

THE
RADIO
Decade

THE RADIO CORPORATION
OF AMERICA

NEW YORK: 1930

FOREWORD

MANY discoveries quite as marvelous in their time as radio have come to us out of the past. The first explosives, the first manifestations of generated electricity were mysteries equally as incomprehensible. History indicates the amazement in the Europe of Charlemagne over such a simple device as the first clock, a gift to the Emperor from an Arabian Caliph.

No age has been entirely barren of the ability to build, discover and create. The story of invention has moved in steady sequence. Each step in our onward journey has been taken from the firm foundation of the past. Bootless would have been the search of the ancients for radio, yet it slumbered about them while they toiled slowly with the creation of language and writing, the crystalization of thought into philosophies, the upbuilding of schools, law, responsible states and organized methods of business, upon which our present advancement rests.

The identifying mark of our times is not that we can discover age-old forces, not that we can employ these natural phenomena, not that we can invent new machines and new processes, but that we labor swiftly. Organized effort, with its energy, perseverance and resource, has replaced the lone worker. The tortuous progress of the past, springing from isolated and often chance findings, has given way to the swift onrush of modern industry, and fully as noteworthy, to a changed public attitude. Modern society is alert to its needs and expects to have them satisfied. Every industry must meet this challenge, or yield to others possessing greater perseverance and resourcefulness.

Radio offers an excellent example of the modern concentration of progress within a short period. It is now just ten years since this slumberer, who awoke to the magic touch of Marconi, stepped into the glaring daylight of his achievement. Ten years ago there was no broadcasting. Radio science had not yet been adapted to the recording of sound and gave no forewarning that it was to remake and rejuvenate the talking machine and moving picture industries. An organized system of international communications by radio was just pushing its way forward

in America. Even in its primary function, the exchange of messages between ships and shore, the use of wireless, viewed by our present standards, remained elementary.

Striking as has been the development of one decade, none can yet tell whither radio is bound. To attempt a forecast of the next ten years would be just as fruitless as would have been attempts ten years ago to picture the current uses of radio. The sequence of invention may carry it into far distant fields. Each adaptation of radio has meant a broader foundation upon which organized research may labor.

What we may be sure of is not the nature of radio's future gifts, but that no hope of discovering a new service from it will be discarded, and no promise of giving it greater public usefulness will be overlooked. The laboratory is pounding back each new frontier.

DAVID SARNOFF, *President*

RADIO CORPORATION OF AMERICA

1920 - 1930

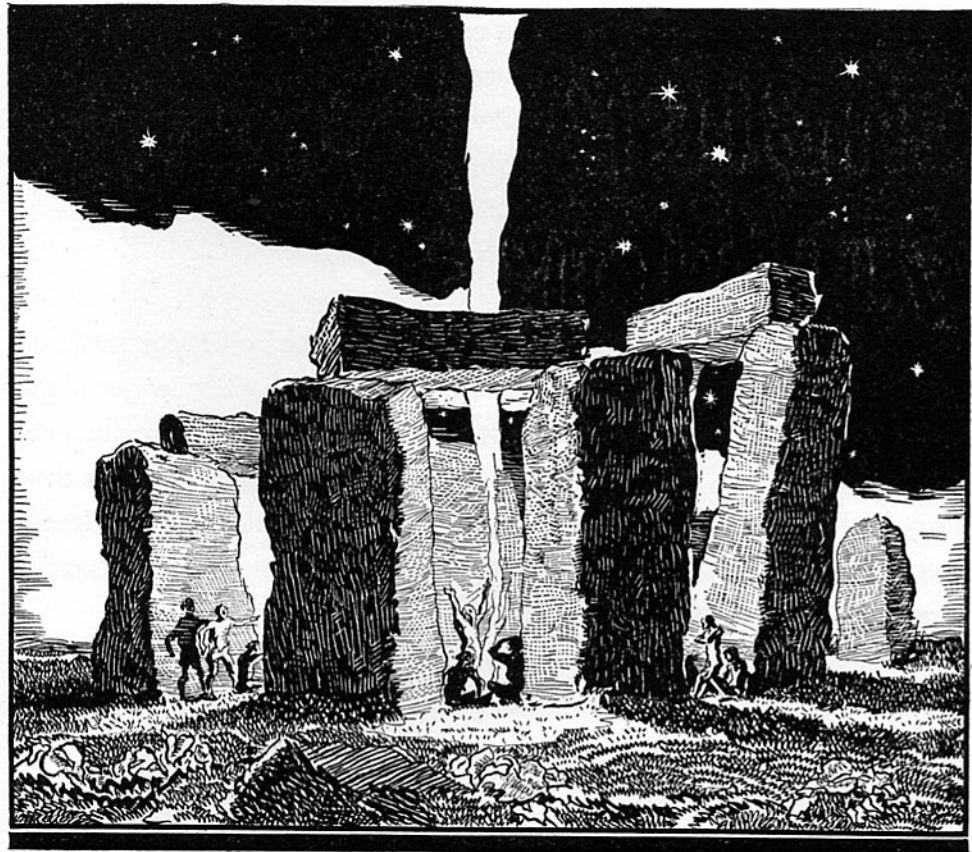
IN THE history of radio the year 1920 will remain outstanding. It witnessed the birth of organized radio broadcasting, an art that has developed in a single decade into one of the greatest forward forces the world has known. It witnessed also the establishment of a commercial international wireless service linking the United States with foreign nations.

The year was important to the Radio Corporation of America because it marked the beginning of that company's work. On the early morning of March 1, 1920, immediately after the return of the high power stations that had been under Government control during the World War, the Radio Corporation of America sent its first message across the Atlantic. This service, founded upon the Alexanderson alternator, which had been built after much effort by the General Electric Company, has extended to every continent and to vessels sailing every sea.

The broadcasting experiments that were being conducted in 1920 by the Westinghouse Electric and Manufacturing Company in Pittsburgh, which led to the operation there of the first broadcasting station on November 2, 1920, have grown into an endowment of education and entertainment that has reached into millions of households and altered life in every city and hamlet of the land.

The year 1930 is also important to the Radio Corporation of America. It marks the beginning of that company's work as an active manufacturing organization, with unified research facilities and its own manufacturing plants. RCA has centralized its efforts and prepared for the greater service of radio it anticipates in the decade ahead.

This booklet is issued on the occasion of this unification, and to commemorate the anniversary of the oncoming of radio a decade ago. It is something in the nature of a report on undertakings and accomplishments, prepared in the hope that it may bear evidence of the fidelity with which RCA has endeavored to bring to radio the full measure of public usefulness, and in recognition of the encouragement and assistance of the people of the Nation, who have made possible the development of this great art.



Man's voice ranged no farther than the light of his campfire

THE SERVICE OF RADIO

IT IS difficult to evaluate what has taken place in the transmission of intelligence within the brief span of the last ten years without recalling for a moment man's unending struggle to extend the range of his own voice.

So long as the nomad tribe remained the political unit the spoken word was sufficient. Primitive man operated singly and incidents of tribal concern were discussed at night about the camp-fire, and those very discussions gave to society its first unifying force. As national entities slowly appeared and concerted action became more essential, keenly felt was the need for means to spread information widely, and

to dispatch instructions quickly in emergencies. Down through scores of centuries this need continued to tax man's ingenuity. Until our present era, with its marvels of electricity, it was safe to say that in no other practical science was humanity quite so laggard.



WHEN THE Greek demigods and warriors departed on the expedition that stands forth as the great romance of antiquity, their leader, Agamemnon, arranged an elaborate system of beacons along the eminences from Asia Minor which would carry the word to his home in Argos that Troy had fallen; and the great dramatist of the golden age of Greece was still relating the joy of the aged watchman high on the battlements when he saw the distant gleam.

