason the talkies have for existence is the development of a new art form and the sooner it is built up, the better. The foremost directors of this and other countries (notably Germany and Russia) are bending their earnest efforts in this direction. The great motion picture industry should support them, and aid them independently. It will doubtless do so and their efforts will be rewarded.

Radio Dons Overalls

All of which might carry the impression that radio is essentially a fine art, dedicated to the entertainment and enlightenment of the world at large. Yet such is far from true, judging by recent developments. Radio has actually donned overalls and gone to work in factories.

The same uncanny ability of the vacuum tube to magnify electrical variations, to serve as an electrical trigger in controlling powerful mechanisms by means of weak ones, and to translate one sort of flow of electricity into another with utmost facility, has brought about its enrolment in the industrial ranks.

Today the radio tube is beginning its factory career. The delicate photo-electric cell, developed primarily for the reproducing of sound pictures, finds a place at the inspection table. It counts packages or pieces as they flash by. It passes upon colors



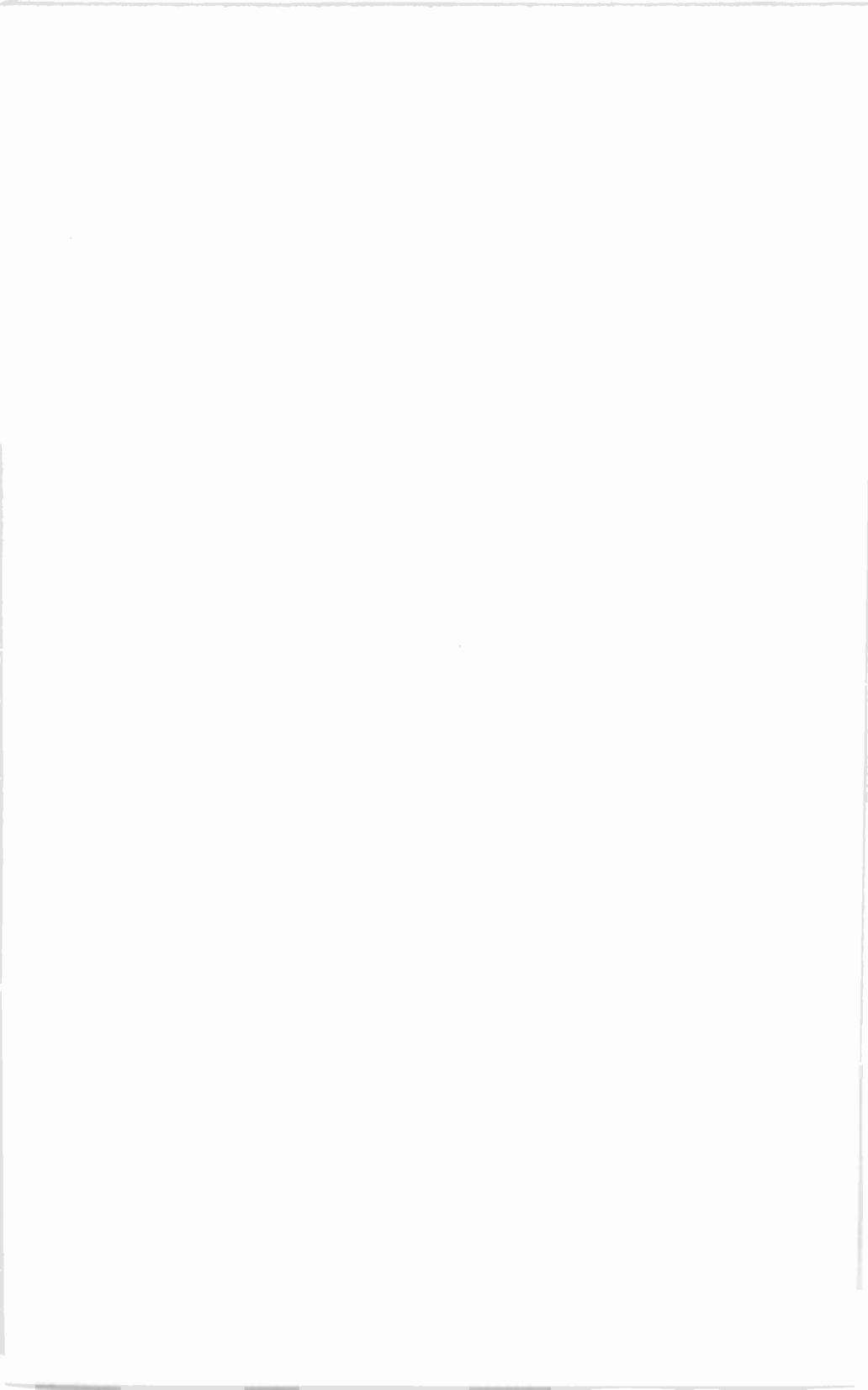
ON THE AIR: NBC PROGRAM IN THE WORKS

"The Empire Builders," NBC program, going forth into countless homes. Production Manager Raymond Knight with glasses, Orchestra Leader Andy Sannella on stand with baton, actors before "mike" and with scripts.



THE SHOW IS ON: A CBS PROGRAM GOES ON THE AIR

Ever listen to "Hank Simmons' Showboat"? Here it is going out over the Columbia System from Studio No. 1, before an invited audience. See the two sound effects men at the left-hand "mike." Who knows what sounds they are producing? Director and leading man Harry Browne in white flannels.



and shades, automatically sorting them. It checks up on finishes and sizes, with a mechanical brain that never tires nor grows careless. It matches shades with far greater precision than the fallible human worker. It measures degrees of illumination. It decides upon the amount of smoke passing up the smokestack, and notifies the stoker in the boiler room when he is slipping on his job. It controls the thickness of paper during manufacture. In the vehicular tunnel it even warns of injurious gases which can be detected by the electric eye long before the human eye.

The high-frequency (or "radio frequency") currents produced by the vacuum tube oscillator are applied to many industrial purposes. In the making of radio tubes, for instance, the metal parts, mounted within the glass bulb, are heated to incandescence by the radio frequency currents induced by the powerful field of the radio frequency coil or "bombarder," so as to drive the imbedded gases out of the metal pores, while pumping for the vacuum. Rare metals, which must be kept free from contamination, are heated in a vacuum by means of the induction furnace, the energy of which is supplied by vacuum tube oscillators.

It is the belief of radio authorities that in time to come the vacuum tube will find even greater application in industry than in radio communication.

Radio Goes Prospecting

The divining rod of old, which was supposed to serve to locate underground water and mineral deposits, has its present-day counterpart in the radio prospecting equipment. The difference is, however, that the divining rod depended for its alleged success upon the involuntary muscular reaction of its supposedly adept user, whereas the radio equipment works for anyone. Radio prospecting is now employed to an astonishing extent. Through the simple expedient of broadcasting radio waves and then detecting them, it becomes possible to locate certain types of underground deposits quite accurately. Much of the guesswork of mining may be eliminated because of the coöperation between radio man and geologist. Mining stocks and oil stocks may yet be found among the most conservative of investments.

