
25 years of radio progress
with RCA

A QUARTER-CENTURY OF RADIO PROGRESS

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the first 25 years of RCA

A QUARTER-CENTURY OF RADIO PROGRESS

RADIO CORPORATION OF AMERICA

New York • *October, 1944*

25 HISTORIC ADVANCES IN RADIO

ACHIEVED BY RCA IN TWENTY-FIVE YEARS

INTERNATIONAL COMMUNICATIONS

Organized in 1919 primarily to give the United States pre-eminence in international radio communications, RCA accomplished that purpose through the creation of a world-wide system of more than 50 direct radiotelegraph circuits between the United States and foreign countries. Through research and engineering, pioneering has never stopped, with the result that the American communication channels operated by RCA have been improved continually in efficiency, and the service extended in peace and in war.

MARINE RADIO

Since its inception RCA has pioneered in the development, installation and operation of ship-and-shore radiotelegraph, radiotelephone, and direction finder equipment for all types of vessels. Approximately 80 per cent of the American Merchant Marine is equipped with RCA radio apparatus.

BROADCASTING

Pioneering in every phase of public broadcasting, RCA's first broadcasting station WDY went on the air in December 1921 at Aldene, N.J. In 1922, RCA set up a nation-wide sales and distribution system and began merchandising radio broadcast receivers and electron tubes for home use. Today 325 broadcasting stations in the United States use RCA transmitters while hundreds of others use RCA studio equipment, electron tubes and associate apparatus.

RADIO RECEIVERS

Radio sets for the home, styled in hundreds of models, have been developed by RCA since the advent of broadcasting, enabling the public to enjoy the latest improvements.

RADIOPHOTOS

Successful transmissions of radiophotos across the Atlantic were made by RCA on November 30, 1924 — the forerunner of direct radiophoto service now operated between the United States and seven countries. Transmissions of photographs, printed matter and weather maps were pioneered by RCA, which inaugurated the first commercial radiophoto-facsimile service between New York and London on April 30, 1926.

RADIO-PHONOGRAPH

Combining radio and the phonograph in 1925, RCA made "the talking machine" an ever-popular musical instrument. Modern phonograph technique — both for recording and for reproducing — is radio technique dependent upon electronic tubes and circuits. High-fidelity phonograph recording and a new process of electrical transcription created by RCA added perfection to the recording of music.

ALL-ELECTRIC RADIOS

The all-electric home receiver, utilizing the light socket as a source of current supply instead of batteries or external current-supply devices, was introduced in 1925 by RCA. The next major advance was the introduction of all-wave receivers which brought to the listening public a greatly increased horizon of radio reception.

RADIO-FACSIMILE

Receivers for recording radio-broadcast newspapers and other graphic material in the home were demonstrated by RCA in February, 1938, before the National Association of Broadcasters, Washington, D. C., and were in operation at the New York World's Fair, 1939-1940; in 1941, radio-facsimile multiplexed with FM-sound was demonstrated.

NETWORK BROADCASTING

America's first nation-wide public broadcasting service came into being when RCA formed the National Broadcasting Company on September 9, 1926, "to provide the best programs available for broadcasting in the United States."

OVERSEAS BROADCASTING

Experimental transmissions in relaying transatlantic broadcasts initiated by RCA in 1925 led to exchange of programs with Europe. In 1929, RCA inaugurated an international program transmission service which it has maintained as a regular and continued operation. Experimental international short-wave broadcasts begun by NBC in 1928 were forerunners of a regular program service introduced in 1937 between the United States and other countries.

SHORT-WAVE RECEPTION

Investigations by RCA engineers of the effect of sun spots upon short-wave propagation, and discovery of the simultaneous variation of the earth's magnetic disturbances led to the development of methods of forecasting the hourly and daily efficiency of short-wave transmission. The diversity reception system, which contributes to the stability and reliability of short-wave communication was introduced by RCA in 1928.

ELECTRONIC TELEVISION

The all-electronic television system, featuring the Iconoscope — "eye" of the radio camera — invented by Dr. V. K. Zworykin of RCA Laboratories, and the Kinescope — the picture tube of the receiving set —developed by him, became the practical and most popular method of television as a service to the home. Interlaced scanning was introduced to minimize flicker; fluorescent screen materials were developed; certain principles of the Schmidt-Kellner astronomical camera were applied and plastic lenses were developed to project television pictures on large home and theatre screens; and a new process was developed to reduce reflections on the glass surfaces of the Iconoscope and Kinescope.

MICROPHONES

As a pioneer in the development of microphones, RCA in 1932 perfected the velocity microphone used by broadcasting stations throughout the world, also in the recording of sound motion pictures and phonograph records.

RADIO RELAYS

Automatic, ultra-short wave radio relay stations designed to "bounce" television pictures as well as other forms of radio communication from city to city were demonstrated by RCA in 1932.

ULTRA-SHORT WAVE EQUIPMENT

Fundamental research in radio wave propagation and advance developments in electron tubes by RCA Laboratories opened the ultra-short and micro-wave spectrums for

new services. Ultra-short wave equipment for use by the police and in the emergency field was developed and its use initiated; quartz crystals were applied to control high-frequency transmitters.

ELECTRON TUBES

Numerous electron tubes for transmission and reception have been introduced by RCA as keys to major advances in radio; for example, alternating current tubes, screen-grid, pentode, and beam-power tubes, electron multipliers, photo tubes, the Orthicon (a highly sensitive television pick-up tube operated at low voltages), a "magic eye" tube (or visual tuning indicator), cathode-ray tubes and oscilloscopes. The "acorn" tube introduced in 1933 opened the way for remarkable advances in the use of ultra-short waves in peace and war. Development of miniature battery-operated tubes, together with miniature components, made possible the "personal" receiver of small size and easy portability. All-metal electron tubes introduced in 1935 facilitated the development of radios for airplanes and mobile units, as well as commercial and home-receivers.

PORTABLE RADIOS

Development by RCA-NBC of the knapsack transmitter and other portable instruments, including receivers, for use by announcers at sports events and parades were the forerunners of the wartime walkie-talkies and handie-talkies.

ALL-RADIO SYMPHONY

NBC Symphony Orchestra with Arturo Toscanini, conductor, was organized in 1937 as the first full-size symphony orchestra devoted exclusively to radio broadcasting.

ELECTRON MICROSCOPE

The RCA electron microscope — one of the most revolutionary scientific instruments of the Twentieth Century — magnifies infinitesimal objects of the sub-microscopic world and permits photographic enlargement up to 100,000 diameters.

RADAR

Basic research on radar instituted by RCA Laboratories as early as 1932 led to important wartime applications.

TELEVISION SERVICE

Television as a new industry and a public service to the home was introduced by RCA at the opening of the New York World's Fair, April 30, 1939, when President Roosevelt was televised as the first Chief Executive ever to be seen on the air. NBC television station W2XBS began tests July 7, 1930. After an extensive series of field

tests and experiments from various antenna sites including the top of the Empire State Building, the NBC station WNBT — New York's pioneer television station — began commercial operation on July 1, 1941. Theatre television on a 15 by 20-foot screen was demonstrated by RCA in January, 1941.

COLOR TELEVISION

Color television, produced entirely by electronic means, was demonstrated to the Federal Communications Commission by RCA at Camden, New Jersey, on February 6, 1940. Television in color was first put on the air by NBC from its Empire State Building transmitter on February 20, 1941.

FM BROADCASTING

Much of the research and development work that made FM (Frequency Modulation) possible was conducted by RCA engineers, who pioneered in exploring the very high radio frequencies and also in developing the apparatus which made these frequencies available for practical service. The NBC station W2XWG, which began operation on January 11, 1940, was the first FM station established in New York by any network broadcaster. FM transmitters for broadcasters were manufactured by RCA prior to the war, and RCA engineers also have made outstanding contributions to FM-broadcast reception.

RADIOTHERMICS

Radiothermics — the application of heat generated by radio waves — was pioneered by RCA, which designed and built equipment that speeds and increases the efficiency of various industrial processes, including the production of penicillin. Radio heat "cooks" plastics to molded perfection, seasons, glues and bonds impregnated materials, "tacks" plywood, dries rayon, treats textiles, and sews thermoplastic materials, solders, rivets, welds and tempers, among other industrial applications.