Back in that dawn of history we find the tribal states employing the new gift of fire, filched from the gods by the martyred Prometheus, as the agency for conveying the news of great events, and the method must have been just as fascinating as radio in our own generation. Races that encountered later the march of progress, the American Indians, the Picts who harrassed the Romans beyond the Empire's northern wall, had developed a system of signals from smoke puffs that was an elementary forerunner of our Morse telegraph code.

But the building of fires was slow work for quick action, and counted for little in short range communication, and numerous other expedients were attempted, such as the beating of drums and the flashing of sunlight on burnished shields. There was slight advancement as the centuries rolled by. It is a significant commentary on communications progress that nearly three thousand years after the fall of Troy, when Western Europe had experienced the liberating influence of the Renaissance; when cannon thundered forth from great galleons that were navigated by the mariner's compass; when printing was a commonly accepted art and the drama and literature were at their loftiest peaks; when telescopes were soon to bring even the distant planets within the ken of men—an age teeming with development and progress—a series of



"Far on the deep the Spaniard saw, along each southern shire,
Cape beyond cape, in endless range those twinkling points of fire"

beacon fires very much like those prepared by Agamemnon wound its course through the hamlets and towns and over the hills of south Britain, speeding the tidings on to London that the long awaited Spanish Armada had appeared off the Cornish Coast.

History and literature abound with stirring incidents of how great nations were informed and roused, and how the news of peace was carried in mad haste. It was apparent even in the days when Greek deities mingled in the combats of ordinary men that tidings must take two

forms—the initial bulletin and the more complete document of explanation; so after the invaders had sacked the palace of old Priam and Hephæstus had shot the spark from Mount Ida, Agamemnon dispatched his official herald to Argos with more details of how he reaped “the harvest of all bliss from Troy.” And it was true in quasi-mythology as it is today that the initial bulletin carried by the blazing beacons merely whetted appetites for the more complete, interpretive account.

There has remained throughout history this division in the conveying of mass intelligence. Peoples have demanded the quickest possible flash of an important event, and a more complete report as soon as it could be transmitted in a manner that would make it comprehensive. That is why the modern newspaper frequently posts bulletins of the news in its window, or announces the result of an election by a signal light from its tower. For even the modern newspaper involves some mechanical delay and with the advancement of civilization speed has become an increasingly important factor.



COMMUNICATIONS— the transmission of information from point to point—received ever increasing acceleration with the coming and development of the telegraph, the telephone and the radio. These are the modern counterparts of the beacon lights of yore, although in our more complex civilization, none serves the exact communications function of another.

But when nations began to appear, with requirements for quickly transmitted intelligence over wider and wider areas, mankind lost something of its close touch with the leader. The royal proclamation, read by the herald or posted in the village, was very different from the voice of the chief out under the stars before the tribal campfire. That personal contact of the voice, with its warmth and understanding, is something after the passing of these many centuries which the people have just regained. Vastly increased distances and vastly larger populations can no longer shut it out.

So radio has not only given and replaced. It has restored.

OF THE many inventions and discoveries that came to the world with field half-revealed and half-concealed, probably the most striking was radio. When the Radio Corporation of America began its work in 1920, it was with the aim of conducting an American wireless communications service across the oceans and from ship to shore.



California or bust!

In the two decades of radio that had preceded, marine and international telegraphy seemed the greatest promise from the new art.

The corporation was formed to develop an industry and to create entirely new services, which was accomplished by mobilizing patents adversely owned by unassociated American companies. It early obtained as its heritage the work of the great Marconi, by acquiring the British holdings in the American Marconi Company.

None could foresee at that time what lay just ahead. With the patent deadlock broken, the radio industry suddenly was unloosened.

So suddenly, in fact, sped its transformation that public bewilderment was one of the first consequences.

Out of the vastness of the air had come, one night, the strains of music and the clear word of a human voice. It was one of those verities of history that seemingly trespass upon the realms of fancy. Dr. Frank Conrad of Westinghouse was conducting experiments in radio telephony between his laboratory and his home in Pittsburgh. His work was attracting the attention of the handful of radio amateurs who had built receiving apparatus after the Government removed its war time restrictions. They wrote him letters and sent him Victrola records, and his response in those days of 1920 marked the birth of the American art of broadcasting.



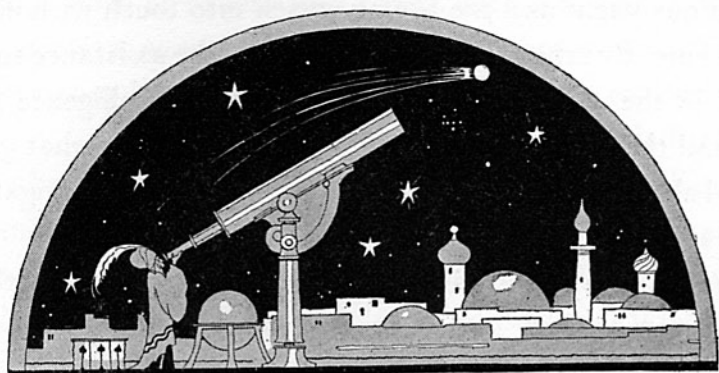
IN THE field of public entertainment, radio found the small towns and hamlets of the country still dependent largely upon their own resources, with much of the talent, as quickly as it developed, moving off to the city. There was the age-old solitude of evenings on the isolated farms, the lonesomeness and detachment that tended to drive men inward, closer to their own concerns, farther from common interests and common aspirations such as mark cultural and social progress—farther from the tribal discussion about the campfire.

To millions of people the capital of the Nation seemed ever so remote, the affairs of government ever so complex. Public opinion a century ago was a dull, phlegmatic force, stirred only by extreme crises. Even a generation past it moved slowly. Today it is brisk and vital. As a forerunner to the explanation and analysis of the press, radio has made its millions of patrons almost a part of the outstanding events of their times. The great political conventions, the Presidential campaigns, international conferences, religious gatherings, forums of informed expression, discussion of current topics, most of everything we really want to hear, are carried to the fireside. It might be said that we need fear no future revolutions, with our modern newspapers and radio. Public

opinion is too thoroughly informed on the one hand, and response to public demand comes too swiftly on the other.

Ten years ago the affairs, entertainments, education and the customs of city and countryside were yet far apart. Now a distant school-boy, listening-in on the inauguration of a President, can detect a "constitutional error" by the Chief Justice of the United States. The great compositions of the classicists—Schubert, Mozart, Liszt—were known to a favored few among the mass of our population. Many lives were denied almost entirely the inspiration and charm that no art can give save music.

To navigation, to communications, to aviation, and to many other occupations of man, radio has bestowed in large bounty. It is difficult to measure the fullness of its gifts. But if it had made no contribution during the decade of its major development other than that of touching the lives of the people more frequently with the grace and sweetness of music, its value still might be regarded as inestimable.