The Surgeon's Radio Knife

Making use of the peculiar properties of radio frequency current generated by oscillating radio tubes, the radio knife has come into use. Contacting lightly with the flesh to be cut, the radio knife sears its way painlessly and safely, cauterizing and sterilizing as it goes, thus greatly aiding the surgeon in his work.

Although radio has unfortunately been the basis for much of the recent medical quackery, and "radio doctors" have sprung up in large numbers throughout the land, the fact remains that in diagnosis as well as in treatment, radio technique may yet play an important rôle. No less an authority than Dr. George W. Crile of Cleveland has formulated a theory of the electrical nature of life, and it may be that in time radio technique will serve the legitimate doctor in good measure. Quite obviously, the body is a delicate mechanism, which points all the more to the possibilities of the application of radio technique accustomed as it is to handling and detecting minute amounts of energy.

At the Foundation of the Universe

Just what goes on within the vacuum tube is a matter for deep thought and discussion. Our physicists have formulated theories as to the shedding of tiny particles of electricity or electrons by the filament or cathode, how these are attracted to the positively charged plate, and the action of the grid or control element as a traffic officer. In the vacuum tube, we are at the very foundation of the universe. In laboratories throughout the world, scientists, research workers and physicists are at work on the vacuum tube, learning more each day as to the nature and behavior of the electrons and how they can be applied to new tasks. We have only scratched some of the possibilities of the vacuum tube. Future generations may well regard our efforts as crude, just as we regard those of Nero with his steam engine which opened the temple doors, in the light of our modern steam engine.

And Back to Communications

To most laymen, the mention of radio means the broadcasting of entertainment and enlightenment. Yet by far the most important work of radio communication is in the transoceanic and marine fields. While our radio programs come to our homes with clockwork regularity, radiograms are being flashed through space from continent to continent, and from ship to shore. Today, the United States maintains direct radio communications with practically every civilized country on every continent, through RCA Communications traffic offices in New York and San Francisco. Several dozen land stations maintain contact with transoceanic, coastwise, river, Gulf and Great Lakes shipping.

That America leads in radio is due to a little known incident in our history. It was while attending the Versailles Peace Conference that the late President Wilson became apprehensive regarding our position in world-wide communications. Great Britain, over some five decades, had secured control of the world's submarine cable network. During the War, the United States had been greatly handicapped for want of direct communication channels, first as a neutral and later as a belligerent. And now, with the advent of peace, Great Britain was ready to acquire sole rights to an American radio invention, the Alexanderson alternator, developed by Dr. E. F. W. Alexanderson of the General Electric Research Laboratories, as a practical and economical means of transoceanic radio communication.

President Wilson dispatched Rear-Admiral Bullard and Captain Hooper to the United States, with the plea to the General Electric Company that the Alexanderson alternator rights be not sold to the British, but, rather, that this great invention be made the basis of a world-wide American radio system. Owen D. Young received the two distinguished visitors, in his capacity of Chairman of the Board. He listened attentively, and promised to present the matter to his associates on the basis of a patriotic appeal. Shortly after, the General Electric rejected the British contract. Even so, America was still without a world-wide communication system. It remained for Mr. Young to mobilize the necessary patent rights, finances, personnel, and property rights

for an all-American radio organization. And thus, inspired by a national need, the Radio Corporation of America came into existence in 1919, charged with providing the American people with a world-wide radio service that would make us free of any foreign interference or domination.

In the decade following the formation of the Radio Corporation of America, a vast system of radio world-wide communications has been built up. Important technical advances have resulted in replacing the high-power, relatively costly Alexander-son alternators with moderate-power, less expensive vacuum tube short-wave transmitters. The development of directional transmitters and receivers has done much to overcome static or atmospheric obstacles experienced in the early days. Today the radiogram traffic flows across oceans and continents with the same certainty as traffic over cable or wire. Little nations, formerly neglected in the scheme of inflexible cable systems, today are provided with direct radio service, full time or part time, depending on the volume of traffic. The radio links through which this service is rendered can never be mechanically severed. Indeed, in the development of the American radio system, the American nation has quite unselfishly provided the much-sought freedom of communications for the world at large.

When Messages Themselves Take Wings

Faster and faster has become the pace of radiogram traffic. From a speed of perhaps twelve words per minute, with the words each repeated two or three times so as to be more certain of breaking through the transoceanic barrage of static, the speed has been steadily stepped up until today, on certain short-wave circuits, between 100 and 225 words per minute flow from transmitter to remote receiver. At the transmitting end, the operator sits before a typewriter keyboard. As his fingers glide over the keys, a paper tape with varying geometrical patterns of perforations, issues forth from one side. This paper tape subsequently is fed through the automatic transmitter, and serves to form flawless dots, dashes and spaces of the telegraphic code, at high rates of speed. Meanwhile, at the receiving end, the operator

watches a paper tape with a wavy ink line passing before his typewriter. He translates the peaks and valleys thereon into corresponding characters and words. The paper tape comes from the automatic recorder, the electrically operated pen of which forms the intricate and meaningful wavy line with almost lightning rapidity. Indeed, so rapid is its operation that frequently a number of operators must be assigned to a single tape so as to keep pace with the automatic facilities.

And this is not all: several years ago, the radio engineers were challenged by Owen D. Young, then Chairman of the Board of the Radio Corporation of America and of the General Electric Company, who stated that the day must come when an entire page of a newspaper could be flashed across the ocean in facsimile form, rather than by the tiresome, costly and time-consuming process of double translation involved by the telegraph code. The challenge was accepted. The engineers went to work on facsimile radio.

In 1930, with the facsimile radio system of photoradiogram four years old, we have photographs, letters, checks, drafts, legal documents and other things flashed across the oceans and across the American continent. Photographs of the styles made at the Longchamps or Ascot races on a Saturday afternoon are available to New York modistes on Monday morning. Business deals are negotiated by radiogrammed signatures. Checks and drafts are honored when flashed via radiogram. Let King George open a naval conference on Monday, and the New York newspapers carry the radiogrammed photograph Monday evening.

No, radio progress is by no means measured solely in terms of phenomenal broadcasting achievements.

Radio—the Riddle

What is radio? Daily that term becomes more involved, more all-inclusive, and yet less certain. Radio is, after all, one of the greatest forces of our modern civilization. It is the riddle of the ages, for no one dares predict its probabilities and possibilities.

CHAPTER XXIV

RADIO HUMOR AND POETRY

SOME there are who detest jokes, especially about themselves. Humor is a peculiar thing. The psychology of humor goes deep into the innards of the human mind. It is one of the surest indications of character. "Tell me what a man laughs at and I'll tell you what he is like" is no boast. There are many kinds of humor—physical, slapstick, the purely intellectual, wit, the humor of situation, the humor of dissociation, to name but a few.