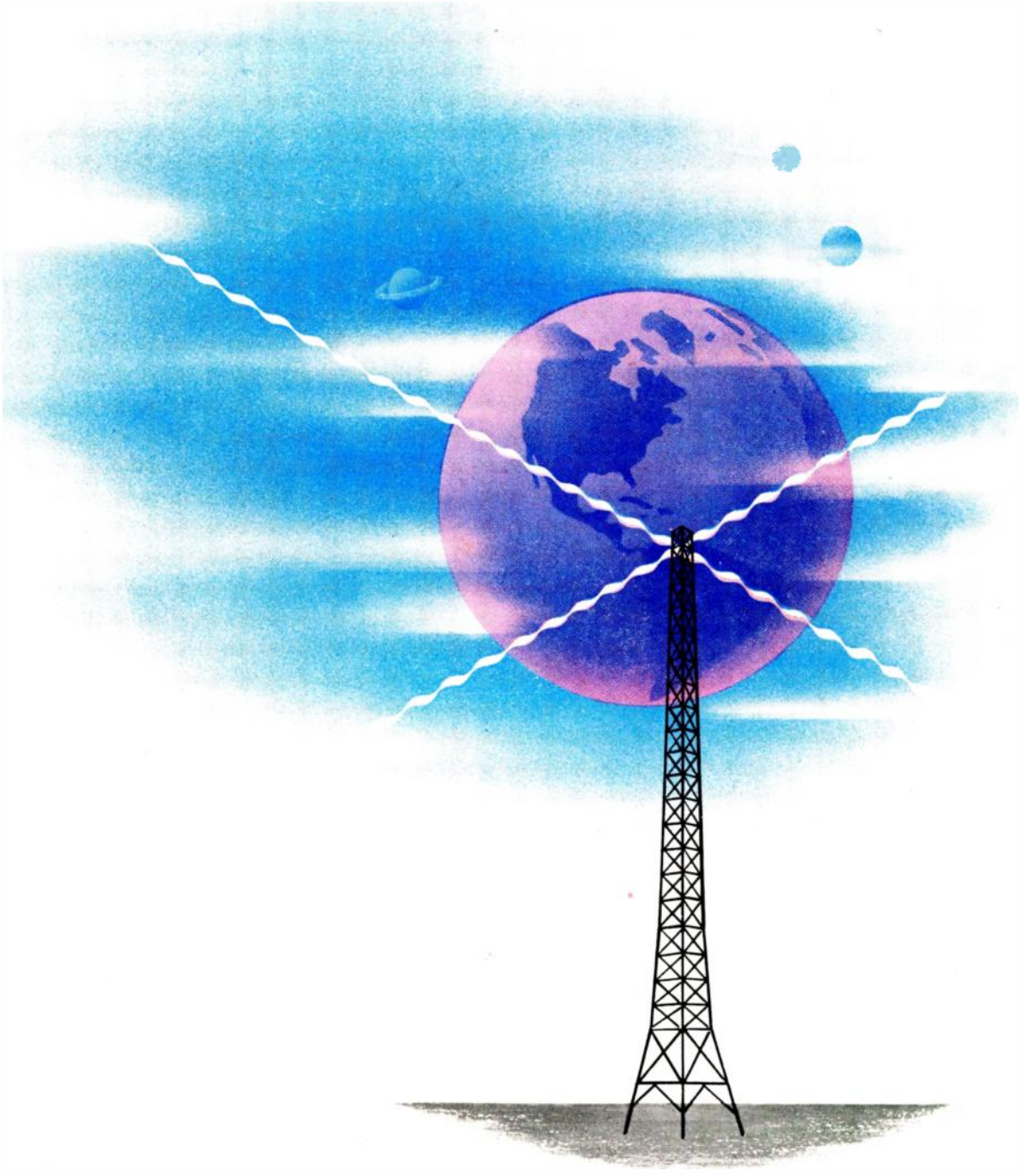
RADIO AT WAR

All divisions of RCA — research laboratories, manufacturing plants, broadcasting and communication facilities — are making substantial contributions to the conduct of the war. Production of vital radio, sound and electronic equipment for the armed forces of the United States and of the United Nations increased more than 100% between 1942 and 1944. Handling a vast amount of wartime research and engineering, RCA developed more than 150 new types of electron tubes and approximately 300 different types of apparatus built since the beginning of the war but not previously manufactured by anyone.

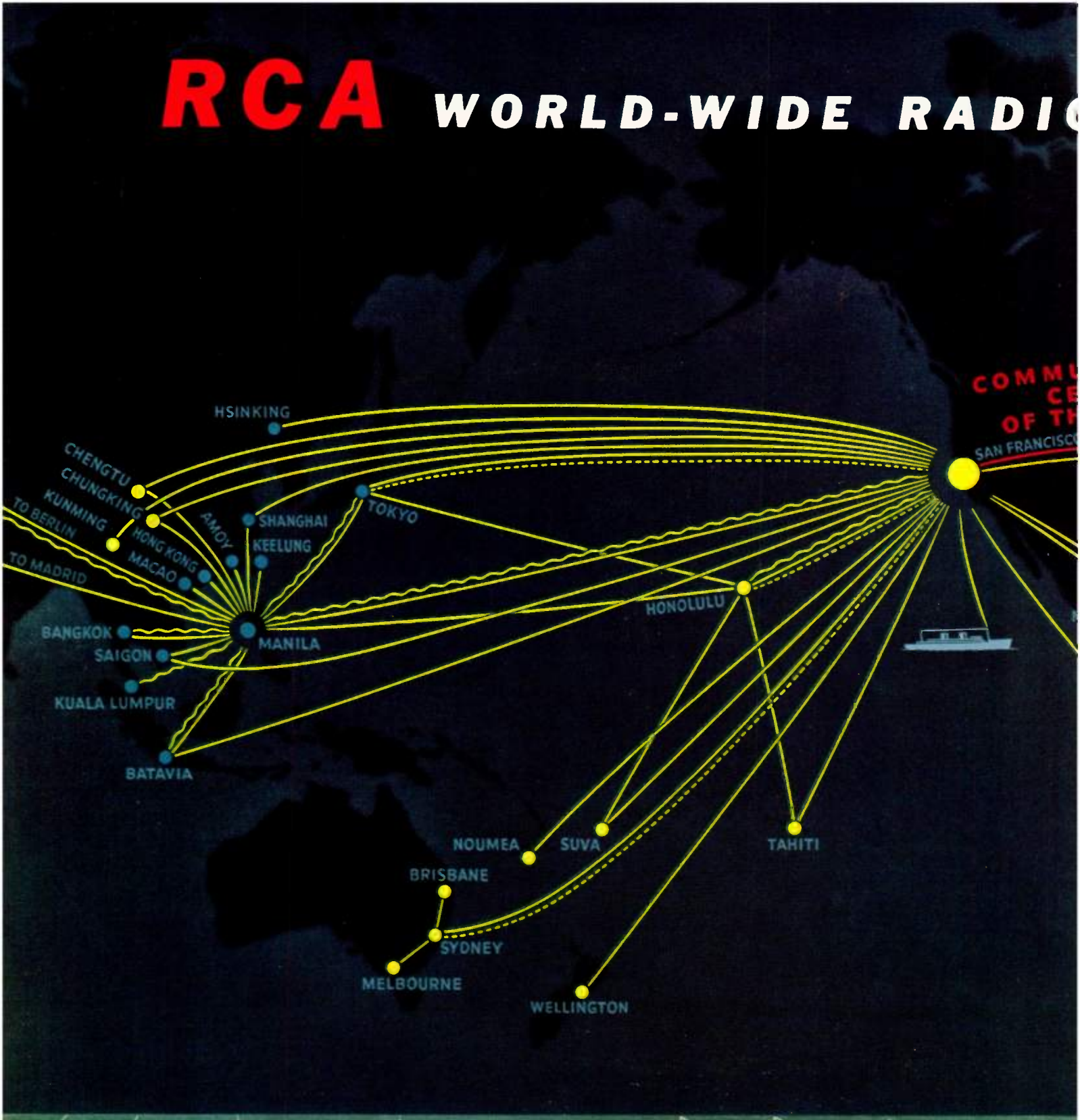
THE ADVANTAGES OF THE NEXT 25 YEARS WILL MAKE

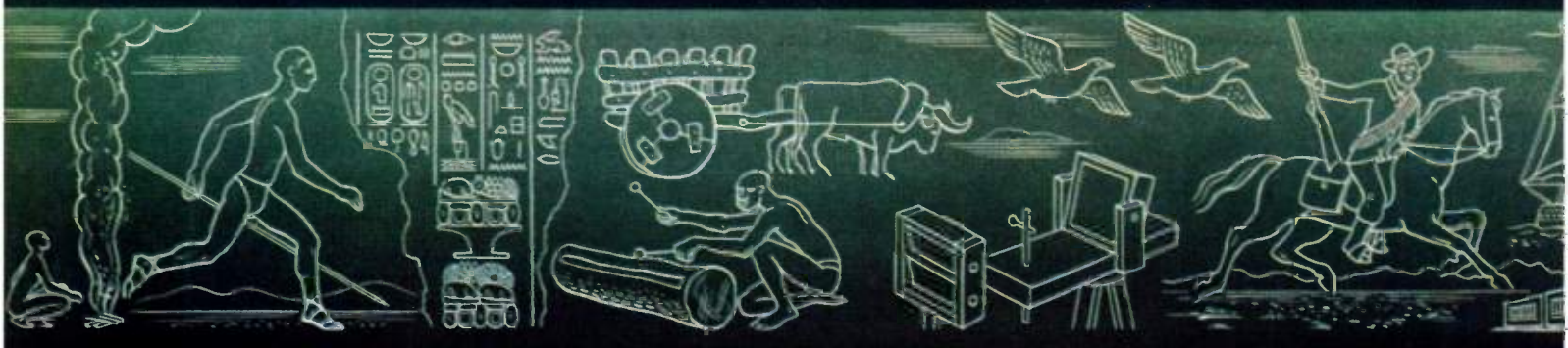
THOSE OF THE LAST 25 PALE INTO INSIGNIFICANCE

David Sarnoff



RCA WORLD-WIDE RADIO





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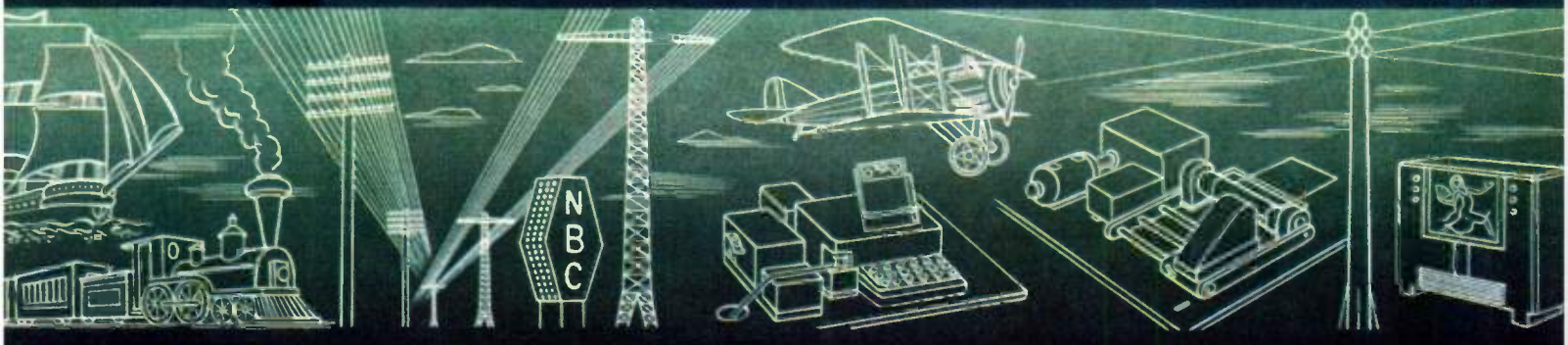
A SERVICE OF RADIO C

COMMUNICATION SYSTEM



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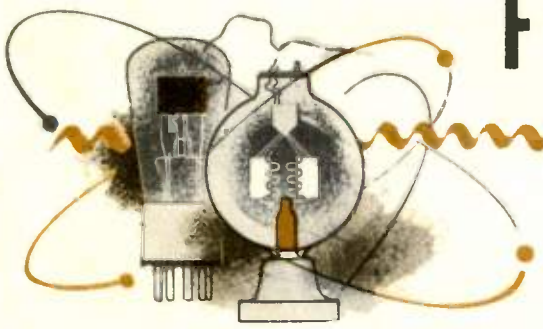
RPORATION OF AMERICA

WRH

DAVID SARNOFF

PRESIDENT, RADIO CORPORATION OF AMERICA

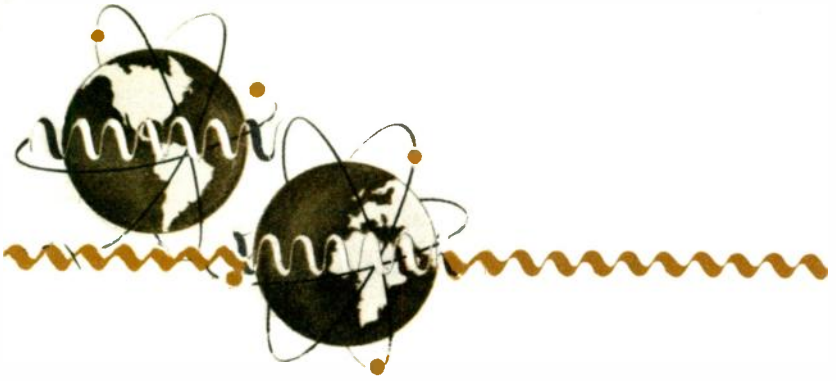
FOREWORD



THE voice and pulse of radio — like the seconds and minutes of Time — speed into the Infinite and vanish in the emptiness of space. Neither Time nor the waves of radio can be recalled. The past holds but the records to reveal how well man has used each fleeting second and each electromagnetic pulse, to learn the secrets of Nature and to harness the hidden forces of the universe. The present, therefore, is opportunity. The future is our challenge.