For twenty centuries the lighthouse was the mariner's warning of the shore

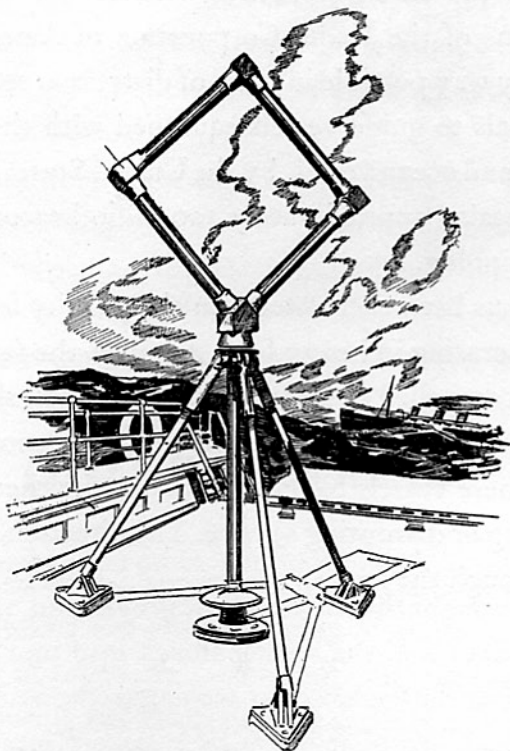
MARINE RADIO

THE WORLD knows the story of how radio ended forever the silence of the sea; how it brought the transatlantic greyhound, the tramp steamer, the luxurious yacht and the fishing smack into touch with each other and the shore. But the exchange of messages, the assistance to business involved in the ability of masters to transmit intelligence from the bridge, and the satisfaction to passengers in knowing what goes on in the world about them, do not spell the principal gift to navigation from this new art.

Needless to say, radio is even more vital to those who ply the oceans than to those who share its benefits and pleasures on shore. A contribution to its marine work of surpassing value is the radio direction finder, a simple device which enables a vessel to determine its exact position by noting the direction from which two or more radio signals come.

Undoubtedly the direction finder is the greatest aid to navigation since the mariners' compass found its way westward out of China, bringing with it that era of exploration that led to the discovery of the New World. By December, 1926, the Radiomarine Corporation, an RCA

subsidiary, had installed the direction finder on 269 ships. This total had been increased to 578 by December of last year. New installations are fast being made. Under ordinary conditions the device permits the taking of accurate bearings on radio transmitters at distances up to 200 miles.



The modest-appearing radio direction finder is one of the greatest aids to navigation in the annals of time

For some two score centuries the navigator approaching shore relied upon the lighthouses as his guide, and for two centuries fog guns, bells and sirens have been his assistance in foggy weather, but all these have been crude improvisations indeed compared with the positive bearings provided by the radio direction finder on shipboard, working in conjunction with radio beacons along the shores.

Prior to the development of the direction finder, the mariner ascertained his position at sea by astronomical observations, but as this was impossible in foggy or cloudy weather, he was called upon much of

the time to sail his vessel by dead reckoning. No accurate allowance could be made for the drifts from ocean currents, and the skipper's first task with the clearing of the skies was to take his bearings and learn his whereabouts. Now as long as he is within range of the shore radio beacons he need not be in doubt. The value of the radio direction finder has been evidenced strikingly in sea disasters.

The stations of the Radio Corporation of America have always assisted in every way possible in cases of distress at sea.

Radio signals to guide vessels equipped with the direction finder are sent to lake and ocean vessels by the United States Lighthouse Service, which maintains approximately 100 radio beacon stations for the protection of shipping.

Difficulty has been encountered in the past by ferry boats in New York harbor operating in heavy fogs. At times the ferries have drifted and have been compelled to search blindly for their slips. Experiments conducted by the Radiomarine Corporation on five-meter wave lengths have enabled these vessels to find their slip on either side of the river without delaying or disrupting service. The direction finder gives them a direct line through the fog.



AT CHATHAM, Massachusetts, the Radio Corporation of America has constructed the most complete marine communications station in the world and equipped it with long and short wave tube transmitting and receiving sets, which easily maintain contact with ships having similar equipment during their complete crossing of the Atlantic. A similar station at San Francisco enables vessels to communicate with continental America from the far reaches of the Pacific. The introduction of short wave marine radio has opened new vistas to the maritime world. Short wave signals travel readily more than a thousand miles, and the old intermediate ship relays are not necessary. A thousand miles has really become a short distance for marine radio communications. World cruising ships have kept in daily contact with American stations on the

entire circumnavigation of the globe. In half an hour's time, recently, the Chatham station talked with the S.S. Resolute, in Bombay harbor, and with the Byrd expedition returning to Australia from the Antarctic.

Ocean travel has changed notably within the ten years due to radio. The traveler may retain easy contact with home or business affairs, and that he does so is evidenced by the increasing volume of radiograms sent to and from ship stations. Large liners handle more than 1,000 radiograms on a single round trip, in addition to the routine ship's business of thousands of words.

The Radiomarine Corporation broadcasts each night a complete press report to more than 100 vessels. This service has become much more comprehensive than the short bulletins dispatched by radio a decade ago. With the cooperation of the United States Public Health Service, RCA has provided a free medical service to ships at sea that do not number a physician among their officers. Undoubtedly many lives have been saved by the medical advice and prescriptions thus made so speedily available.

For the past year four or five of the largest trans-atlantic lines have been supplied with a general market report by wireless. A complete service including not only the filing of quotations, but also the prompt handling of orders and confirmations, was started on several ships last year. During the sharp market activity of last autumn, quotations were posted direct from the Stock Exchange in two minutes, although tickers in New York were running two hours behind.

RCA has just inaugurated the first facsimile radio service from shore to ship, transmitting as the initial bulletin a message to the passengers of the S.S. "America" from President Hoover, written by the President in longhand.

Facsimile communication with the S.S. America indicates that in the near future transmission of a complete daily newspaper will be possible, so that passengers on shipboard will have news as complete and comprehensive as do persons on shore. This service also is to be extended for the transmission of complete weather maps to ships at sea. The availability of the weather map will be another real aid to navigation.

OF MORE than passing moment to all owners of radio receiving sets has been the work of RCA in converting apparatus on several hundred merchant vessels from the old spark type to modern tube equipment. If you were an early listener-in on the radio, at about the time distance was the greatest prize one could seek and when chain programs were a novelty, you will recall the interference caused by ships at sea. It was



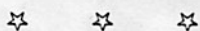
Lone wandering but not lost

especially provoking along the Eastern coast, and vessels sailing the Gulf of Mexico frequently marred programs for auditors as far away as Washington.

This has been corrected, as radio auditors know. More than 900 vessels covered by RCA contracts have been outfitted with the continuous-wave vacuum-tube transmitter, with its non interfering, highly efficient operation. This transition has meant that a handful of land stations today handle several times the amount of traffic that formerly occupied the attention of several dozen stations. Possessing a greatly increased range, this new equipment has reduced to a minimum the troublesome, time-consuming and costly relaying of radiograms from ship to ship over a distance of several hundred miles, and the static infested waters of the tropics have lost their terrors. Ten years ago radio

in those torrid regions could cover little more distance than the distress rockets of the shipping of yesterday. Continuous wave signals mean that a number of channels may be utilized where one formerly existed. One of radio's major problems continues to be the limited number of available channels.

In quite another field has there been real marine-radio progress. The radio telephone connecting the Leviathan with the shore has proved so useful and dependable that the service is to be extended to other ships. Although the Leviathan telephone is operated simultaneously with the regular message communications service and with the stock reports, reception of the human voice compares favorably with land line telephone reception. The service has been popular with passengers.