Fundamentally, however, all humor is alike. The machinery of humor is contrast—contrast between what ought to be and what is. One example will suffice. If we see a small boy slip on the ice we think nothing of it. If we see a decrepit old man slip on the ice the situation arouses only our pity. But if we see a haughty individual, immaculately dressed, walking proudly down the street, head in air, gaily sporting a monocle and cane, and he should slip, it would provoke laughter. Viewed factually there is no reason to laugh. He may have hurt himself quite as much as the elderly man or the boy. In many instances our momentary laughter turns to sorrow as we approach the haughty one only to find him badly injured. But hurt or no hurt, the humorous element is not lacking. The boy on the ice is commonplace, in keeping with boys. The old man on the ice in no way jars our sense of proportion. But the gentleman who falls on the ice ruins his dignity. All that he is meant to be, all that the word "gentleman" signifies, is rudely disturbed in our minds as we see him sitting awkwardly on the ice. The contrast between the gentleman and his position, the discrepancy in our minds between dignity and sitting on ice, causes us to laugh. And laughter is no mere surface emotion; it is a deeply rooted instinct.

Humorists are not feather-pated. Rather, humor indicates a sense of proportion. The man who takes himself and his little travails too seriously is no humorist. He who looks upon the

world objectively, who can see "men's little hopes and petty fears" in their true insignificance, he who can laugh at the foibles about him, is the true humorist.

Let us not, however, make this a discussion of psychology. But one more point fundamental in humor, especially in national humor. That at which the humor points must be well known and seriously accepted. If a person is told a joke about an object or a person he does not know, the joke falls flat. We can appreciate a caricature of President Hoover, or Coolidge or Smith. We have seen them or their pictures. We know what they look like in real life. The contrast between the caricature and their actual features supplies the humor. But a joke on an unfamiliar object provides no contrast, no sense of proportion dislocated, no humor.

Among the greatest assets of the Ford car were the jokes prevalent concerning the "Lizzie." These national jokes were conclusive proof of the widespread knowledge of the car and its chief characteristics. Otherwise there could have been no jokes. No greater compliment can accrue to an industry or a product than to be made the subject of national jokes.

Radio may be proud to have attained that stage. It shows the national character of radio and the deep regard with which people accept it. For if an object is slightly accepted, jokes which poke fun at it, would have no contrast. So well is radio known to the great mass of Americans that all manner of jokes have sprung up concerning its many phases. It is almost impossible to trace a joke to its source. But in time it is heard on the lips of a man in Seattle and from a man in Palm Beach. Who knows where it originated? But it is appreciated everywhere. And along with jokes come cartoons and humorous columns.

Radio early became a common source of fun from professional humorists. Newspaper columns sprang up overnight devoted to radio. Others parodied these columns. Thence issued the humorous column devoted to radio. We can do no better than to quote a few examples of newspaper radio humor.

The following appeared in *The Sun Dial* of the *New York Sun* of September 25, 1926, written by H. I. Phillips:

CHAIN RADIO STATIONS

The Radio Corporation of America, buying station WEAJ from the American Telephone and Telegraph Company, announces plans for a national broadcasting service. This is the first application of the chain system in the radio field. All that remains to be done now is to give the radio stations green fronts and dress all the attendants in white uniforms.

Economy of operation, wider distribution and better service are cited as the motives for the merger. Tenors can be secured immeasurably cheaper in cargo lots, and it costs far less to get a freight train full of male quartets than it does to buy them two or three at a time.

"It's a simple matter of merchandising," explained an unofficial spokesman today. "Take a violinist or cellist—go on, take one; we have plenty—it is economically unsound for a radio station to run out and buy one whenever one is wanted. With one great corporation controlling many stations it will be possible for us to buy violinists in gross lots and at a great discount.

"Harpists, harmonica players, whistlers, nature talkers, travel lecturers, after dinner speakers and How to Keep Well speakers are very expensive under present conditions. Why? Because they are bought in small lots. In the future we intend buying up the whole product. We may even control the national output of whistlers."

"How about baseball scores?" a reporter asked.

"I was coming to them," was the answer. "We intend to work a great saving by manufacturing our own baseball scores from now on. Up to this time the radio stations have had to get their scores from independent teams. This was costly and troublesome. By opening our own factories and manufacturing our own baseball scores a vast sum will be saved. I figure our plants will turn out 2,000,000 a day when running full time."

"What is your plan with regard to Bedtime Stories?" was the next question.

"Ah," was the reply. "I'm glad you asked. Centralization of the Bedtime Story industry will be brought about at once. Do you realize that at present there are over 1,167 concerns turning out Bedtime Stories east of the Mississippi alone? Do you know that none of them is making money and that the product is far from satisfactory? Our plan is to close all these factories and open one big Bedtime Story plant in Long Island City and produce a complete Bedtime Story by one operation in which the human element is reduced to a minimum."

So humor takes its course, following hard upon the heels of any innovation pertaining to radio. Not only the new attracts. Trends in the radio field are just as open to lampooning. As the

sponsored program took hold and listeners were at once annoyed and amused by the discrepancy between fine programs and industrial firms having nothing to do with the programs, such sponsoring was given a kindly poke in the ribs. After a while sponsors attached their names to the reporting of any event of wide interest. So it is that in November of the same year, 1926, in the midst of the football season, during which many games were reported over the air, The Sun Dial came out with the following satire:

WHAT RADIO REPORTS ARE COMING TO
(The Football Game)

"This, ladies and gentlemen, is the annual Yale-Harvard game being held under the auspices of the Wiggins Vegetable Soup Company, makers of fine vegetable soups. The great bowl is crowded and the scene, by the courtesy of the R. & J. H. Schwartz Salad Company, is a most impressive one.

"The Yale boys have just marched onto the field, headed by the Majestic Pancake Flour Band, and are followed by the Harvard rooters, led by the Red Rose Pastry Corporation Harmonists, makers of cookies and ginger snaps.

"The officials are conferring with the two team captains in midfield under the auspices of the Ypsilanti Garter Company of North America. They are ready for the kickoff. There it goes! Captain Boggs kicked off for Yale by courtesy of the Waddingham Player Piano Company, which invites you to inspect its wonderful showrooms. The ball is recovered by "Tex" Schmidt by arrangement with the Minneapolis Oil Furnace Company, Inc., and is run back 23 yards by courtesy of Grodz, Grodz & Grodz, manufacturers of the famous Grodz Linoleums.

"On the next play the Harvard runner is thrown hard by McGluck, one of Mahatma Cigarette Company entertainers, and is completely knocked out by two Yale guards, Filler and Winch, by courtesy of the Hazzenback Delicatessen Products Corporation, makers of exquisite potato salads, cheeses, smoked ham and salads. Yale is penalized fifteen yards through the kind coöperation of the National Roofing and Copper Gutters Company.

"The teams are lining up again. It is a forward pass . . . a long forward pass under the direction of the Great Western Soap Powder Company, makers of the world's finest soap powders and cleaning fluids. The pass was caught by Schnapps, the Harvard back, who slipped on the wet ground under the auspices of the Hector M. Milligatawney Chocolate Works, the world's leading manufacturers of bon

bons and almonds. He had a clear field, and if he had not fallen down he would have scored a sure touch-down by special arrangement with the Shore Acres Tutti Frutti Company of New England, makers of fine chewing gum.

"Just a minute, folks. Time is being taken out by Umpire Willie Himp, acting for the National Hair Oil Company, makers of hair oils and dandruff lotions. I can't make out what has happened. A Yale man appears to have been knocked unconscious through arrangement with the Atlantic and Pacific Safety Razor Corporation. Kindly stand by," etc. etc.