As history measures the years, twenty-five years in the fascinating realm of radio is but a twinkling. Radio of 1944 is not the radio of 1919. Marconi's feeble sparks that kindled world-wide wireless have long since blended into history. With them have gone the sparks which dot-dashed radio history across the heavens from the mastheads of the St. Paul, the Philadelphia, Baltic, Olympic, Republic, Titanic, Lusitania and many other ocean liners. The first transatlantic signal is but a memory, yet its wavelength was the first ethereal thread in an international pattern of communication that now overspreads the Seven Seas. The long waves generated by massive high-frequency alternators that carried the messages of the First World War across the Atlantic have given way to globe-girdling, short-wave beams empowered by electron tubes. The crashing spark transmitters romantically served their day until the electron tube revolutionized all radio and made it a part of everyday life in the home as well as in the commerce of the world. Now music at the speed of light encircles the earth.

When the call to the Second World War trumpeted from Europe, radio was ready for its unprecedented role in global warfare. It became the Voice of Freedom; it coordinated the outposts and battlefronts of the AEF and the United Nations all around the world. Communication, whether to Alaska or Iceland, to a carrier in the Pacific or bomber over the Atlantic, to beachheads in Italy and France or a task force at Truk, became a matter of seconds.



At the end of RCA's first quarter-century we find the Allies headed for victory, with radio establishing new records of accomplishment as indicated by such words as radar, handie-talkie, walkie-talkie and radiothermics. We may well be proud of our first twenty-five years for they prove how thoroughly and efficiently we have built in the past; how well we have made use of Time and our opportunities. We have contributed much in the development of radio so that it might serve the Nation and help to save civilization. We shall continue to fight for Victory — to win and preserve the peace. Ours, too, will be the task of providing the world at peace with new wonders in radio for the advancement of civilization, even in the remotest corners of the earth.

Peace will find the world on the threshold of television — one of the great realities of electronics. Again all radio will be changed. We shall step into our second quarter-century with new electron tubes, and radio scientists will blaze new trails in the enchanting realm of microwaves — waves so tiny that they are akin to light. These electron tubes will be the beacons of progress in that mysterious wilderness of the unknown, the electromagnetic spectrum of Tomorrow.

We shall not forget the past. We learn from our mistakes and gain new inspiration from our achievements. Let us keep our eyes looking forward across the horizon to meet the challenge of the future. Opportunities for invention and for progress are constantly increasing. Each advance is but a key to new and greater achievements. Out of the electron tube that enabled radio to speak and to sing were developed the radically new tubes that enable radio to see at a distance, no matter how dense the weather or how black the night.

Today RCA is a symbol of radio progress throughout the world. The armed forces have found the RCA monogram on the apparatus that served them flying high over the "hump" to China; they have found its mark aboard the Flying Fortresses, on submarines, on battlecraft of all types as well as on tanks and in the field. Radio has gone with them into the jungles, into the Arctic, into the skies, on the seas and beneath the seas.

RCA has always been dedicated to pioneering, in every phase of radio. Our men of research and engineering have combed the skies for Nature's clues; they have deciphered the signposts of science that lead onward. Yet as they look back across the past twenty-five years they realize how much they have to learn; how modest are their efforts to emulate Nature in the transmission and reception of sound and sight. Their tools are electricity, the electron, and invisible waves. With them they have fashioned magic devices to harness the wonders of Nature for the welfare of the people.

For twenty-five years it has been the mission of RCA to serve people everywhere in every walk of life. That remains our continuing responsibility. Our record sets the pace; it challenges us to excel and to attain new goals. RCA has spun a world-wide communication system around the earth linking more than 50 nations; it has led the way in development of electron tubes. It mastered the short-waves, electronized the phonograph, and created the electronic system of television. RCA pioneered in broadcasting and gave to America its first nation-wide radio networks. It helped to carry the voice of the President of the United States within earshot of every person on earth.

All of these achievements will be surpassed in the post-war world of radio. Our obligations to society in research and engineering, in production and communication, will be carried into future generations. Our heritage is radio — a science, an art and an industry of boundless possibilities. Our destiny is to create, so that we may serve civilization with such distinction that at the end of our next twenty-five years — the completion of half a century — RCA will still be at the forefront of radio progress of the world in 1969.

David Sarnoff

PRESIDENT, RADIO CORPORATION OF AMERICA

BOARD OF DIRECTORS OF RCA

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DE WITT MILLHAUSER

EDWARD W. HARDEN

BERTRAM CUTLER

THE RADIO CORPORATION OF AMERICA has its roots deeply embedded in the history of radio communications as a science, an art and an industry. Through research and engineering over the past twenty-five years, RCA has pioneered and put into practical use many of the outstanding developments in the field of radio science; it leads the way in electronics and television.

The seed was planted when Maxwell offered to the world his theory of the ether, and Hertz produced the electromagnetic waves. The growth began when Marconi sent the first faint signal in 1895. Unending research and pioneering would nurture it—first, across Marconi's garden, then across the English Channel in 1899, across the Atlantic in 1901, and on and on to encircle the globe—with messages, music and pictures traveling at the speed of 7½ times around the world in a second.

Marconi applied for his first British patent on wireless telegraphy in 1896. A year later, in July, 1897, the Wireless Telegraph and Signal Company, Ltd.* was incorporated in England as the first commercial wireless organization. Incidentally, that was the year J. J. Thomson discovered the electron which the radio tube was destined to generate and control. It would revolutionize all radio and extend its services for the

*Name changed in 1900 to "Marconi's Wireless Telegraph Company, Ltd."

benefit of mankind. Vital steps in this process were Fleming's invention of the valve detector in 1904, and DeForest's invention of the 3-element tube, which he named the audion, in 1906.

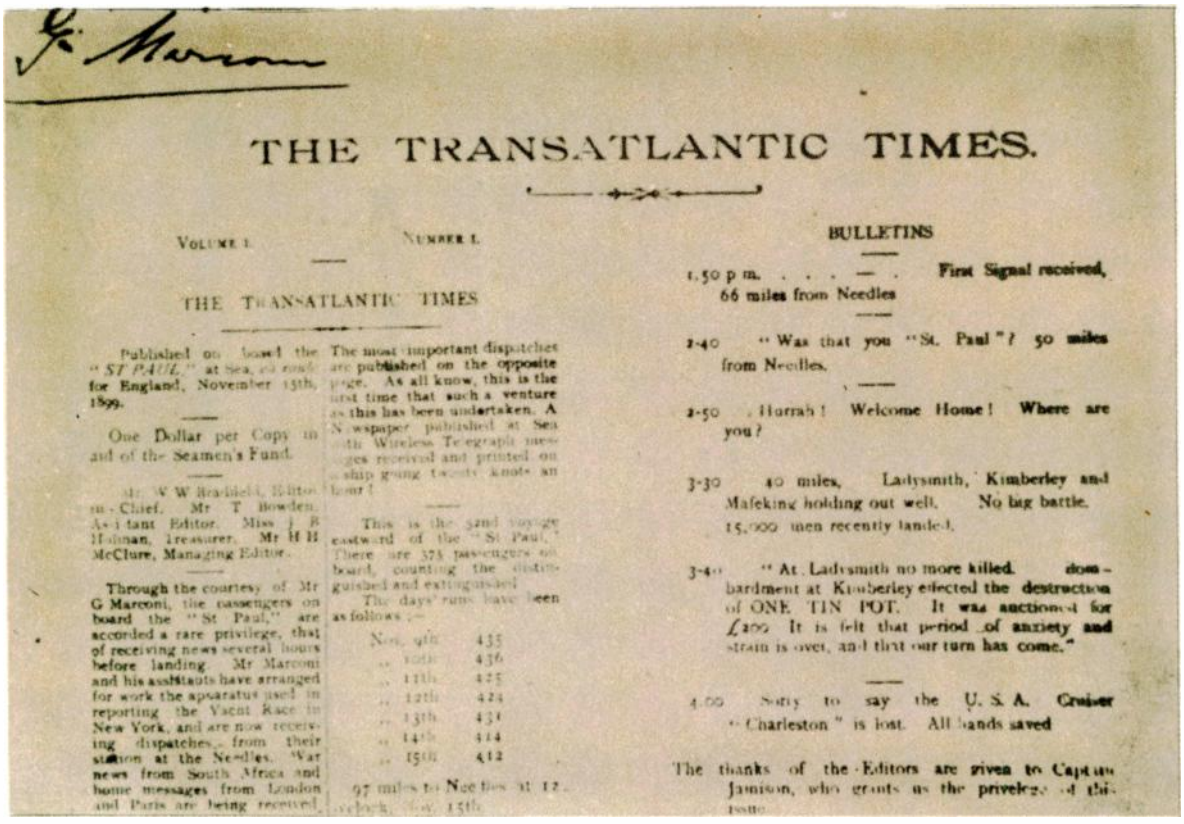
In the meantime, Marconi had added success to success by increasing the range of his invention. Ship and shore stations were equipped. Ships of war as well as ships of commerce used the invisible method of signaling, and soon the wonder of wireless was front-page news throughout the world. The SS Republic disaster in 1909 and the tragic sinking of the SS Titanic in 1912 revealed the great usefulness of wireless on the oceans.