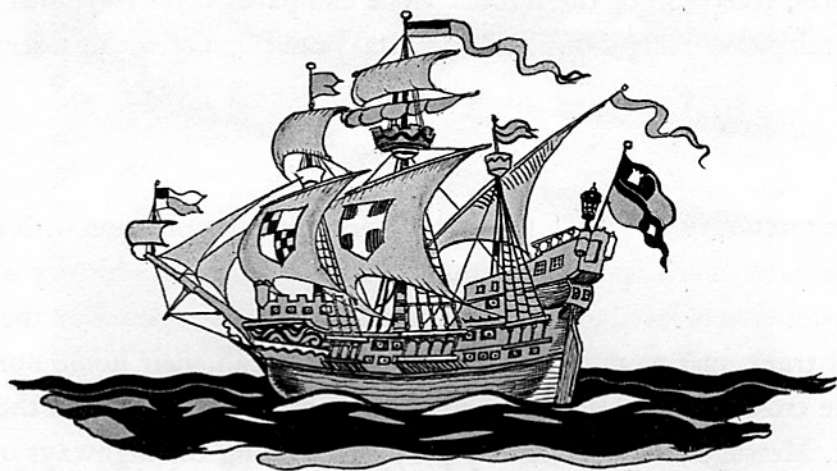


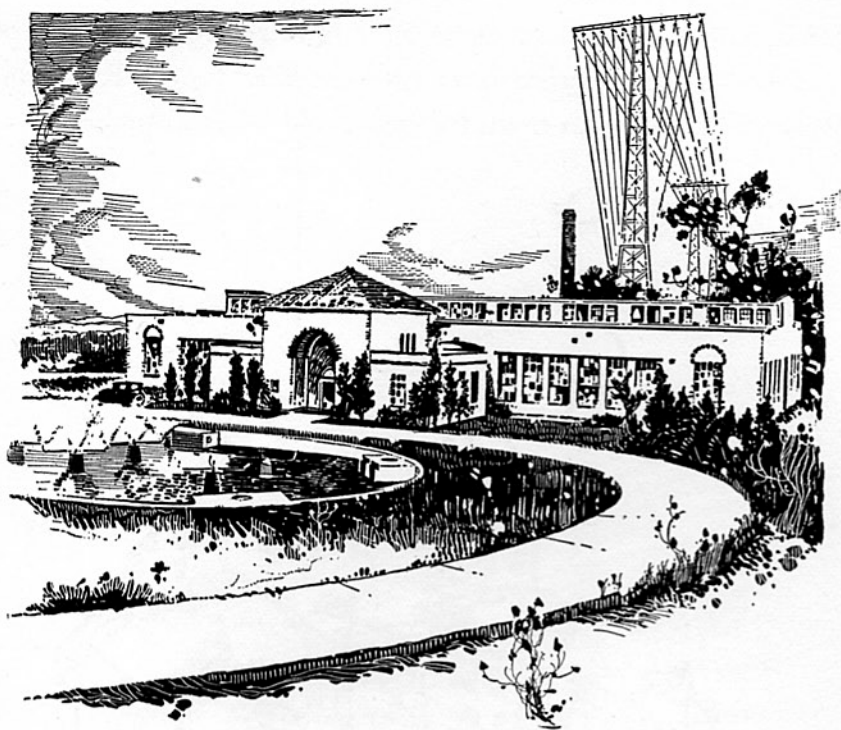
THE CHARACTERISTICS of radio that permit communication with moving objects mark one of the great forward steps in the history of the transmission of intelligence. We look ahead to the telephone on the railroad train, just as now travelers are able to call their home number while crossing the Atlantic. The airplane operator talks with the airport. Messages may be sent by passengers riding the highways of the sky.

As far back as 1925 the Radio Corporation was supplying through its coastal stations assistance to aviators on ocean-going attempts, in securing for the United States Weather Bureau last minute reports from vessels in various parts of the ocean. This assistance was provided without charge. It was but one small indication of how radio might help in the conquest of the air.

Work has been carried forward constantly by the companies associated in the radio group to give radio the fullest possible service for aviation. Radio equipment for airplanes and airport stations has been built under specifications of the Radio Corporation of America. Several model receiving sets have been developed and combination telephone and telegraph transmitters for airport use are being manufactured.

Beacon receivers designed to permit pilots to receive weather reports and to follow beacon courses have been installed by the Radiomarine Corporation on many air-mail, transport and other airplanes.





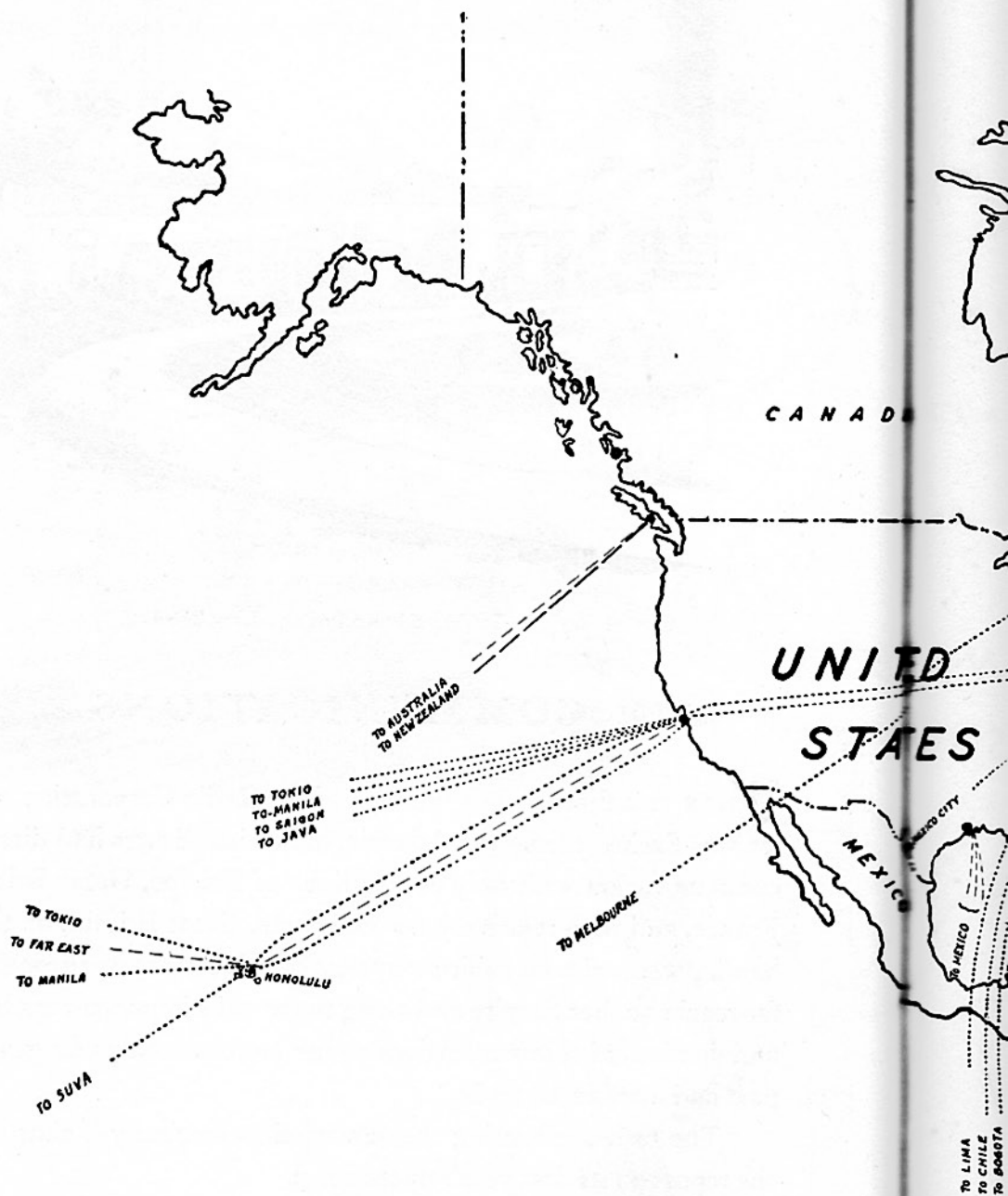
Radio Central at Rocky Point, Long Island