Radio seems unable to move a step without being ridiculed. All of which is proof of the fact that the people are most interested in any slight trend of radio. It will be noticed that in almost every case, humor concerns broadcasting, for the simple reason that radio is known to most people in this aspect. Were other fields of radio endeavor as common property as is broadcasting, the humorists might have something to say about these other branches too. All that the humorist demands is that the goat on which he vents his genial spleen be recognized by all, that all may appreciate his tasty remarks.

Those whose humor flows pictorially have taken radio to their bosoms quite as fondly as have those who juggle words. Cartoons drawn around the subject of radio have appeared in most of our newspapers and magazines. The reader may rest his eyes, grown weary over the foregoing small print, or perhaps, tear-filled from laughter, on the following exhibit of radio through the cartoonists' eyes.

The Poetic Muse Meets Radio

The idea of radio has always been romantic. We speak of radio waves as going through the "ether." But nobody knows just what ether is. Travelling practically instantaneously, radio programs swish out in all directions, hindered not by mountain nor desert, their music travelling through buildings, forests, ocean, and then coming down a small piece of wire and into the home. A twist of the dial and one may have an opera or a lecture, jazz or a symphony. No wonder radio grips the imagination. As a feat of magic, great and to be viewed in awe and wonder, radio has made

man's own physical abilities seem puny. To the layman, it is beyond human understanding. He marvels, a wonder to behold. But unlike the Sphinx, it is not static. Radio is alive, dynamic. It is a god not only in its bigness, its power, its omnipresence, but in its aliveness. Radio became the perfect subject for poetry.

Being an untechnical man, the poet considered radio a mystery; being a man of powerful imagination, the subject lent itself to gorgeous treatment. Here was a subject which the poet might fondle in his mind. Many have been the poems written to and about radio, some vulgar and insipid, others beautiful and tender and deep. But why speak of poetry when the poems themselves are at hand?

THE DANE TREE

By Alfred Noyes

This poem was written in honor of the official opening of the Daventry station, England, and was broadcast during the inaugural ceremony. Reprinted from the *Radio Times* of August 7, 1926.

Daventry calling . . . Dark and still
The dead men sleep at the foot of the hill.

The dark tree, set on the height by the Dane
Stands like a sentry over the slain.

Bowing his head above their tomb
Till the trumpet rends the seals of doom.

Earth has forgotten their ancient wars,
But the lone tree rises against the stars.

Whispering, "*Here in my heart I keep
Mysteries, deep as the world is deep.*"

"*Deeper far than the world ye know
Is the world through which my voices go . . .*"

Daventry calling . . . Wind and rain
Against my voices fight in vain.

The world through which my messages fare
Is not of the earth, and not of the air.

When the black hurricane rides without,
My least melodies quell its shout.

My mirth and music, jest and song,
Shall through the very thunders throng.

You shall hear their lightest tone
 Stealing through your walls of stone
 Till your loneliest valleys hear
 The far cathedral's whispered prayer,
 And thoughts that speed the world's desire
 Strike to your heart beside your fire;
 And the mind of half the world
 Is in each little house unfurled.
 Till Time and Space are a dwindling dream,
 And my true kingdoms round you gleam;
 And ye discern the thing ye crave—
 That I go deeper than the grave;
 I, the sentinel; I, the tree,
 Who bind all worlds in unity.
 So that, sitting around your hearth,
 Ye are at one with all on earth.
 Daventry calling: memory, love,
 The graves beneath, and the stars above.
 Even in my laughter you shall hear
 The power to whom the far is near,
 All are in one circle bound,
 And all that ever was lost is found.
Daventry calling . . . Daventry calling . . .
Daventry calling . . . Dark and still
The tree of memory stands like a sentry . . .
Over the graves on the silent hill.

Dealing with the listener rather than the mystery and awe-inspiring beauty of radio is the following poem, entitled "Broadcast," by Isabel Fiske Conant.

Now have your fairy stories all come true,
 When the high forces of the ether rally
 To serve on Aladdin in an alley,
 Now ask if prince or pauper fathered you—
 You need no magic carpet swift and blue.
 The mountain humbly comes to Mahomet,
 And you hold audience such as never yet
 Was ever dreamed of even Rome's tyrannic few.

Now set the years aside. Think from a hill
 A Voice that had no peer speaks to its friends.
 Think lest your heart races and then quiets. Still,
 Lest that restoring Voice too sudden ends,
 Think that you hear broadcast beatitudes,
 Or fading whispers from three hilltop roods.

The broadcast program has also been subjected to poetic treatment as evidenced in

FROM OUT OF THE AIR

By Roselle Mercier Montgomery

The day's defeated banners all are furled,
 Diana's bright new bow hangs in the west,
 And Dusk, the good, gray nurse, begins her rounds—
 Hushing the birds and bees . . . and babes . . . to rest.

Wind-children in the tree-tops softly rock,
 Upon the lawn the shadow-goblins play,
 While we sit silent in the porch's gloom
 And hear a 'cello . . . singing . . . far away.

Oh, marvel! Can it be a human touch . . .
 Upon a man-made thing of wood and string . . .
 That makes those sounds that come from out the air—
 Those sobbing strains that set us quivering?

Nay, magic, surely, of the Summer night!
 Perhaps some sad, old god . . . whose heart still clings
 To Earth that would have none of him . . . comes back—
 His lute sobs to us in the dusk . . . and sings!

It whispers of the wonder and delight
 Of some old life we lived—ah, who knows when?
 Stirs half-remembered joys that once we knew,
 And brings them . . . through the air . . . to us again.

And pain, old pain, comes creeping back . . . Ah, strange
 How restless in their graves the dead griefs lie!
 When the far 'cello calls . . . their ghosts arise
 And walk the shadowed aisles of memory!

While we sit rapt there, Night steals softly up
 And hangs her lanterns in the Summer skies . . .
 Far off, a city audience applauds—
 As on the air the singing 'cello dies!

And to those who question the meaning of radio, that mystic voice of the ether answers:

VOICES

By Robert Davis

- I am Radio. Distance nor barrier oppose me. Through all space I fling my mysterious reverberations.
- I am the whisper that leaps the hemisphere; the song that echoes around the world; the cadence that rides the ether in a thousand tongues.
- I am the wisdom of the ages revived in a single breath; the lullaby of the cradle; the thunder of war; the voice of the State.
- I am the litany and the surpliced choir; the trumpet and the reed; the bow and the string; the singer and the song, in key with the cosmic chords.
- I am the rhythm to dancing feet. I sway the world in rhapsody to the measure of beating hearts. I am the universal orchestra in tune with carnival.
- I am the life of the market place; the thrill of the bourse; the roar of the ring; the fury of the forum; the cheers of the Coliseum.
- I am the comrade of the sick; the courier to the lonely; the ally that knows no frontier.
- I am all the voices of the earth and the murmur of the multitude merged in one vast articulation.
- I am the message from the microphone. I am the conqueror of the void. I am the triumph of the centuries.

I AM RADIO

CHAPTER XXV

AND WHAT OF THE FUTURE?