The Marconi Wireless Telegraph Company of America, organized on November 22, 1899, contributed much to the advance of wireless as the years went by. It served the Nation in peace and in war.

WAR REVOLUTIONIZES RADIO

When the Armistice ended the First World War on November 11, 1918, wireless was generally confined to dots and dashes. But during the war a great transformation had taken place — radio had found an electric tongue; it had learned to talk and to sing. New vacuum tubes had been developed as keys to major advances in the develop-

Marconi in Newfoundland received the first trans-atlantic wireless signal on December 12, 1901.



THE TRANSATLANTIC TIMES.

VOLUME I. NUMBER I.

THE TRANSATLANTIC TIMES

Published on board the "ST PAUL," at Sea, en route for England, November 15th, 1899.

One Dollar per Copy in aid of the Seamen's Fund.

Mr W W Bradfield, Editor-in-Chief. Mr T Bowden, Assistant Editor. Miss J B Holman, Treasurer. Mr H H McClure, Managing Editor.

Through the courtesy of Mr G Marconi, the passengers on board the "St Paul," are accorded a rare privilege, that of receiving news several hours before landing. Mr Marconi and his assistants have arranged for work the apparatus used in reporting the Yacht Race in New York, and are now receiving dispatches from their station at the Needles. War news from South Africa and home messages from London and Paris are being received.

The most important dispatches are published on the opposite page. As all know, this is the first time that such a venture as this has been undertaken. A Newspaper published at Sea with Wireless Telegraph messages received and printed on a ship going twenty knots an hour!

This is the 32nd voyage eastward of the "St Paul." There are 375 passengers on board, counting the distinguished and extinguished.

The days' runs have been as follows:—

Nov. 9th	435
" 10th	436
" 11th	425
" 12th	424
" 13th	431
" 14th	414
" 15th	412

97 miles to Needles at 12 o'clock Wed. 15th.

BULLETINS

1.50 p.m. . . . — . First Signal received, 66 miles from Needles

2-40 "Was that you "St. Paul"? 50 miles from Needles.

2-50 Horrah! Welcome Home! Where are you?

3-30 40 miles. Ladysmith, Kimberley and Mafeking holding out well. No big battle. 15,000 men recently landed.

3-40 "At Ladysmith no more killed. Bombardment at Kimberley effected the destruction of ONE TIN POT. It was auctioned for £200. It is felt that period of anxiety and strain is over, and that our turn has come."

4.00 Sorry to say the U. S. A. Cruiser "Charleston" is lost. All hands saved

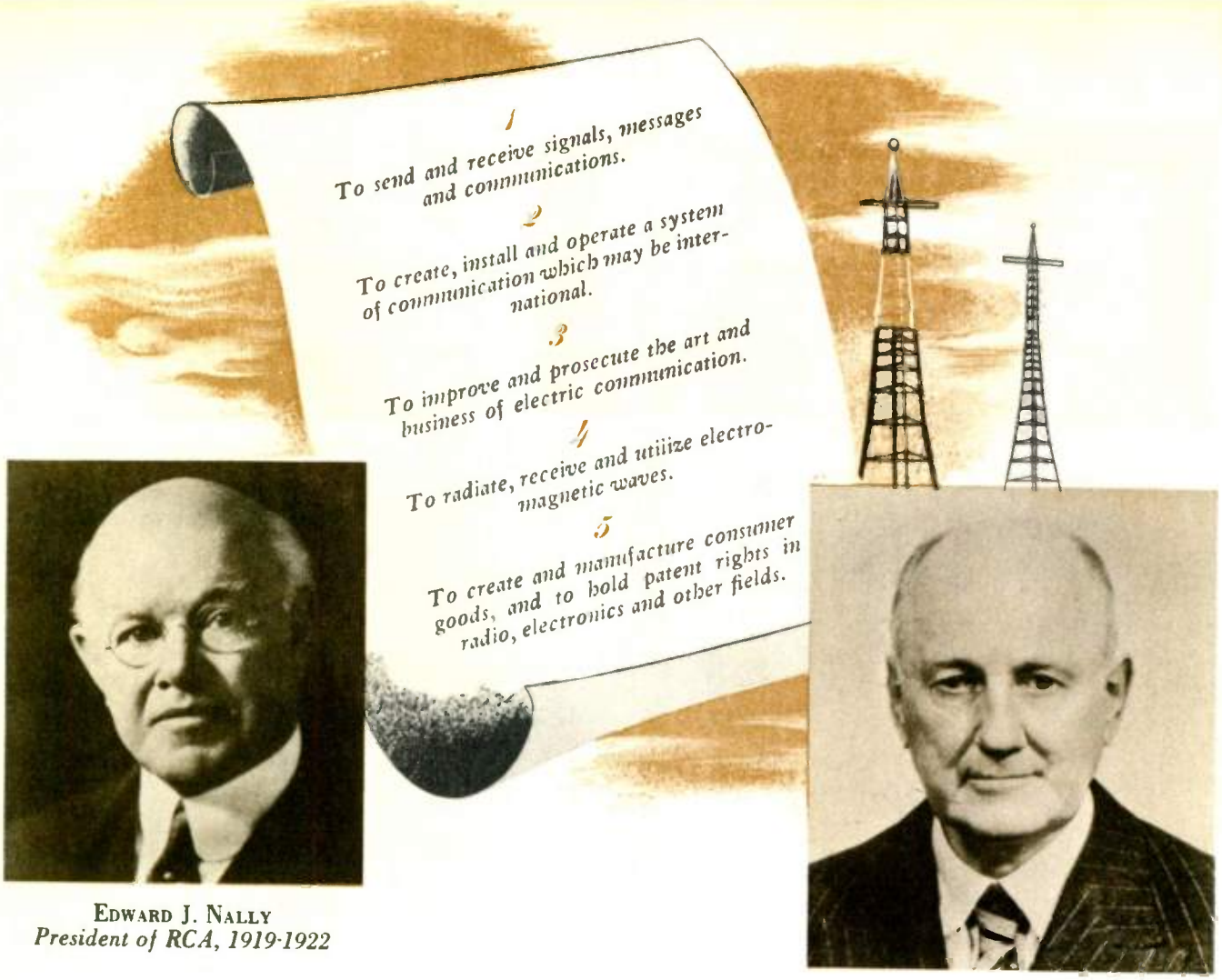
The thanks of the Editors are given to Captain Jamison, who grants us the privilege of this issue.

Radio always has had a natural relationship with the quick dispatch and dissemination of news; today broadcast listeners everywhere hear current events and history in the making.

ment of radiotelephony and in harnessing the short waves which prior to the war had been considered beyond the range of usefulness. The war had changed all that. Radio emerged from the conflict revolutionized. As a science and an art, radio was on the threshold of a new era.

Because the Marconi companies and the Marconi inventions were to a large extent in British control, the United States faced the danger that this revolutionary method of wireless communication, with all its international implications, would be in foreign hands. The war had revealed the power over world communications as represented by the foreign ownership of the transoceanic cables. Wireless telegraphy in the hands of the United States Government had given the Nation an independent wartime communication service that spread across the hemispheres.

But Congress declined to sanction the continuance, in peace, of such a Government service. Restoration of the Government stations to the Marconi Company meant possible foreign control — even though American inventors such as DeForest, Alexanderson, Fessenden, Tesla, Edison, Armstrong and others had contributed immeasurably to the radio art.



EDWARD J. NALLY
President of RCA, 1919-1922

Lieut. General J. G. Harbord, Chairman of the RCA Board of Directors, who served as President from 1923 to 1930.

THE FORMATION OF RCA

It was at this juncture, in 1919, that the Radio Corporation of America was formed by the General Electric Company, as a result of suggestions by officials of the United States Navy, in order to provide an all-American communications company. On November 20, 1919, the business and property of the Marconi Wireless Telegraph Company of America were acquired by the Radio Corporation of America, to which a charter had been granted on October 17, under the corporation laws of the State of Delaware. Then General Electric turned over rights under its own radio patents to the new company, which was to carry on the business of wireless communications as well as to develop new inventions and new radio apparatus.

On December 1, 1919, RCA began business as an all-American organization, with Owen D. Young, Chairman of the Board; Edward J. Nally, President, and David