COMMUNICATIONS

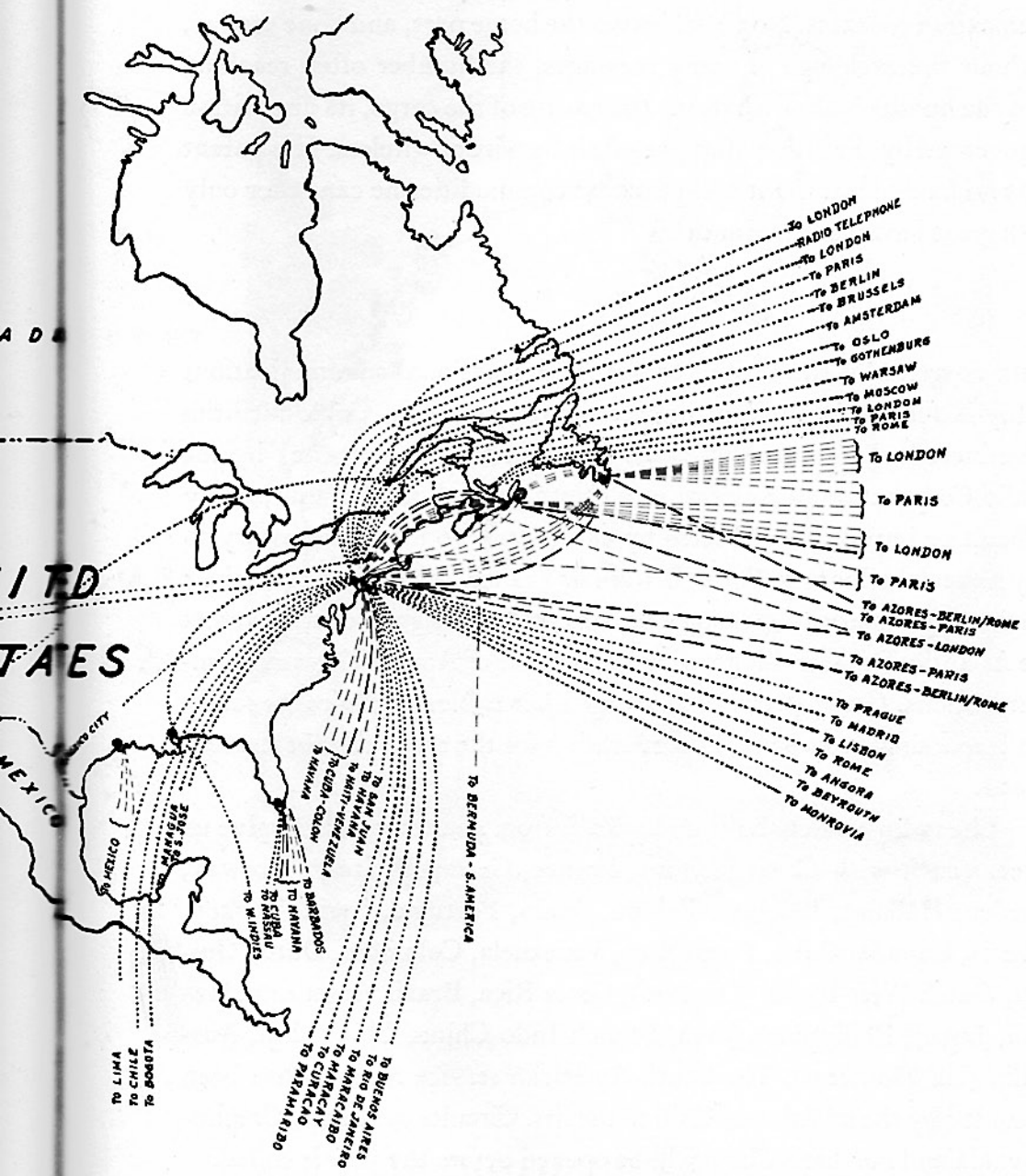
WHEN THE first wireless message of the Radio Corporation of America was flashed across the Atlantic, the United States had direct cable communication with only two nations of Europe, Great Britain and France, and with relatively few elsewhere. Great Britain, on the other hand, possessed a magnificent system of cable contacts throughout the far reaches of her Empire and along the world's important trade routes, and dominated communications as her merchant ships for generations past had dominated trade.

The task confronting the new wireless company is thus stated in the report on its first year's operations:

"WHEN it is considered that trans-oceanic wireless communication is practically a new art and that everything in the organization, from the messenger boy up, had to be found—created, as it were—and that the staff which took over the stations from the United States Government on the day set for the



Comparison of
 International Communication Services
 1920 and 1930



LEGEND

- Cables in Operation in 1920
- - - Cables Laid Since 1920
- Radio Circuits Opened Since 1920

transfer had no opportunity to rehearse the many duties connected with such a huge undertaking, it is remarkable that it could be done; but it was done and the service has continued to this day practically without interruption."

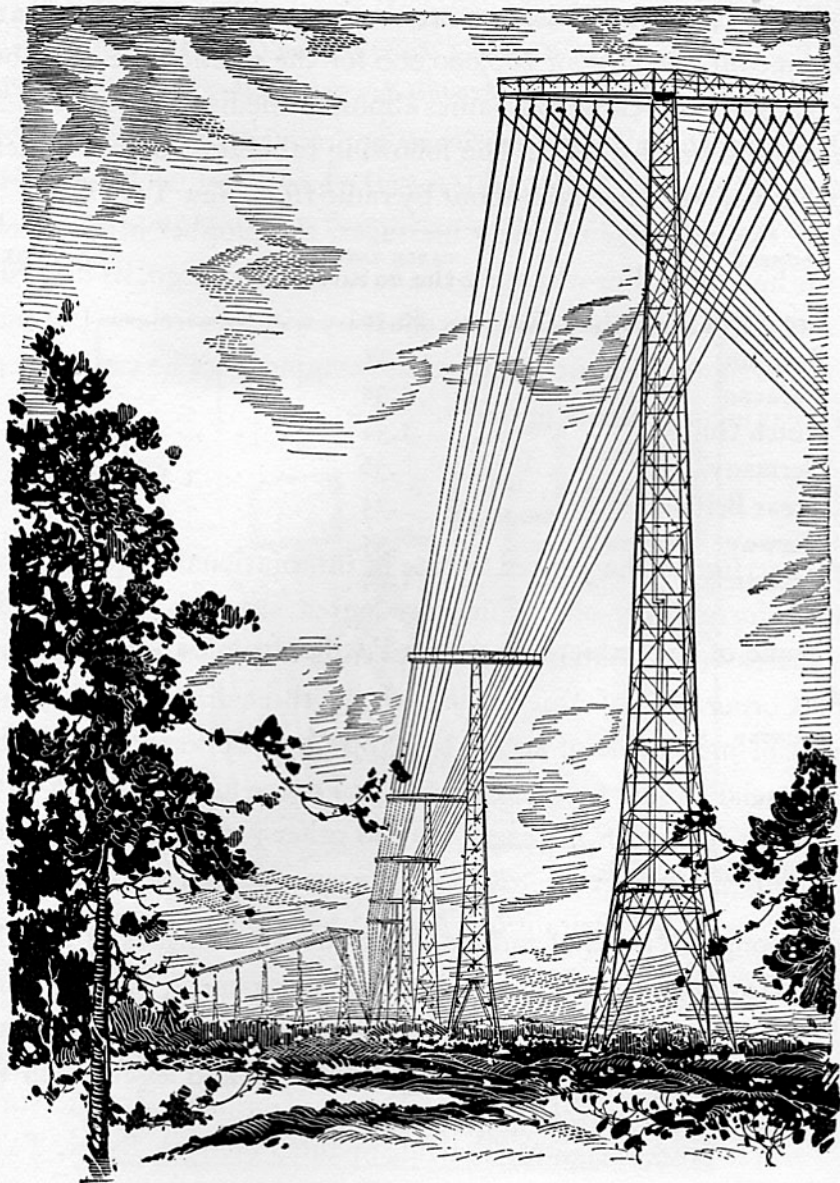
Ten years have given America an appreciation of the value of communication contacts. No vessel leaves the home port, and none arrives, without the exchange of many messages, the number often reaching into the hundreds. For whatever the nature of the cargo, its disposition is governed by the orders that precede it by wire or wireless. It is patent that no foreign merchant will purchase commodities he can order only with great inconvenience or delay.