"OH, the dullness and hardness of the human heart which only considers present things, and does not look toward futurity." So wrote the talented monk, Thomas à Kempis, during the Dark Ages. And lest we be accused of having hearts dull and hard, we hasten to close the present dissertation on this thing called broadcasting, standing on our tip-toes, peering into the blue sky down where it meets the horizon, daring even to speculate and drift away in dreams of what might float behind that billowy cloud, that last horizon, the Tomorrow of radio.

In view of the marvelous accomplishments of present-day radio, it might seem unreasonable to expect further advances in the future. Still, that attitude is but a manifestation of the ego of each generation, which dares believe in the finality of its achievements, forgetting that its accomplishments are to serve not only as the pinnacle resting on the achievements of past generations, but also as the foundation on which succeeding generations are to build. From the crashing spark and crude coherer which spanned the thirty-odd miles of the English Channel for Guglielmo Marconi, at the close of the last century to the rebroadcasting of European programs over our national networks at the dawn of 1930 may seem a stupendous era in broadcasting progress. Nevertheless, we should prove hopelessly without imagination and overwhelmingly possessed of inflated ego if we did not look forward to even greater progress during the next decade. Greater progress in a decade than in three previous decades!

We smile at ourselves in the thought of speculating on the next decade. Ten short years, to be sure, that pass as a single day. To the geologist, who is used to thinking in terms of millions of years, ages, eons, periods and strata, 'tis less than a drop of water in the ocean. To any other art, science or industry, ten years seems a short time indeed. But radio is only twice again

as old as ten years. And broadcasting is but ten years old. Viewing it in this light, ten years is many centuries, all history in a day. We are to look ahead a distance equal to that already traversed by radio broadcasting since its inception. So much has happened in the last few years. All that the word "radio" represents in its multifarious implications and manifestations has grown from nothing within this short span of years. What with the accelerated development in the future, we may be fools to look ahead ten years, at which time broadcasting will be twice as old as it is today. But so many far-sighted fools have been responsible for radio progress in the past! We are in good company.

Laboratory—The Fortune Teller's Booth

The efforts of scattered inventors and workers largely accounted for the first two decades of radio development. The pioneers had to make their way slowly through the uncharted thickets and underbrush of an unknown field. Fundamental principles had to be discovered, studied, and formulated. The mathematical structure of radio technology had to be painstakingly constructed, checked, and rechecked. The early pioneer had to pull himself up by his own bootstraps, making his own formulas on which to work, formulas now received as axioms or self-evident truths. The radio worker was constantly faced with many "variables," or "X" values in his calculations, which made for the uncertainty of wireless communications during the early days. Radio, in short, was simply an experiment, dragged out of the laboratory and into the workaday world long before its incubation was completed.

During the World War, organized research became an American practice. The fact that, like a young man, we were suddenly thrown on our own resources because our European parents were busily engaged with certain family difficulties caused us to depend on ourselves. And so the research worker, provided with every conceivable facility and incentive together with the development engineer working on definite problems, came to take the place of the proverbial long-haired, wild-eyed inventor working in his lonely attic. Organized research brought about the solution of practical, economical, and positive transoceanic radio service

in the form of the Alexanderson alternator. It made the vacuum tube commonplace. It developed the super-heterodyne receiver for broadcast reception. It perfected the tuned radio-frequency receiver which is now standard equipment in most homes. It made the single-control tuner possible. It brought about realistic tone quality. And it provided all the other accomplishments of modern man.

Today the radio progress of tomorrow is being moulded in the vast radio research laboratories of the country. Hundreds of research workers and engineers, working on definite problems, are paving the way for the future. The achievements of next year, the year after, and even the year after that, are to be seen today in the research laboratories. Even the progress five years hence is now in the making. Therefore, the radio fortune teller need not consult a pack of cards or a crystal; rather, a peep into the research laboratories is the best possible means of prophesying accurately and sincerely the future of radio. And that is precisely the method employed by all radio soothsayers who cannot afford wrong guesses.

The Latest Word—But Not the Last

Year after year, the public becomes convinced that the season's radio offerings are positively the acme of perfection, only to find these same radio offerings surpassed by those of the succeeding season. Nevertheless, broadcast receivers produced during the past year or two have attained such a high state of relative perfection that there is little danger of their becoming obsolete within a period of several years. In tone fidelity, volume, selectivity, and even sensitivity, together with simple, practical, and economical operation, there is little to be desired. Nevertheless, by direct comparison with developments to follow it becomes apparent that these sets have been the latest rather than the last word in their day. Yet it is likely that the improvements from year to year will no longer be as striking as they have been in the past, during the chaotic days of experimental radio. It is in refinements, rather than in startling innovations, that we must

look for further progress, barring, of course, the revolutionary discovery which is always possible.

The development of the broadcast receiver follows closely the lines laid down by broadcast transmitting facilities. It is well to note that the radio networks have had their influence on the design of broadcast receivers. Without the old-time urge for super-distance or "DX" reception, and with the demand for utmost simplicity of operation, broadcast receiver design has tended away from extreme sensitivity towards extreme selectivity. No longer do we adjust half a dozen knobs for the purpose of picking up the faint signals of a station on the other side of our continent. Yet if the public should again demand extreme sensitivity, it may be supplied.

In the matter of tone quality, fortunately the human ear rapidly adapts itself to almost any form of rendition, which it soon accepts as perfect. We have all been through the ordeal of listening to the poorest kind of radio reproduction, forced on us by a radio set owner who is firmly convinced of its excellent quality. A similar psychological situation in the days of the old-time mechanical phonographs used to be known as "phonograph ear." Even when a fully developed "radio ear" hears a radio set of considerably better tone quality, there is apt to be doubt as to the improvement. What sounds excellent to one may sound poor to another. Some like their radio music pitched high, others low, others medium. A radio dealer may demonstrate several sets in the average home before making a sale, because of the different musical ears. Hence, while it is possible to improve on present-day radio tone quality, the climax seems nearly to have been attained for the vast majority of the public. Only those with finest, most balanced, and most critical ear may appreciate that further progress which is bound to follow.

Radio Hands Across the Sea

For a certainty, one of the greatest advances to be made in broadcasting during the next decade will be in the direction of international broadcasting. The rebroadcasting of European programs over American networks was somewhat prematurely

though experimentally introduced back in 1925, when some of the engineers of the Radio Corporation of America thought the public would appreciate the experimental nature of the work and be glad to take part in radio history in the making. But the public immediately drew unfavorable (and somewhat unfair) comparisons between the clarity of local programs and those coming through several radio and wire circuits over a distance of perhaps 3,400 miles. Since then steady progress has been made in long-distance radio telephone transmission and reception. For several years the RCA engineers have worked on receiving antennas and receivers, taking full advantage of their experience in transoceanic radio telegraphic work. Day after day the strength of the intercepted signals from many cooperating foreign stations, together with the degree of background noises or static, has been recorded. This time the wiser engineers have sought the maximum results and operating certainty before making the overseas signals available to the National Broadcasting Company's control room for distribution over the NBC networks. Transmission experiments to foreign receiving stations have also been carried out on a large scale.