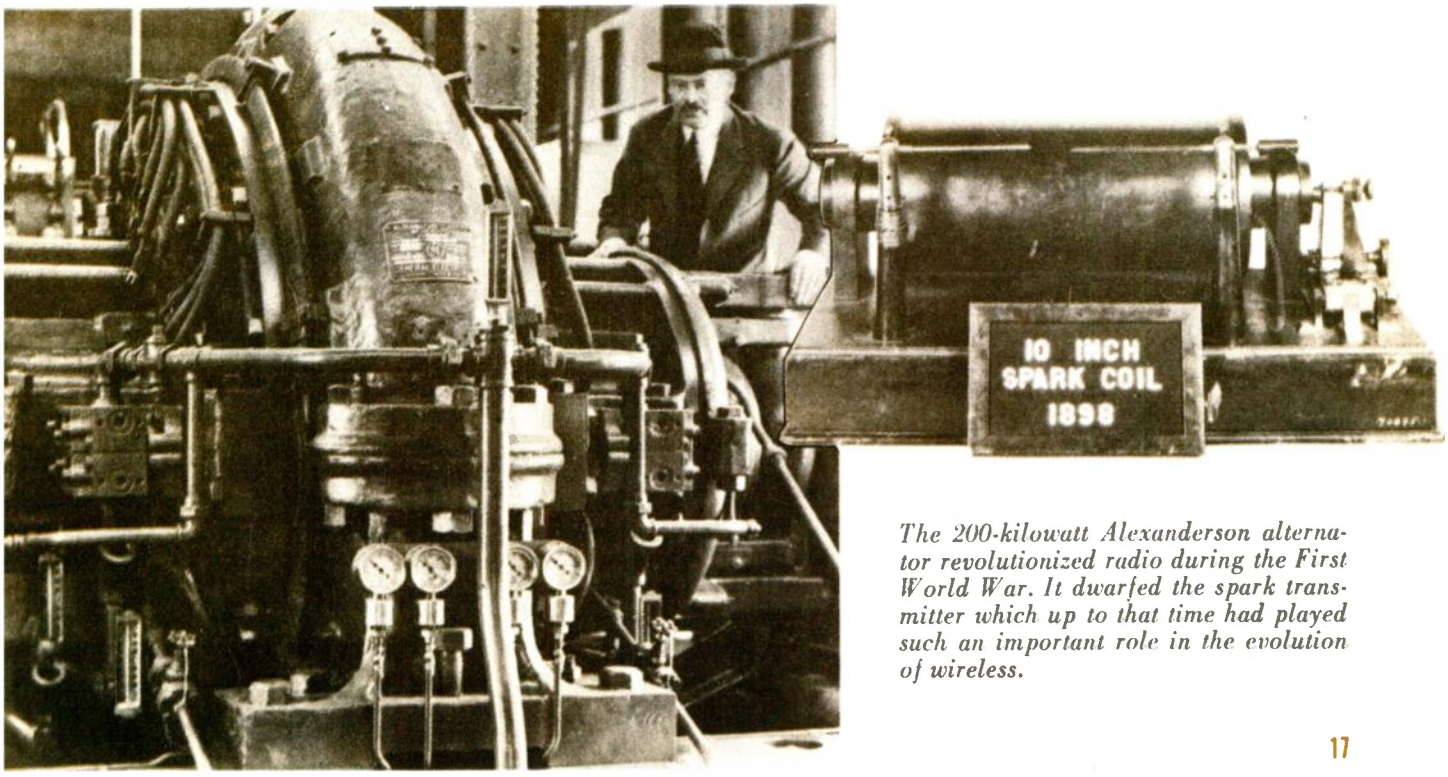
LEWIS MACCONNACH
Secretary

GEORGE S. DESOUSA
Vice-President and Treasurer

HENRY A. SULLIVAN
Controller

Sarnoff, Commercial Manager. Primarily, the purpose of RCA was to give the United States pre-eminence in radio communication, independent of all other countries. The aim was not only to send and receive signals and messages on an international scale but also to improve and advance this new system of electric communication; to conduct progressive research and to create and manufacture consumer goods — all with the purpose of serving Americans everywhere. Great possibilities for expansion of wireless service at sea as well as for communication between and within nations were foreseen.

The wireless stations which the Government had taken over from the American Marconi Company during the war were turned back to the new RCA in February, 1920. One of the principal stations was at New Brunswick, New Jersey. There Uncle Sam

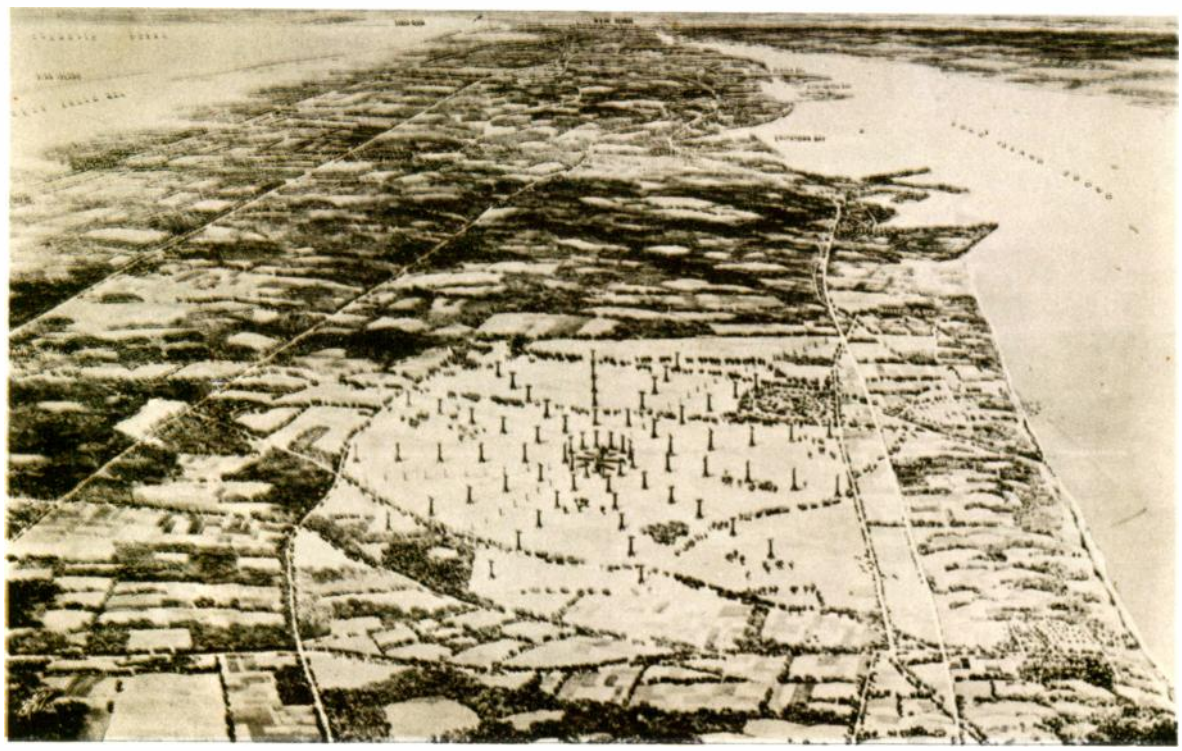


The 200-kilowatt Alexanderson alternator revolutionized radio during the First World War. It dwarfed the spark transmitter which up to that time had played such an important role in the evolution of wireless.

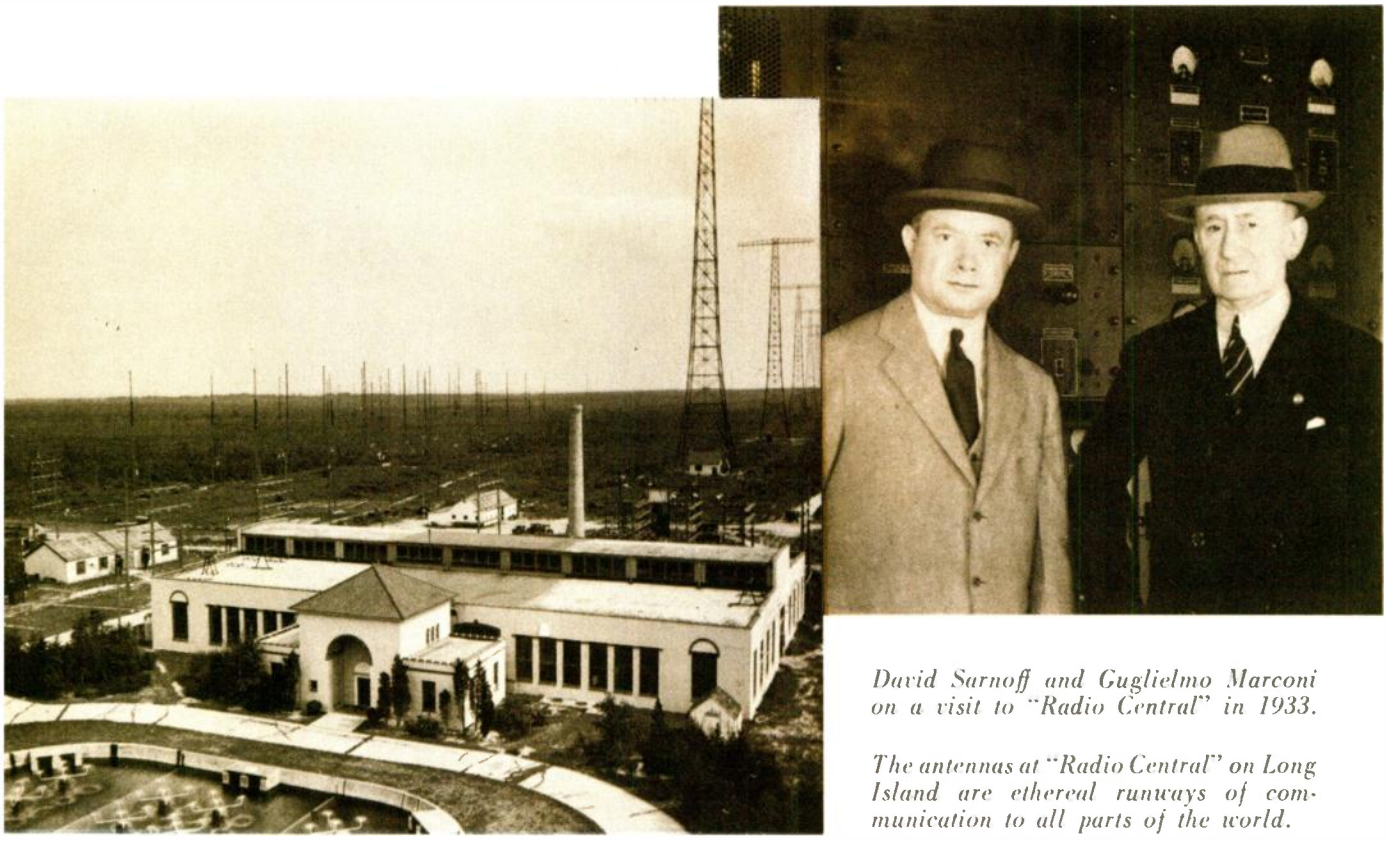
had found his "radio voice" and had become a power in the international air during the World War when the Alexanderson high-frequency alternator went into action. Incidentally, it was from this station that President Wilson's Fourteen Points, which served as the basis of the Armistice, were transmitted to Germany.

Commercial long-distance radio communication between the United States and foreign countries was inaugurated by the Radio Corporation of America on March 1, 1920, when the first messages over RCA transatlantic circuits were sent between New York and London. Before the end of 1920, service had been established with England, France, Norway, Hawaii, Japan and Germany.

Radio engineers and contractors soon were busy building a "Radio Central" on a 10-square-mile tract at Rocky Point, Long Island, dedicated to world-wide communication. The receiving station was located 25 miles away at Riverhead. When construction had been completed, President Harding, on November 5, 1921, formally opened this great new center of radio by sending a radiogram addressed to all nations. The 200-kilowatt Alexanderson alternators now whirled to achieve new communication records in peacetime.



RCA's "Radio Central" at Rocky Point, Long Island, which opened in 1921, is a world-center of communication.



David Sarnoff and Guglielmo Marconi on a visit to "Radio Central" in 1933.

The antennas at "Radio Central" on Long Island are ethereal runways of communication to all parts of the world.