THE POSITION of the United States in international communications today is fortunately one of unprecedented strength. Cable facilities have increased. A system of radio circuits has been extended by the Radio Corporation of America into thirty-three different lands, many difficult or impossible of access by cable. It is no longer necessary to pay financial tribute to Great Britain or France for continuing to their destination American messages sent to other foreign countries across the Atlantic. To meet this growing importance of America in world communications, Great Britain has merged her cables and wireless facilities into a single company, in preparation for the trade contest she sees ahead.

The radio services built up by RCA from year to year now give us direct touch with Great Britain, France, Germany, Italy, Norway, Sweden, Holland, Belgium, Poland, Spain, Portugal, Syria, Turkey, Liberia, Canada, Cuba, Porto Rico, Venezuela, Colombia, Dutch Guiana, Dutch West Indies (Curacao), Costa Rica, Brazil, Argentina, Hawaii, Japan, Philippines, Java, French Indo-China, China, Fiji, Australia (via Montreal). The South American service recently has been extended by the addition of Chili to the list. Circuits to Russia, Czechoslovakia and northern China will be opened before the year is ended.

The volume of radio messages has increased annually, as shown by the following figures:



Sentinels of a new era.

YEAR	NUMBER OF PAID WORDS HANDLED	YEAR	NUMBER OF PAID WORDS HANDLED
1920	7,000,000	1925	33,000,000
1921	17,000,000	1926	36,000,000
1922	22,000,000	1927	38,000,000
1923	27,000,000	1928	45,000,000
1924	32,000,000	1929	58,000,000

Radio contributed cheaper rates to international communications. It has meant a saving of \$60,000,000 for the public here and abroad. The trans-oceanic cable companies almost immediately met the reduced rates established by RCA. The following tabulation shows typical reductions per word brought about by radio from New York City:

COUNTRY	CABLE RATES PRIOR TO RADIO	PRESENT RATES
Argentina	\$0.50	\$0.42
Belgium . . . . .	.25	.23
Curacao	1.38	.46
Dutch Guiana	1.38	.46
Germany . . . . .	.36	.25
Great Britain . . . . .	.25	.20
Norway . . . . .	.35	.24
Venezuela	1.00	.60

Some of the reductions on the Pacific, from San Francisco, have been:

COUNTRY	CABLE RATES PRIOR TO RADIO	PRESENT RATES
China	\$0.88	\$0.75
Japan	1.21	.67
Philippine Islands . . . . .	.72	.53

Among the users of radio are various departments of the United States Government, press associations, newspapers, leading financial and business houses, shipping firms, importers and exporters. Radio is employed extensively by the foreign embassies and legations in Washington for reports to their home governments.



To THE inland nations of Europe peculiarly radio has meant speed. Radio messages go to their destination directly as well on land as on sea. Since the development of radio, the cables have been speeded up and it would be unfair to indicate that radio always comes in ahead. Nevertheless, it is true that speed, as well as economy, has been one of its contributions in trans-oceanic communications.

The Radio Corporation of America has constantly expanded its facilities to better its service and anticipate increased demands. A communications staff of a handful of young men in 1920 has grown into an organization of 1,100 persons, with an annual payroll of over \$2,000,000. At the present moment, no foreign nation possesses an international radio service comparable in completeness to that maintained by this organization.



The sending and receiving room of R C A Communications, Inc.,
on Broad Street, New York

A MAJOR contribution of RCA's engineers has been the development of "diversity reception," a solution for the fading of short wave signals. In international communications, fading was even more irritating than it is now in broadcast reception. It was found that fading did

not occur simultaneously in different localities, and "diversity reception" consists of three antennæ at the points of a triangle, the three towers being 1,000 feet apart. Connecting the three antennæ is a device which skilfully merges the three receptions of the short waves from abroad and brings the combined signals to the receiving operator.

The value of this development is not limited to the patrons of the radio for international communications. It has made possible at last, as was first evidenced on Christmas Day, 1929, the successful broadcasting of European radio programs. Prior to "diversity reception" no broadcaster could be sure that a program from Europe would come through at the hour and in the manner required.

What the international broadcasting of radio programs promises in promoting that universal understanding toward which all nations look with hope may be judged from the manner in which radio has served to destroy our own provincialism.

RCA engineers have also made a real contribution by their development of an economical method of directional transmission, replacing the elaborate and expensive super-structure required by the earlier "beam."

Those active in radio communications believe their task is really just beginning. The Radio Corporation of America has spent millions of dollars on research and development in the field of international communications. It has spent more than a million dollars on facsimile reproduction, and it must keep on spending because the present stage of development promises so much for the future. Pictures and messages are now transmitted in the United States and abroad by facsimile. And it is interesting to learn that we are not alone in this endeavor. Facsimile services are being established rapidly by some of the other nations.

SOUND PICTURES

IT IS ONE of the genuine wonders that the prodigy of the sciences yields itself to such diversified employments, and stamps its influence on industries that long since seemed rigidly matured.

Thus it occurred that radio, a business founded to send radio-grams to ships on the ocean lanes and to nations across the seas, discovered in its research laboratories the beginning of the great development of speech and entertainment broadcasting.

Adaptations of these discoveries created the new art of electrically recording sound. The phonograph record business became revolutionized in a day. Parallel applications of these discoveries to reproducing apparatus provided the means of obtaining the full value in reproduction of the greatly improved qualities in recording.

With amplification by electrical means, it was now possible to fill auditoriums and theatres with balanced reproduction of pleasing quality and since radio progress had further made possible the perfect synchronization of recorded sound on the motion picture film, the dreams of producing audible pictures became commercially practical for the first time.

And thereby scientific development spread out a new highway of opportunity before the motion picture industry, which had appeared to have neared the end of its technical progress. The silent drama had been given new inspiration and new life. It found its opportunities in the field of public entertainment tremendously expanded. Revitalized as it is, this industry may now look for wider fields of service, and these are appearing. The possibilities of visual and aural education, extended to the schools, are just being explored, and it is not the prediction of a visionary to venture that much more practical and effective methods of instruction eventually will have universal adoption.



WHAT ARE some of the present results of talking motion pictures? It is said that 10,000,000 persons have been added to the weekly motion

picture audience by them alone, and it is certain that producers have virtually remade the industry to meet this one development. New plays are demanded, new music, new equipment. And it should be remembered that almost everything up to the present has been carried on while the industry was learning the consequences of this new application of radio. We may anticipate that the experience gained during the brief period of the studio use of sound will lead to better and more artistic workmanship, better recording and more faithful reproduction. To aid the motion picture industry in keeping abreast with developments, RCA Photophone, Inc. is establishing a projection theatre in Hollywood, where exhibitors may be shown immediately the products of the scientific workshops.

In the early part of 1928 the Radio Corporation of America and associated companies organized the Photophone subsidiary to make use of the methods developed within the associated organizations of creating talking moving pictures. Two methods of synchronizing sound with picture have evolved up to the present stage of talking movies—the sound-on-film and the disc record systems.

Developments in both these methods have been accomplished by RCA Photophone, Inc., and its associated organizations.

To this Company was assigned the mission of distributing sound recording apparatus and equipment for the reproduction of sound synchronized with motion pictures.