It was on New Year's Day of 1930 that the public had the first genuine opportunity of appraising the results of several years of engineering research and development in overseas broadcasting. That day, programs from England, Holland and Germany, transmitted by short-wave stations in those countries, were picked up by the RCA short-wave receiving station at Riverhead, N. Y., sent by direct private wire to the NBC control room in New York City, and rebroadcast by the NBC network stations over the entire country, with a clarity and volume that impressed even the veriest layman. The programs lasted for several hours, indicating that the rebroadcasting was now in the nature of a definite service rather than a fortunate stunt, as contrasted with the short rebroadcasts during the previous years. More recently, the rebroadcasting of the opening of the Naval Disarmament Conference in London, beginning with the address of King George to practically the entire civilized world, more than repaid those who rose at five-thirty to hear the beginning of the international congress.

Of course there is occasional static. There is also some fading to be contended with at times. There is the variation in average signal strength. The engineers have gone far towards reducing these variables to minimum terms, yet even now there are times when the short-wave signals cannot be received with the desired clarity; obviously, the reception of clean-cut speech or music for rebroadcasting is quite a different matter from the reception of dots and dashes for direct transcription into radiograms by skilled operators. The modest power of the short-wave transmitters used abroad prohibits certainty in the reception of European programs in advance. However, more powerful stations are planned, some are under construction, and it is only a question of time when high power multiple short-wave transmitters will send husky signals across the Atlantic, elbowing their way through any and all static interference, and maintaining a satisfactory minimum signal strength even during severe fading.

Before the end of the next decade, European programs will be commonplace in American homes. London, Paris, Madrid, Berlin, Rome, The Hague, Brussels, Warsaw and other cities will arouse little greater "distance thrill" than Kalamazoo, Oshkosh, Oscaloosa, or Sheboygan.

"Embalmed and Treasured Up"

Radio broadcasting has been a transient and perishable commodity. Programs may require 50 hours of preparation, yet live but an hour or less before the microphone, and then vanish into thin air. Of radio programs, and not of human beings, might Shakespeare have said, "that strut and fret their hour upon the stage and then are heard no more." They might be likened to "moths that come upon a flood of light, and eddy in the sunshine, and are gone." What a waste! Spendthrift we are in radio programs as in other things. Reason revolts at the thought of one-performance runs for supreme gems of the radio world.

The future will in some measure reduce this waste of artistic achievement. It is quite conceivable that programs of outstanding artistic merit or of preëminent historical importance will be recorded so that, perhaps years later, they can be used in whole

or in part. Such material will also form a useful historical record of our times, from the artistic, intellectual, and political viewpoints.

There are a number of possible applications for such records. Some people will desire to purchase copies of certain of these records to be played on their electric phonographs at their convenience to revive the memory of some thrilling moment on the air. Then again, smaller or local stations, not associated with any network, in the outlying sections of the country, may desire to use these records in connection with local or regional advertising or as sustaining features in their own programs.

It is indeed likely therefore that broadcast programs contain too many gems to shine for but an hour and then pass into oblivion. The future may record and preserve in permanent form for such special uses each gem of the air: "the precious life blood of a master spirit, embalmed and treasured up on purpose to a life beyond life." Certain of the present broadcast receivers are provided with recording features actually to record desirable programs coming over the air, as well as the recording of home talents and personalities.

Hatching the Television Egg

Broadcasting caters to but one sense perception—hearing. Important though the ear may be, it is second in importance to the eye, which retains an image much more faithfully and permanently than the ear. Radio television, or radiovision, must come, but *when*, no sane man would dare predict. All he may safely say is that in time the audience will probably *see* as well as hear the performance. Unfortunately, radiovision has been the subject of unjustified and lavish promises. Laboratory demonstrations of a highly intricate character have been made available to the public, and subsequently wrongly interpreted as the inauguration of everyday television. On the other hand, crude radiovision demonstrations have been given to the public, pricking the bubble of their hopes, and doing more harm than good. Hence television has remained the great enigma of radio.

There are a number of possible interpretations of what "tele-

vision" means. Many people have naïvely assumed that television would be practically equal in its perfection to natural vision by the eye of man. In other words, they assume that when radio television enters the home, one side of the looker's room will melt into nothingness, and in its place will appear the distant event blazing in all its natural colors and with utmost precision of detail. A great football game, crowded streets through which the conquering hero passes for his triumphant reception, the 'vista of a musical comedy stage—these and many more subjects, by day or by night, will form the walls of the room of his home, and bring perfect distant vision to him. The scientist, faced with this conception, sadly shakes his head and necessarily relegates into the far distant future even the remote possibility of such an achievement. If this is what television means, he says, we shall not have television in the home for many years to come, if ever (unless, perchance, some supreme genius discovers a transcendently powerful new law of nature which sweeps aside all known obstacles to perfect television).

On the other hand, there is a considerable group of people, many of them enthusiasts or radio amateurs, to whom television means almost anything that can be seen. Faint, indistinct, blurry, smudgy, and wabby images of an alleged face and shoulders, fading in and out, and distorted almost beyond recognition are hailed by these persons as "television." They are similar in spirit to the old "DX hounds" or long-distance-reception enthusiasts of the early days of broadcasting. More important to them the fact that the image flickers through the air than that it *is* an image; more thrilling that a picture can be transmitted at all than that the picture might be attractive and entertaining.

Presumably the great bulk of our population has an opinion relative to successful television which lies between these equally impractical extremes. It can be assumed that television will certainly not hold public attention unless it has continuing entertainment value. This, in our opinion, is the criterion for successful television—that the lookers in their homes shall, in the course of time, forget or overlook the medium whereby they see distant things and shall rather be interested in and enjoy that which they see. Entertainment and education—these must be brought

by radio television if it is to be woven into the fabric of human life.

It is rather easy to lay down the specifications for a successful television receiver, and it is much more difficult even remotely to approach even these ideals. For example, the receiver must be simple in operation, compact in size, attractive in appearance, and within a reasonable price range. It must produce pictures which are bright enough to be viewed in a room having ordinary illumination. People will not desire to swelter in rooms with all the (non-existent) black shades down in order to shut out every bit of daylight (and life-giving air). Furthermore, the color of the picture must be somewhat attractive. The existing pictures are generally in pink and black, a combination rather displeasing to many. The size of the picture must be sufficient to enable half a dozen people to view it from convenient angles at distances of anywhere from five to ten feet. Above all, the picture must carry enough detail to depict a story or an event in fairly acceptable fashion. Presumably, judging from the experience of dramatists, it must be possible to show "close-ups" of the head and shoulders of at least three people, and it must be possible to show "long-shots" or more distant views of fairly large groups of people.

The picture which is displayed must be readily "framed," that is, brought into a central viewing position and then automatically maintained in that position without sidewise or vertical motion. It must be free from annoying flicker (such as was so irritating in the early days of the silent motion picture). The equipment must be practically silent in operation so that there will be no interference between the television receiver noise and the reception of the accompanying radio telephone broadcast which gives the corresponding sounds. It is to be expected that television of the future will invariably have a sound accompaniment, automatically synchronized, so that picture and sound become parts of a satisfactory entertainment unit.