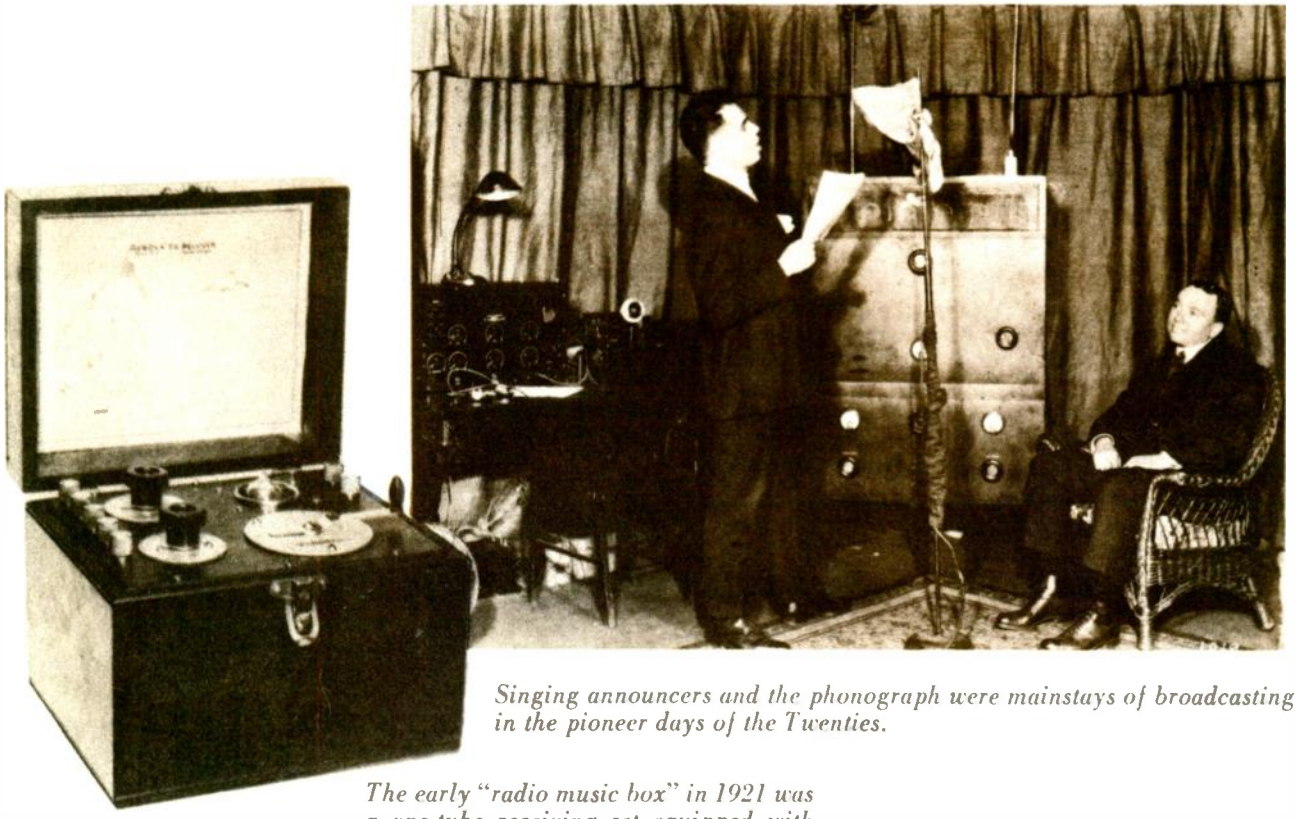
In 1920, RCA had obtained the right to use in its field the radio inventions of the American Telephone & Telegraph Company, under agreements between the latter company, the General Electric Company and Radio Corporation of America. But patent conflicts in the new art continued to multiply as other inventors and research organizations made discoveries in radio. Many of these inventions were acquired by RCA. And in 1921, under additional agreements, RCA acquired the right to use the inventions of the Westinghouse Electric and Manufacturing Company in the radio field.

BROADCASTING BEGINS

Up to that time, the primary use of radio had been for point-to-point telegraphic communications, in which the comparative secrecy of the wireless code was sufficient to protect ordinary telegraphic confidences. For private telephone conversations, the radio was then far too public, and that fact gave false strength to the idea that radio-telephony was a limited field.

But this very "defect" created a far greater usefulness. If a far-flung audience

could hear a radiotelephone message at the same time, here was a radically new means of mass communication. If radio could carry speech, it could also carry music. Out of the realization of this idea broadcasting was born. The pioneer experiments of Frank Conrad, over KDKA, the Westinghouse station at Pittsburgh, had been so successful that the Harding-Cox election returns of 1920 were broadcast to a limited number of nearby amateur receivers. News of this triumph of radio kindled the broadcasting "craze," which spread like wildfire across the country. Immediately, endless possibilities were foreseen for broadcasting, and, quickly, hundreds of stations were on the air. Almost overnight radio listening became a national pastime.



Singing announcers and the phonograph were mainstays of broadcasting in the pioneer days of the Twenties.

The early "radio music box" in 1921 was a one-tube receiving set equipped with earphones.

SARNOFF CONCEIVES THE "RADIO MUSIC BOX"

All this and more too had been envisaged in 1916 by David Sarnoff, then Assistant Traffic Manager of the Marconi Wireless Telegraph Company of America. In a

memorandum to E. J. Nally, the General Manager, Mr. Sarnoff proposed a "radio music box" and outlined its future as follows:

> I have in mind a plan of development which would make radio a household utility in the same sense as a piano or phonograph. The idea is to bring music into the house by wireless . . . For example, a radio telephone transmitter having a range of say 25 to 50 miles can be installed at a fixed point where instrumental or vocal music or both are produced . . . The receiver can be designed in the form of a simple "radio music box" and arranged for several different wave lengths, which should be changeable with the throwing of a single switch or pressing of a single button . . .
>
> The same principle can be extended to numerous other fields — as, for example — receiving lectures at home, which can be made perfectly audible; also events of national importance can be simultaneously announced and received. Baseball scores can be transmitted in the air by the use of one set installed at the Polo Grounds. The same would be true of other cities.
>
> This proposition would be especially interesting to farmers and others living in outlying districts removed from cities. By the purchase of a "radio music box" they could enjoy concerts, lectures, music, recitals, etc., which may be going on in the nearest city within their radius . . . Should this plan materialize, it would seem reasonable to expect sales of 1,000,000 "radio music boxes" within a period of three years. Roughly estimating the selling price at $75 per set, $75,000,000 can be expected.

The plan did materialize! Mr. Sarnoff's estimate that at the selling price of $75 per set, $75,000,000 could be expected within a three-year period was surpassed, for RCA's actual sales of home instruments during the three years from 1922 through 1924 totaled $83,500,000.

Most of the listeners to the early broadcast programs used crystal detectors — tubeless receiving sets. Development of vacuum tubes both as sensitive detectors and amplifiers quickly expanded the radio audience, and by 1921, broadcasting overshadowed all other developments of what had once been the revolutionary art of the Wireless Age.

The wireless amateurs, numbering between 3,000 and 5,000, had served as a reservoir for trained radio operators during the First World War. Now with music in the air, they turned from dots and dashes to use the radiophone to talk through the air. They built receiving sets that helped to reveal the great potentialities of broadcasting. The amateurs listening-in with their wireless sets formed a vast field-testing laboratory; they were the nucleus of the first radio audience. Soon they took up the vacuum tubes and cast aside the old spark gaps; they helped to blaze the trail into the short-wave spectrum and contributed to the advance of the art through their home-made transmitters and receiving sets. The radio industry drew upon the amateur ranks for many of its leaders.

AN OPENING GONG

The Dempsey-Carpentier championship fight in the great wooden saucer at Boyle's Thirty Acres in Jersey City on July 2, 1921, was a broadcast that literally opened the ears of millions to the possibilities of radio reception. The lucky owners of crystal detector sets and one-tube receivers heard the blow-by-blow description in their earphones. At the final gong, they knew more about the details of the fight than those who had trekked through the heat and dust of that summer afternoon to sit at the ringside. Major J. Andrew White was the announcer, with David Sarnoff at his elbow to assist in the description through the microphone of station WJY, temporarily installed by RCA at Hoboken.

Jack Dempsey, heavyweight champion of the world in 1921, listening to a "radio music box" tuned by Major J. Andrew White, announcer, at the training quarters just before the Dempsey-Carpentier championship fight.

That autumn, station WJZ was officially opened by Westinghouse at Newark, New Jersey, as the first regular broadcaster in the metropolitan area. The first program featured world series bulletins. In quick succession, WBZ opened at Springfield, Mass.; KYW at Chicago; WGY at Schenectady; and WBAY, an experimental station of the American Telephone & Telegraph Company in New York, changed its call letters to WEAF. That was the station which a year later broadcast the first commercial program, thereby leading to solution of the problem—who would pay for broadcasting?* The Princeton-Chicago football game was the first broadcast from the gridiron in 1922, and the New York Philharmonic Orchestra, heard on the air for the first time

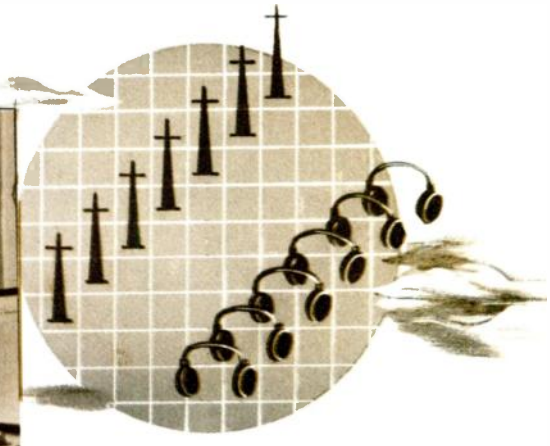
*September 7, 1922, a talk on real estate sponsored by the Queensborough Corporation at the rate of $100 for ten minutes.

on November 22, gave noteworthy recognition to radio as a new medium for the presentation of music.

Radio history was being made almost daily. In the first eleven months of 1921, General Electric and Westinghouse produced for sale by RCA 5,000 tubes a month; production in June, 1922, totaled 200,000 tubes. In 1922, the American public spent between $75,000,000 and $100,000,000 for radio sets, tubes, headphones, and batteries. On October 15, 1922, high-power vacuum tubes were used for the first time in RCA transmitters handling traffic between New York, England and Germany. The vacuum tube had grown to 20-kilowatt power! Broadcasting stations increased from 30 to 556 between January 1, 1922 and March 1, 1923. Americans spent $175,000,000 for radio instruments in 1923.

Radio reception was destined for a sensational change by the announcement in 1923 that the superheterodyne circuit, embodying the developments of Major E. H. Armstrong during the war, had been designed as a commercial product, and that RCA would introduce it for home use. Because of its marked efficiency, sharp tuning and sensitivity, the "super" became a universal receiver; it superseded the regenerative set as effectively as the "regenerator" had sent the crystal detector into discard.