One of the first major producing organizations to adopt the Photophone System of sound recording was the Radio-Keith-Orpheum Corporation, which owns and operates vaudeville and sound motion picture theatres in many cities, in addition to its great production studios at Hollywood, Calif. Its products are distributed under the name of Radio-Pictures. The Radio Corporation of America owns a minority stock interest in the Radio-Keith-Orpheum Corporation.

Rapidly the development of production technique is creating better sound pictures, and again looking forward one may confidently expect that greater developments from radio progress are in store.

RESEARCH, ENGINEERING AND MANUFACTURING

IT HAS been the conviction of the Radio Corporation of America that as radio entered into the lanes of human endeavor to meet the rigors of competition with more seasoned servants of mankind, it should not forget its birthright of the laboratory, nor should the home of modern research regard with too much satisfaction and complacency the accomplishments of its vigorous child.

Throughout the years of its activity this company has held the development of radio its primary aim. The vastness of space is open to all who can employ it for the progress of humanity and in its expanse and unknown qualities may repose many more closely veiled secrets awaiting the scientist, the inventor and the engineer. To seek them is the obligation of any radio manufacturing organization concerned with more than the expediency of the present.

Nobody can be certain what portion of the radio art remains ahead, but all can be sure that the labors of the past have yielded such a splendid harvest of achievement that no seed should be left unplanted; and from the intensive nature of radio research being conducted throughout the world today it is apparent that the best of American ingenuity and inventive genius must be exercised if the Nation is to retain its favorable position in the conquest of this elusive force of nature.

Much of the laboratory research being carried on at present is to make practical what already has been discovered, and what in itself holds out the picture of a complete reorganization of existing methods. When television comes to the stage of general usefulness we may anticipate a new industry arising on the foundation of the old. Facsimile reproduction in a practical sense is already in every day use.

Research has been conducted constantly to improve the quality of radio broadcast and the sensitiveness and selectivity of receiving sets. One of the major manufacturing steps in the history of the Radio Corporation of America was taken with the coming of the present year.

The close association between the radio and the talking machine industries was early apparent. Plans were carried out for the manufacture of combination radios and talking machines. The association resulted eventually in a negotiation by which the Radio Corporation of America acquired the Victor Talking Machine Company, and on January 1, 1930, the RCA-Victor Company was created.

Activities of the Radio Corporation of America, General Electric and Westinghouse in the vacuum tube field similarly have been taken over by the new RCA-Radiotron Company, which has its laboratories situated at Harrison, New Jersey, and which possesses five factories, two in Cleveland and one each in Harrison, Newark and Indianapolis.



SUBSEQUENT to the organization of RCA-Victor and RCA-Radiotron, stockholders of the Radio Corporation of America authorized an increase in the capital stock to consummate a unification of activities and acquire full control of these two companies, and of the National Broadcasting Company, and RCA Photophone, Inc., in which ownership had been shared with General Electric and Westinghouse.

Prior to this program of unification, RCA had using and selling rights under patents of the Radio Group, manufacturing rights being owned by General Electric and Westinghouse. The increase in the capital stock permitted the acquisition of licenses, with certain reservations, under General Electric and Westinghouse patents, to manufacture the radio apparatus used and sold by the RCA and its subsidiaries. In addition, it enabled the acquisition of real estate, factories and manufacturing facilities from these two parent companies.

The tangible assets and manufacturing rights obtained from General Electric and Westinghouse were paid for in shares of common stock of the Radio Corporation of America. The result of this reorganization is that RCA takes its place, through its subsidiaries, as a manufacturing organization, rather than as a mere selling organization marketing the radio apparatus built by General Electric and Westing-

house, as it has been heretofore. The unification paves the way for greater efficiency and economy. It permits the consolidation of manufacturing, and the union of technical and research work that should give new impetus to radio development and provide radio devices at a lower cost.



R. C. A. INSTITUTES

THE LEVEL to which an industry rises is determined by the ability and training of its personnel. Great discoveries of the scientist reach the general public through the manufacturer, whose success is measured by the skill of his workers. Beyond the manufacturer of a widely accepted product must be a vast organization for service.

Because of the rapidity with which the radio industry attained its enormous size, the problem of providing trained operators, engineers, mechanics and artisans required constant attention. The coming of sound pictures called for other experts. Someone must now be schooling men in television, in order that manufacturers may build their staffs and dealers may obtain their service men when it comes.

R.C.A. Institutes, Inc., conducted by the Radio Corporation of America, has undertaken throughout the growth of the industry to train young men for responsible work in the various fields of radio. Its graduates are aboard vessels sailing the seven seas. They operate broadcasting stations, service transmission stations and radio receiving sets, install apparatus and carry on the radio communications that unite the world by invisible strands.

In addition to the large institution maintained in New York, R.C.A. Institutes conducts a home study course for individuals in all parts of the country. Most of the students of the Institute, of whom thousands have been graduated, have had no previous technical training in radio, and perhaps most of them would have followed other vocations had not the opportunity for instruction been open to them.

The school is conducted primarily as a service to the radio industry. Dealers and service men are instructed in all radio receiving sets they are likely to encounter when they begin their contact with the public. Training is not restricted to apparatus of the Radio Corporation of America. The standing attained by this school and the record of its graduates in the development of the industry, attest the nature of its mission and its value to radio.



BROADCASTING

THROUGHOUT the history of the broadcasting art the Radio Corporation of America has held as a primary objective the promotion and encouragement of radio programs of the highest artistic quality, educational value and wide-spread public interest.

Sound policy would permit no other course. RCA has been engaged in the sale of radio receiving sets. Its licensees have been engaged in the sale of competitive sets. Obviously radio could not become a great public force nor could there be a wide-spread market for apparatus if it should be perverted to selfish or partisan ends, and so the organizations earliest interested sought to devote it to the public advantage. The art was scarcely underway when its Pittsburgh sponsors perceived an opportunity for public service, and seized it. The returns of the election of President Harding in 1920 were sent out on the day of the opening of the station that received the call letters KDKA. The election results were heard by a few thousand listeners, most of whom must have realized that they were participating in an epochal event.

In one of the lectures before the Harvard Graduate School of Business Administration, H. P. Davis, Vice President of Westinghouse,

who had given Dr. Conrad the cooperation of the company, explained the beginning of broadcast.

"As a matter of historical record and sequence in the origin and progress of radio broadcasting as a public service," said he, "the following chronicle of events is important:

"After a period of testing and experimental operation, the Westinghouse Electric and Manufacturing Company on November 2, 1920, at East Pittsburgh, Pennsylvania, put the first broadcasting station in the world, now known as KDKA, into operation, and transmitted as its first program the returns of the Harding presidential election. Following this, a daily program from 8:30 to 9:30 p.m. was immediately instituted. The daily schedule of the station has been continued without interruption up to the present time.

"After nine months of continuous operation of station KDKA, the Westinghouse Company opened WBZ at Springfield, Massachusetts, in September, 1921, followed on October 12, 1921, by WJZ at Newark, New Jersey, and on November 11, 1921, by KYW at Chicago, Illinois.

"It was not until the summer of the next year that any other stations of prominence were placed into operation, and very few then, as it was a considerable time later that the great rush for wave lengths took place . . ."



TO TELL the story of the growth of radio broadcasting would be to repeat what everyone already knows. By 1924 broadcasting already had accomplished a great many things, and the principle of public service remained. The attitude of the Radio Corporation of America with respect to this new use of wireless was set forth in the annual statement to stockholders at the close of that year. The report said:

"BELIEVING that a company serves its stockholders best that serves the public best, your Corporation has continued to expand and improve its broadcast facilities.

"SINCE THE establishment of the printed newspaper, nothing has had so profound an effect on communication as radio broadcasting.