Assuming that all these difficult conditions were to be met—and scientists are a long way from having produced equipment which does meet all these requirements—there would still remain the question of program production and of network syndication. Television programs require handsome as well as artistic per-

formers—or at any rate not unhandsome performers (except for special and particularly villainous parts). The performers will necessarily be in costume, and will be “made up” to whatever extent is necessary. It is clear also that the technique of television broadcast will be very different from that of ordinary broadcasting and will in most respects resemble more closely that of sound motion picture production. The broadcasting studios of the future may well find themselves required to use “sets,” that is, backgrounds and scenery as on the stage, or else the equivalent of such sets. In fact, television transmitting stations may be forced to use sound motion picture film as “raw program material” for at least a portion of their daily offerings. It is not unlikely that there will be a close association between television and motion pictures.

But assuming all program difficulties to be overcome, and the genial sponsors for the programs to be found, and assuming that the artistic problems involved in television have been overcome, there still remains the matter of national syndication. Engineers are aware that the transmission of satisfactory television images is anywhere from ten times to one hundred times as difficult as the transmission of good telephone signals. This is true whether the transmission is by radio or by wire. To carry television images from the originating studio to a multitude of outlet stations situated all over the United States would involve wire line or radio networks of a quality and perfection far surpassing anything which is known to be available at this time. If, in the future, such networks of supremely fine quality become available for television syndication, their cost may fall outside of the range of economic use, in which case the syndication of television programs may be in large measure dependent upon a combination of local talent and the use of sound motion picture film transported to the station in advance and comprising a good portion of its programs.

Many people ask: How near are the engineers to reasonably good television? The answer is simple. If the methods which are commonly used and demonstrated to the public were to be taken as an indication of the possibilities of television, a pessimistic conclusion would be drawn to the effect that we have not yet “scratched the surface” of television. Fortunately, a number of methods of advanced and novel type which are under develop-

ment in the laboratory, though in experimental condition, show much more promise and even indicate the possibility of a final solution of the television problem. One of your authors has ventured the prediction—dangerous as predictions always are—that national television of high quality within a year would be a miracle; within three years, a splendid engineering and commercial achievement of unique rapidity; and within five years, a normal and healthy example of successful technical and commercial effort. Let us hope that enterprise and intelligence will upset this prediction and bring nearer the day when we shall see as well as hear through the air. Let us not be too pessimistic. After all, was not much the same pessimism shown in the days before the telephone, before radio, before broadcasting, before the airplane?

Please Set the Table for One More Guest

Radio came into the home to pay its respects, remained as a guest, lingered as a friend, and has now been accepted as a member of the family. Experimental sound motion pictures have now entered the home as guests, reciprocating the many visits paid them in their own home, the theatre. The highly developed broadcast receiver of today, with its wonderful sound-reproducing system, invited the collaboration of motion pictures and sound records for the presentation of home talkies. Already experimental sound pictures are available for the home, making use of 16-millimeter films and their synchronized disc records. But the ultimate in this field, as in the theatre, will incorporate picture-and-sound films with self-contained sound counterparts. The problems of squeezing motion pictures and photographic sound track into the narrow gauge film for home use are difficult as well as numerous, but good progress is being made toward a solution.

Just as the broadcast program may eventually include a permanent form or record whereby programs may be repeated at will by the listener-in, so the television programs of the future probably will include a permanent form or film record. However, in the case of television, the film or permanent record may come at an early stage of the commercial development because it is already developed and available to the many home movie projectors now

in use. There remains the addition of the sound record, which is also rapidly being developed. In other words, some television programs may be transmitted from sound motion picture films.

The day is soon to dawn when history will be repeated at the snap of a switch. Great events will be recorded, photographically and acoustically, for all time. Family and friends will live over and over again on the home talkie screen. An event can be re-enacted by radio at any time. Personalities will never die. Immortality of the appearance of man will apparently be a physical reality.

Ethereal Printing Co., Inc.

Still another phase of radio development may find a place in future broadcasting, namely, facsimile radio. Often radio television is erroneously held to include still pictures, drawings, maps, finger prints, and so on, which are now flashed over the trans-oceanic radio circuits as a matter of daily routine. Television, strictly speaking, applies to the instantaneous flashing of living subjects or their equivalent from film pictures over wires or radio, and their immediate reconstruction in a sequence of "motion pictures" at the receiving end. Still images, on the other hand, are handled by the facsimile radio process, and are known as photoradiograms, rayphotos, radio photos, and by other names.

We may, without danger, expect great things of facsimile radio, since the technique is far simpler and further advanced than that of radio television. Whereas a television picture must be reproduced at the rate of 15 or more times per second to obtain the illusion of an animated picture, the facsimile picture may be handled in several minutes to an hour, depending on the detail required. Obviously, then, time is not the split-second proposition which it is in the case of television. Since difficulty of transmission of a picture depends on the rate of transmission, television is many times more difficult than facsimile transmission.

Future radio broadcasting may see the introduction of the radio newssheet, in the form of a facsimile radio reproducer operated as part of the home radio set. During the afternoon, the latest news can be sent to the home or during the night, when broadcasting stations are ordinarily silent, they may transmit the continuous

stream of elements that are required for facsimile reproduction, while the home radio set may be automatically switched on after the family has retired, with the output shifted from loud-speaker to silent facsimile reproducer. The next morning, the family wakes up to find a tabloid radio newspaper, illustrations, headlines, advertisements and brief news items, ready at the breakfast table. Why not? The technique is nearly sufficiently perfected. Broadcasters have the items available. The radio set is already in use. We shall see.

The Radio City

We have peered into the future of radio's scientific developments. Will not radio the art also progress? It will. Even now, dream has piled on dream so high that it is breaking forth in action, the Radio City.

The great artist is generally, one might almost say inherently, an individualist. He produces his art when he can, and unpredictably. External pressure may help, sometimes it hinders. Until very recently the artist has flourished under two conditions. He might be found, isolated from society, scorned, flourishing mentally and inspirationally, though seldom physically, in a soil seemingly unfavorable to the growth of his genius. Or again, the artist has been found to flourish in a company of kindred spirits, as witness the great masterpieces painted in Fifteenth Century Florence, the hospitable home for the great with brush and pigment. Or again the great dramas that were penned and staged in the reign of Good Queen Bess. These instances would show that although genius asserts itself under the most trying conditions, it flourishes best under sympathetic and understanding environment. All Renaissance Florence was interested in painting. All Elizabethan England was interested in the theatre. Artistic and dramatic wars, factions, debates; all showed a keen interest in these fields of endeavor and proved them to be of vital importance to the people of those times and communities.

The Twentieth Century is the Machine Age. Man is required to spend less physical energy than ever before. And with the decreased value on brawn comes a rise in premium on brains to run the machines that take the place of human physical force. Half-

baked and soul-weary theorists, under the self-delusion of being artists, have denounced our machine age as contrary to the best interests of art and the leisurely life with which to appreciate art. Let us examine the situation.