In 1923, Lieut. General J. G. Harbord, who commanded the Second Division in the First World War and had been General Pershing's Chief of Staff, was named President of the Radio Corporation of America. David Sarnoff, then General Manager, became Vice President and General Manager.



Since the early days of broadcasting, the electron tube has been a master key to major advances in broadcast reception as well as in transmission.

FIRST PROGRAM

Daily Schedule Is Announced for Radio Broadcast

Oct 9 1921

FOR the information of those who already have receiving sets or those who may install them during the week, following is the time schedule of the numbers on the daily broadcasting schedule:

1:45 P. M.—World Series, play by play.

8:05 P. M.—Baseball comment and an analysis of the World Series game.

8:15 P. M.—Summary of the day's important news dispatches.

8:30 P. M.—Concert program of musical and vocal selections.

On Friday night at 7 o'clock fairy stories told by The Man in the Moon and three musical numbers especially selected for children.

The sending of the World Series reports, of course, is governed by weather conditions. In the event that rain may prevent the game taking place, announcement of that fact will be made at several intervals during the afternoon.

A daily radio program of 1921.

Douglas Fairbanks and Mary Pickford in one of their first broadcasts through the NBC microphone, which was designed as a symbol of music.

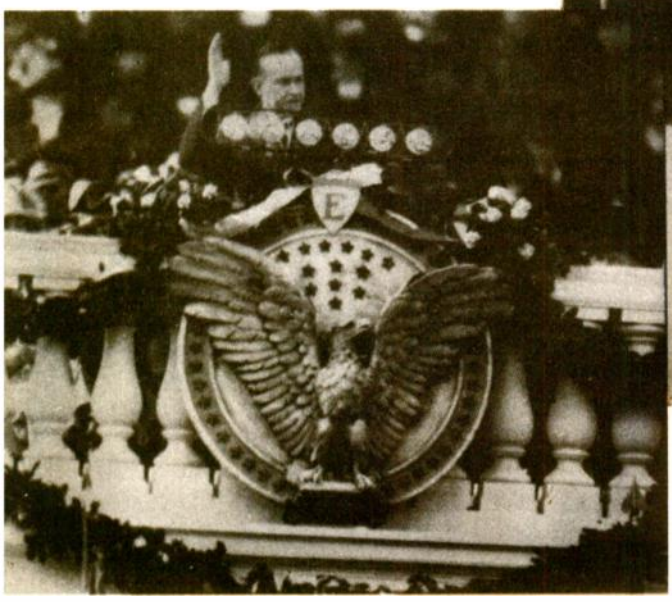
Olga Petrova, noted actress, in 1921 appeared before the microphone in costume as actors do today before the television camera.

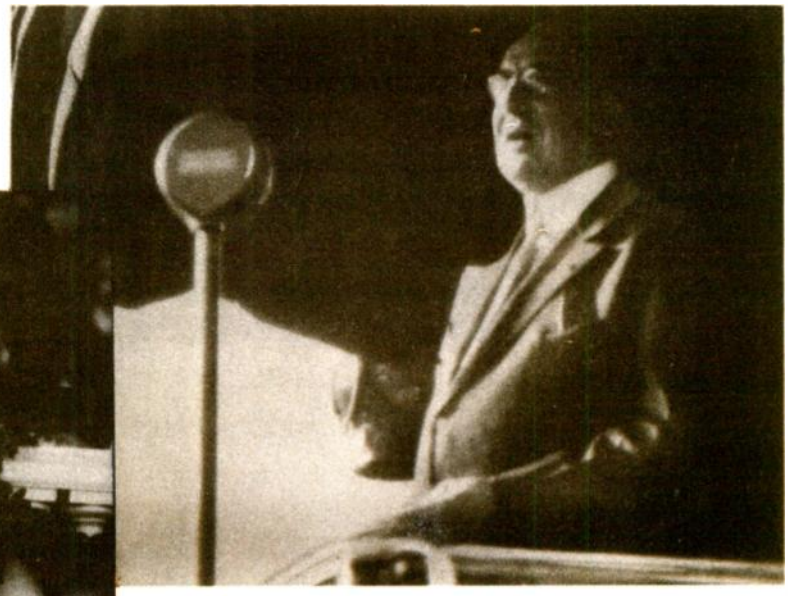
NEW YORK BECOMES CENTER OF BROADCASTING

Station WJZ, acquired by RCA in the spring of 1923, moved from Newark to New York to share with WJY new modernistic studios in Aeolian Hall on 42nd Street. This put broadcasting near to the theatrical center and Broadway talent, thus making it convenient for performers to reach the microphone. Predictions were heard that a nation-wide network would some day carry New York programs to all the country. Hope was stimulated by the first multiple-station network that linked WEAF, New York, WGY, Schenectady, KDKA, Pittsburgh, and KYW, Chicago, in June, 1923.

President Harding spoke from St. Louis and was heard in that area through KSD, while at the same time New Yorkers heard his voice through WJZ, and Washingtonians listened through WCAP. This was the first "Presidential network hookup," but not Harding's first broadcast, for he had spoken before a microphone at the burial of the Unknown Soldier on November 11, 1921, at Arlington, Va. Later, Woodrow Wilson, in his only public address after retiring from the White House, broadcast over WEAF on Armistice Day — November 11, 1923. In December of that year, the opening of Congress was featured as the first broadcast from within the Capitol at Washington.

BELOW: *The Coolidge Inaugural on March 4, 1925, established a record in broadcasting for that day by the use of a hookup comprising twenty-one stations!*





ABOVE: *President Warren G. Harding was the first Chief Executive to broadcast through microphones which in those days were called "enunciators."*

Microphones were installed at both the Republican and Democratic National Conventions in 1924, enabling the nation to listen in for the first time on this "lesson in civics." The gooseneck horn was the popular loudspeaker of that day, and the voices that issued from it spread the word that Calvin Coolidge had been nominated by the Republicans at Cleveland, and John W. Davis by the Democrats at New York. A record-breaking audience listened-in at the 3,000,000 radio sets of that day when William Jennings Bryan, speaking from the convention at Madison Square Garden, called radio "a gift of Providence."

While broadcasting was making new strides daily, other phases of radio were keeping pace with it. On July 6, 1924, a radiophoto of Charles Evans Hughes, then Secretary of State, was transmitted by RCA from New York to London, where it was radioed back across the Atlantic and recorded in New York. Later in the year, pictures

Picture of Charles Evans Hughes, then Secretary of State, was radioed across the ocean by RCA on July 6, 1924.

In November, 1924, RCA radiophotos of President Coolidge and others were transmitted across the Atlantic.

of President Coolidge, the Prince of Wales, Prime Minister Stanley Baldwin and others were flashed from London to New York.

Distance across the Atlantic was shrinking. The first international broadcast transmitted from Chelmsford, England, was picked up by RCA at Belfast, Maine, relayed by short-wave to WJZ, New York, and there rebroadcast to the American audience. The voice of broadcasting was also becoming stronger; 50-kilowatt transmitters were being tested.

The Coolidge inaugural on March 4, 1925, was broadcast by the record-breaking hookup of that day — 21 stations! Several days later, on March 12, WJZ, New York, and WRC, Washington — the RCA station in the Nation's capital — rebroadcast the gong of Big Ben atop the House of Parliament, while it was striking midnight in London.

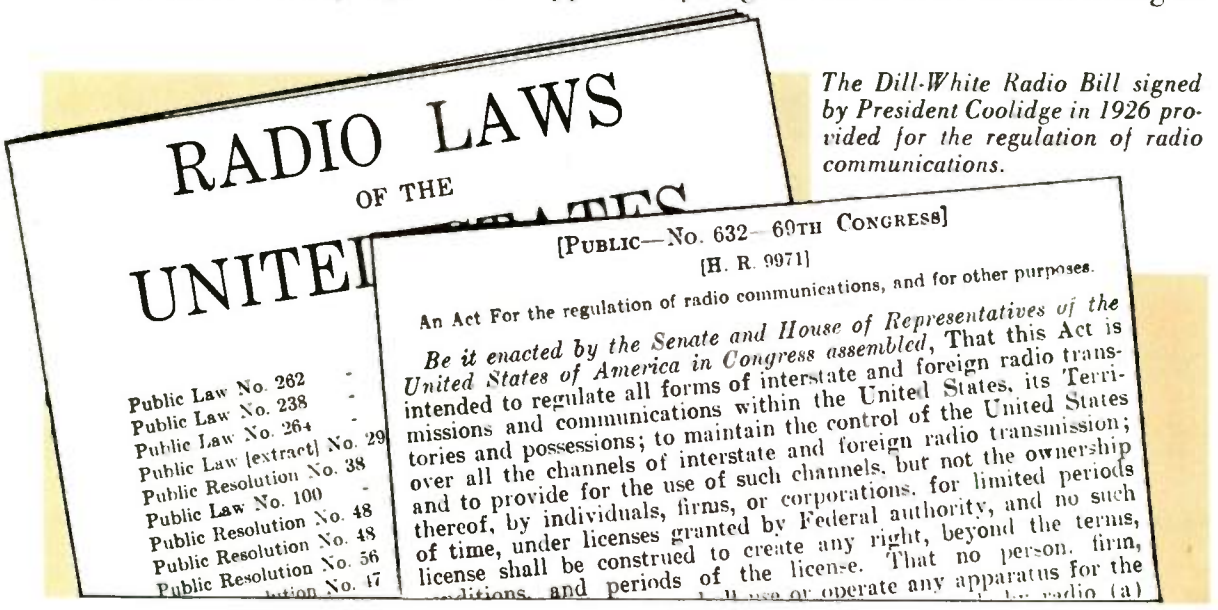
But radio activity was not confined to the Atlantic. On May 7, 1925, facsimile messages, maps and pictures were transmitted from New York to Honolulu, 5,136 miles, over the RCA radiophoto system.

The year 1925 also marked the opening of a new era in home-radio reception, when RCA introduced an all-electric receiving set, utilizing electron tubes arranged for either battery or light-socket operation. A year later headlines in the news featured a sensational development in radio tubes which would make it practical to operate home-radio receiving sets by plugging them into the house-lighting socket. RCA had developed tubes to operate on alternating current. Gone was the necessity for batteries and current-supply devices which up to this time had littered the living room alongside the radio set. Radio in the home now would be more compact, more convenient, more decorative and, particularly, foolproof and simpler in operation.