"IN YOUR NEW laboratories we are at work constantly, not merely upon improvements in receiving sets . . . but upon improvements in the quality and character of broadcasting itself . . . As yet, a national program is an occasional, rather than a continuous feature of broadcasting. In the effort for improvement and ultimate stabilization of broadcasting upon a high, artistic and educational plane, your Corporation is taking a prominent part."



"The awakening of this mighty colossus —
asleep since the beginning of time."

In 1926 the Radio Corporation of America organized the National Broadcasting Company. Undoubtedly every home that possesses a radio set knows the service of this broadcasting organization and its attentiveness to the question of giving to radio its full public value.

It is of interest, however, to recall the nature and purpose of this agency for mass information as contained in the original announcement of its creation, issued in November, 1926:

- "THE MARKET for receiving sets in the future will be determined largely by the quantity and quality of the programs broadcast.*
- "WE SAY quantity because they must be diversified enough so that some of them will appeal to all possible listeners.*
- "WE SAY quality because each program must be the best of its kind. If that ideal were to be reached, no home in the United States could afford to be without a radio receiving set . . .*
- "ANY USE of radio transmission which causes the public to feel that the quality of the programs is not the highest, that the use of radio is not the broadest and best use in the public interest, that it is used for political advantage or selfish power, will be detrimental to the public interest in radio, and therefore to the Radio Corporation of America . . .*
- "THE RADIO CORPORATION OF AMERICA is not in any sense seeking a monopoly of the air. That would be a liability rather than an asset. It is seeking, however, to provide machinery which will insure a national distribution of national programs, and a wider distribution of programs of the highest quality.*
- "IF OTHERS will engage in this business the Radio Corporation of America will welcome their action, whether it be cooperative or competitive.*
- "IF OTHER radio manufacturing companies, competitors of the Radio Corporation of America, wish to use the facilities of the National Broadcasting Company for the purpose of making known to the public their receiving sets, they may do so on the same terms as accorded other clients.*
- "THE NECESSITY of providing adequate broadcasting is apparent. The problem of finding the best means of doing it is yet experimental. The Radio Corporation of America is making the experiment in the interest of the art and the furtherance of the industry."*



CONTRARY to the belief of some, the National Broadcasting Company does not operate a large chain of radio stations over the country. It supplies material to independent stations, which take the service at their own desire. Part of the material is provided to the subscribing stations without charge. For part of it the National Broadcasting Company pays the stations. Some features are paid for by the subscribing stations.

To guide the company in its effort to perform a public service, an advisory committee consisting of some of the leading men of the country and including among its members spokesmen for the church, organized labor, the law and other American institutions assists in the shaping of its policies.

In 1929 the National Broadcasting Company served 73 stations linked together by 32,500 miles of wire, which meant that virtually the entire population of the United States could be entertained or informed by one program in the same hour. Within the year the President of the United States spoke thirteen times through this national network, which carried also twenty-seven addresses by Cabinet members, and forty by members of the Senate and the House of Representatives.

And as evidence that the National Broadcasting Company reaches the public ear and arouses the public interest, its mail last year contained 1,000,000 letters from its patrons in the homes of the country.



ENTERTAINMENT AND CULTURAL CENTER

HOW IMPORTANT radio has become to the cultural progress of the nation is disclosed by plans for a great institutional center in New York devoted to the arts encompassed by radio progress.

A business and residential area three blocks square, in the heart of the city, is to be transformed into a community of sound and vision, where outstanding musical and dramatic events may be created on a grand scale, and from which they may be disseminated upon a national and world-wide basis.

Radio is to have a definite home, close by its allies in the fields of education and entertainment. The talking moving pictures, musical comedy, the drama—television, perhaps—will be there. Thus radio will be given a new reservoir of talent, and the artist who at a future date steps upon the variety stage will appear before a national audience.

The Radio Corporation of America and its subsidiary companies in the fields of entertainment and education will occupy the radio city as the lessees of the series of studios, theatres and business offices. Negotiations leading to the relationship of RCA to the development were concluded between the President of the Corporation and a representative of the John D. Rockefeller, Jr., interests, which will finance the project. It is estimated by building authorities that the development will involve an investment of more than \$250,000,000.

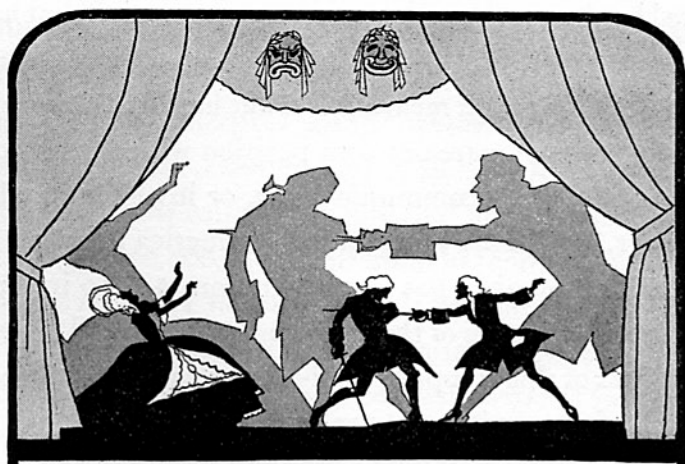
On the site fronting for three blocks on Fifth Avenue, between 48th and 51st Streets, will arise a complete architectural unit that will include four great theatres devoted respectively to a new conception of variety entertainment, sound motion pictures, musical comedy and dramatic productions.

Twenty-seven broadcasting studios, some of three stories in height, will be built for the radiation of music, entertainment, education and current information. In the belief that television eventually may become as widely used as broadcasting, even though it may be a matter of

many years, the new studios will take it into full consideration. They will be built for tomorrow as well as for today. Office buildings in architectural harmony with the rest of the development will house the various organizations associated with the development of electrical communication and entertainment.

In addition to the four great theatres and the studios, more than a million square feet of office space will be leased by RCA, the National Broadcasting Company, and other RCA organizations.

Over the entire community will tower a magnificent sixty-story office building in which the broadcasting studios and the executive offices of RCA will be located. Streets will be widened, subterranean bus and motor terminals will be constructed, underground boulevards will be built and an enormous parking tower will provide additional facilities for automobile parking. The community will give a new note to city planning and beautification and a new future to radio as a public servant.



CONCLUSION

ALL THAT has transpired in American radio within the last ten years cannot be attributed to any one individual, nor indeed, to any one company. It has been the fortunate opportunity of the Radio Corporation of America to lead in bringing about the great development that has marked this decade.

It is impossible to determine what would have happened in radio without the formation of this organization to break the patent deadlock. Perhaps we can gain some impression when we consider that although radio had then run a course of twenty-four years, in 1920 broadcasting was just being disclosed and only a scattering of crude receiving sets were being used over the country. It is estimated that in 1920 the value of equipment sold was about \$5,000,000. By 1929 it was reaching close toward \$1,000,000,000. Ten years ago there was no radio audience. Eight years ago the radio audience was estimated at 75,000. Today it numbers 50,000,000 men, women and children.

The people of the country profited by the creation of an organization that unloosened radio and gave it this first great impetus. They have profited by the continued labors of an organization that has treated radio as a moving force and invested with assurance in its future.

We can obtain a rough measure of what has been done with American radio when we compare our own position with that of foreign nations in broadcasting, in communications, or in the kindred developments of the art. The Radio Corporation of America is owned by 60,000 stockholders. The number has increased from 25,000 in April, 1929. Nothing is better evidence of the confidence of the small investor in the future usefulness of this company to the American public. Stockholders of R.C.A. reside in every State of the Union.

Those who have witnessed the growth of radio in the momentous decade of 1920-1930 must recognize how much has occurred in so short a time. It is the conviction of the Radio Corporation of America that few triumphs of science ever were given to the people more rapidly, and none with any more sincere effort to preserve a high level of public service.

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