That people are no more happy now than in ages past is probably true. But not because of the machine age. Rather, because our ancestors knew no better and were contented with their lot. So is a cow contented to graze and chew its cud. But who would exchange life's excitements for the existence of a cow? We may not be happier than our forebears, but we have the potentialities of greater happiness. Perhaps we have not used these potentialities to the full. In the struggle to attain the machine age, the means by which we are now coming into leisure which we can then devote to pursuits of the mind and the spirit, in this struggle many of us have forgotten how to be leisurely. The machine age in the making has made of many of us machines. But this need not be, nor can the age be blamed. For the fact remains that we spend less time earning our daily bread than ever before, and that time is spent less arduously, leaving us freshened rather than fatigued, depressed, robbed of ambition and soul-destroyed.

Having made our machine age, we are just now learning to utilize it, making the machine slave to man, not man slave to the machine. We have earned our capital, the machine, by hard labor. We are now about to draw the interest, in more leisure than ever before. That leisure time must be spent somehow. And if the Twentieth Century is not to follow in the footsteps of ancient Persia and Rome, spending our hard earned wealth in a manner leading to eventual destruction, it is imperative that means be devised to make the growing hours of time on our hands fill lofty purposes. The question of spending leisure is of ever-increasing importance.

There can be no doubt that the leisure and wealth accruing from the machine age, to be most valuable to man, must be spent in the creation and enjoyment of art. And so we may rightfully say that the machine age is freeing us for art's sake; not only freeing us, but making possible the dissemination of the finer things of life to poor and wealthy alike.

Machines have never made art, and never will. Genius and

human ability alone do that. But now the machine age comes to make possible the expenditure of genius in the interests of art. Those who claim that they are tied to their machines have only themselves to blame. It may be true that some are victims of their own devisings, but on every hand we find broadminded men realizing the true place of the machine in life.

One of these manifestations is the Radio City. In the heart of New York City a group of gigantic buildings, streets, plazas, theatres, opera houses, broadcasting studios, and laboratories are being planned by a number of leaders and organizations, with the coöperation of John D. Rockefeller, Jr., and the Radio Corporation of America and its subsidiaries.

What will become of the Radio City nobody can foretell. Its effect on the art and culture of the country and the world is unpredictable. For no such experiment has ever before been attempted, could ever before be attempted. Only the machine age, against which maniacal obstructionists rave and rant, is making it possible. The Radio City, falling into the hands of the purely commercially inclined would strangle the cultural possibilities in many fields, just as some of the latent artistic possibilities of the motion picture have been buried beneath the mediocrity which many of those at the helm of that industry foist upon the public for their private gain. On the other hand, under the guidance of those who know the true relation of science to art, it is hoped to make the Radio City a home for the communion of kindred spirits, devoted to the use of commerce and science and machinery, not for their own advancement, but for the furtherance of art in all its phases, the graphic arts of the theatre and the screen, the musical arts in all their forms, and the arts of the dance. And that the results of all these mighty concerted efforts may be appreciated by the greatest numbers—for only by appreciation can art be said to raise the cultural standards of a community or an age—radio and motion pictures and television and other developments of our great scientific laboratories will come to the aid in the transmission and preservation of culture.

Too often, enterprises of such a nature, undertaken by artists, fail for lack of administrative ability. For some reason, the artist has never been known as a good business man. Many an artistic

venture has failed, not for lack of art, but because art could not carry the burden of commerce. For just such reasons, for example, the Provincetown Playhouse, the birthplace of some of the foremost dramatic productions, failed, as well as many other enterprises. On the other hand, the administrative heads of the Radio City will do well to stay outside the doors leading to the creative workshops. For with his eye on the administrative end, and rightly so, the executive is in no position to judge the artistic merit of the creative work he is administering. Each to his own tasks, but all with the one end in view.

The Radio City tempts one to enthusiasms, to care-free imaginings, to raptures of praise and high hopes for the future. It is with difficulty that we retain a judicious mien lacking in many who envision the Radio City, now in the planning, as capable only of good. Too often have we seen other enterprises, founded on similarly high ideals, entrusted to the care of similarly intelligent, idealistic men, backed by great wealth, fail utterly. The establishment of the Radio City will not in itself assure high class entertainment, culture and art. Hundreds of problems remain to be solved, thousands of others not yet even dreamed of, before such ambitions can be realized. But the prospects are wholesome. The potentialities are such as no other such venture has ever carried. Our machine age is tuned up and ready to serve in the furtherance of art. It remains now only to find the right human beings intelligently to steer this vast Radio City on the right path, through richer and poorer, through sickness and health, to the ultimate attainment of Unity; Man, freed by the Machine, can now devote his talents and use the Machine itself to raise the spiritual and artistic level of his own existence.

"Where the Blue Begins"

As we look into the black and troubled waters of the past we may discern at the bottom the hulk of many a relic. Some of these were experiments ill-founded, hopes wrecked upon the rocks of ambition, broadcasting dreams shattered by the lure of the mighty dollar, or shoaled upon the sand bars of fraud beneath the placid surface of the sea of commerce. Others were once the mighty

monarchs of radio, the cynosure of all eyes, proud, the finest possible, built by the best brains in the world, officered by the most worthy and manned by competent seamen. But stout and strong as they were, these ships were forced by progress to bow their exits and now lie beneath the sea. These old hulks, however, and the crews that manned them, still live, in the reflected light of those who have displaced them. As they lie in their watery graves they may see the greater radio craft floating majestically on the surface, and know that the floating vessels were made possible only through the experience and knowledge learned in building their predecessors.

We lift our eyes from the bottom of the Stygian depths to the surface of the radio ocean, sometimes so calm and placid that it would seem a stone tossed in the water would cause ripples throughout the sea. At other times the ocean is choppy, spanking up white-caps of discontent that cause the mariners of the present radio craft to trim their sails and make for shore. But as the sun comes out they once more turn their eyes to the far horizon, where the blue begins. Rollers and storms may discommode; never do they stay the striving of the craft. Their journey's end is not in sight, but as they press forward, eagerly anticipating the adventures beyond the horizon, their sails unfurled in the breeze of progress, the water of present accomplishment swishing by their sides into the past, the bubble of daily comment and transient public opinion dancing as fragile and pretty ornaments on the surface to break upon the hull, the members of the crew sit upon the open deck and look into the sky at the silent stars and moon. And as they sit and gaze at the black space between the sea and the sky they realize that both beneath and above them the swift, sure messages of radio are winging and hurtling to their destinations. The younger members of the radio crew are thrilled with the progress already made and look eagerly to the future. Those who have lived the great range of radio, those who have grown up with the art and the science, those who have shipped on the very first frail radio vessels into strange and unknown waters, they also thrill at the thought of the development in which they have shared. They speak to the youngsters of "the good old days." Perhaps the youngsters think of the older ones as fossils. Perhaps

their attention is wholly riveted on the future. But the old ones know the hardships that have gone before, hardships that will never have to be borne again, and with the hardships the thrills that have accompanied the pioneering, thrills that can never be forgotten, thrills that can never be replaced, thrills that can be experienced by none in the future, thrills that are the exclusive heritage of those whose hands have moulded the primitive forms of light in the pale dawn of the 20th century, shaping them into the glorious midday blaze of the sunshine of the Radio Age.