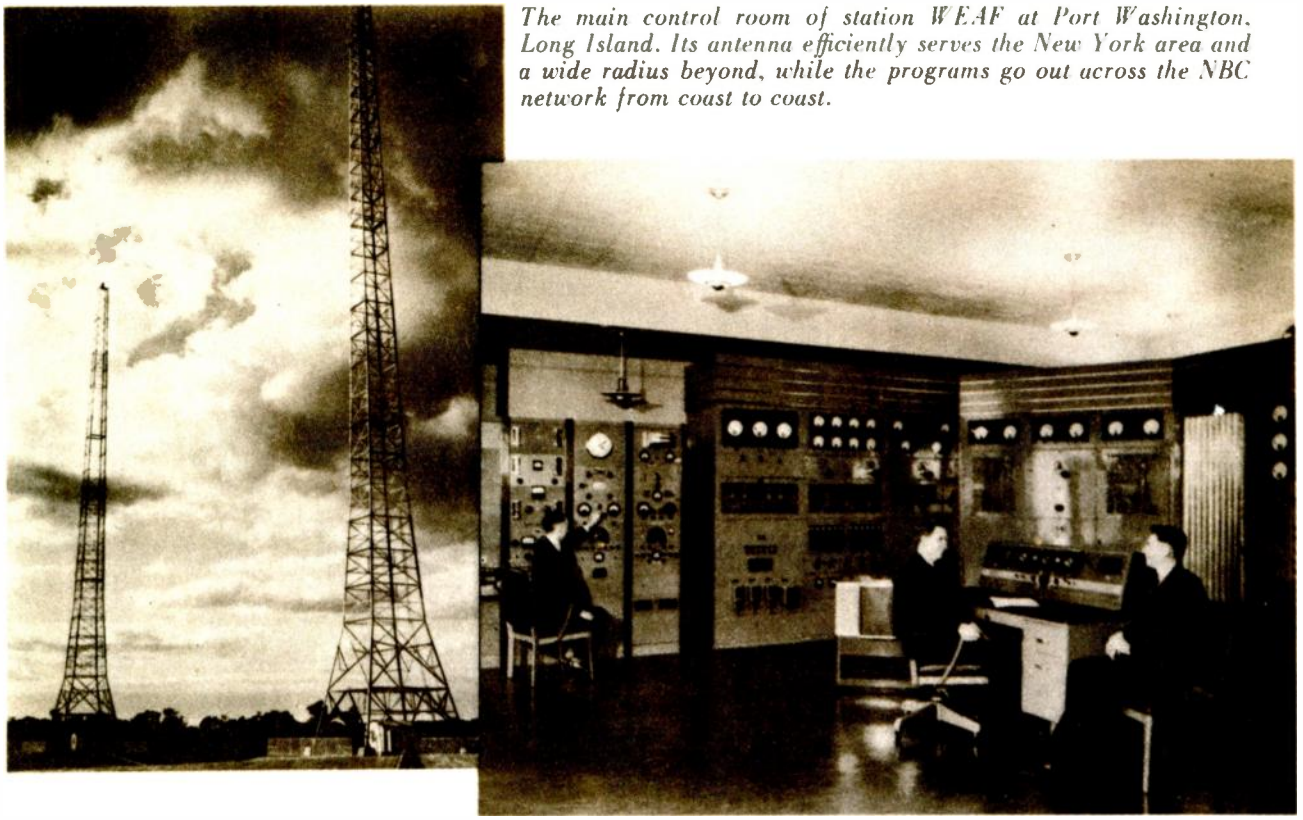
1926 — A YEAR OF MILESTONES

The year 1926 was destined to see many new milestones erected in radio. On the first day of the year John McCormack, noted Irish tenor, and Lucrezia Bori, star of the Metropolitan Opera, made their debuts over WJZ. It was a historic broadcast, the success of which encouraged other noted artists, who theretofore had frowned upon broadcasting, to go on the air. They were convinced by the quality of the McCormack-Bori concert that radio could do justice to their art; furthermore, radio had found a means of paying them — the commercial radio sponsor.

Broadcasters could now offer widespread "circulation"; their audience numbered millions. Advertisers grasped a new opportunity to go on the air to advertise and gain


RADIO LAWS
OF THE
UNITE
Public Law No. 262 -
Public Law No. 238 -
Public Law No. 264 -
Public Law [extract] No. 29
Public Resolution No. 38
Public Law No. 100 -
Public Resolution No. 48
Public Resolution No. 48
Public Resolution No. 56
[PUBLIC—No. 632—69TH CONGRESS]
[H. R. 9971]
An Act For the regulation of radio communications, and for other purposes.
Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act is intended to regulate all forms of interstate and foreign radio transmissions and communications within the United States, its Territories and possessions; to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by individuals, firms, or corporations, for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license. That no person, firm,

The Dill-White Radio Bill signed by President Coolidge in 1926 provided for the regulation of radio communications.



The main control room of station WEAF at Port Washington, Long Island. Its antenna efficiently serves the New York area and a wide radius beyond, while the programs go out across the NBC network from coast to coast.

good will for their products through entertainment. They linked their trademarks with the names of popular performers and orchestras, speakers and news. Radio became a powerful advertising medium — the Fifth Estate.

Five years of wild growth of broadcasting, culminating in interference by overlapping stations, was put to an end when President Coolidge, on February 23, 1926, signed the Dill-White Radio Bill. Up to that time, the old Wireless Act of 1912, written before any one had dreamed of nation-wide broadcasting, had been used to regulate the new art. It could not cope with the rapid expansion of broadcasting, and chaos had resulted on the wavelengths. The Dill-White Bill and the creation of the Federal Radio Commission restored order.

The way was cleared for increased service on all wavelengths. The picturegram of a check was sent through the April air of 1926 via the RCA system from London to New York, where it was honored and cashed. On April 30, RCA sent the first radiophoto across the Atlantic on a commercial basis; it was a picture of the Pilgrim Society dinner in London radioed to New York for publication in The New York Times.

Radio activity also spread to far corners of the earth as aviation tested its wings on flights over remote areas. The Byrd-Bennett plane, "Josephine Ford," flew to the

North Pole carrying a 44-meter radio transmitter. That was in May, 1926, the same month that the dirigible Norge sailed over the Arctic and sent the first wireless message directly from the North Pole.

Sports continued to reveal the popularity of its alliance with radio, and on September 23 of that year, the Dempsey-Tunney championship fight was broadcast by long and short waves to all parts of the world; again the world series was broadcast by WJZ's nation-wide hookup.

In 1926 the silent motion picture became a talkie. Electronics gave the film a sound track — and sound being the stock in trade of radio — it had a close relationship with the talking picture. It was natural, therefore, that in 1928, RCA organized the R.C.A. Photophone, Inc., and entered the talking picture apparatus field.*

NILES TRAMMELL
President of the National Broadcasting Company

Soon after formation of the National Broadcasting Company in 1926 the dream of nation-wide broadcasting became a reality as the wire lines stretched from coast to coast to link broadcasting stations.

NBC GOES ON THE AIR

September 9, 1926, became a historic date in the annals of radio — the National Broadcasting Company was organized as a service of RCA. It was announced that the aim of the NBC "will be to provide the best programs available for broadcasting in the United States," and to accomplish its purpose NBC had two key stations in New

*Now, more than 6,000 theatres in the U.S. are regular users of the RCA theatre-sound system.

Announcing the

National Broadcasting Company, Inc.

National radio broadcasting with better programs permanently assured by this important action of the *Radio Corporation of America* in the interest of the listening public

THE RADIO CORPORATION OF AMERICA is the largest distributor of radio receiving sets in the world. It handles the entire output in this field of the Westinghouse and General Electric factories.

It does not say this boastfully. It does not say it with apology. It says it for the purpose of making clear the fact that it is more largely interested, more selfishly interested, if you please, in the best possible broadcasting in the United States than anyone else.

Radio for 26,000,000 Homes

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.

Today the best available statistics indicate that 5,000,000 homes are equipped, and 21,000,000 homes remain to be supplied.

Radio receiving sets of the best reproductive quality should be made available for all, and we hope to make them cheap enough so that all may buy.

The day has gone by when the radio receiving set is a plaything. It must now be an instrument of service.

WEAF Purchased for $1,000,000

The Radio Corporation of America, therefore, is interested, just as the public is, in having the most adequate programs broadcast. It is interested, as the public is, in having them comprehensive and free from discrimination.

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.

To insure, therefore, the development of this great service, the Radio Corporation of America has purchased for one million dollars station WEAF from the American Telephone and Telegraph Company, that company having decided to retire from the broadcasting business.

The Radio Corporation of America will assume active control of that station on November 15.

National Broadcasting Company Organized

The Radio Corporation of America has decided to incorporate that station, which has achieved such a deservedly high reputation for the quality and character of its programs, under the name of the National Broadcasting Company, Inc.

The Purpose of the New Company

The purpose of that company will be to provide the best program available for broadcasting in the United States.

The National Broadcasting Company will not only broadcast these programs through station WEAF, but it will make them available to other broadcasting stations throughout the country so far as it may be practicable to do so, and they may desire to take them.

It is hoped that arrangements may be made so that every event of national importance may be broadcast widely throughout the United States.

No Monopoly of the Air

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 to 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 this experiment in the interest of the art and the furtherance of the industry.

A Public Advisory Council

In order that the National Broadcasting Company may be advised as to the best type of program, that discrimination may be avoided, that the public may be assured that the broadcasting is being done in the fairest and best way, always allowing for human frailties and human performance, it has created an Advisory Council, composed of twelve members, to be chosen as representative of various shades of public opinion, which will from time to time give it the benefit of their judgment and suggestion. The members of this Council will be announced as soon as their acceptance shall have been obtained.

M. H. Aylesworth to be President

The President of the new National Broadcasting Company will be M. H. Aylesworth, for many years Managing Director of the National Electric Light Association. He will perform the executive and administrative duties of the corporation.

Mr. Aylesworth, while not hitherto identified with the radio industry or broadcasting, has had public experience as Chairman of the Colorado Public Utilities Commission, and, through his work with the association which represents the electrical industry, has a broad understanding of the technical problems which measure the pace of broadcasting.

One of his major responsibilities will be to see that the operations of the National Broadcasting Company reflect enlightened public opinion, which expresses itself so promptly the morning after any error of taste or judgment or departure from fair play.

We have no hesitation in recommending the National Broadcasting Company to the people of the United States.

It will need the help of all listeners. It will make mistakes. If the public will make known its views to the officials of the company from time to time, we are confident that the new broadcasting company will be an instrument of great public service.

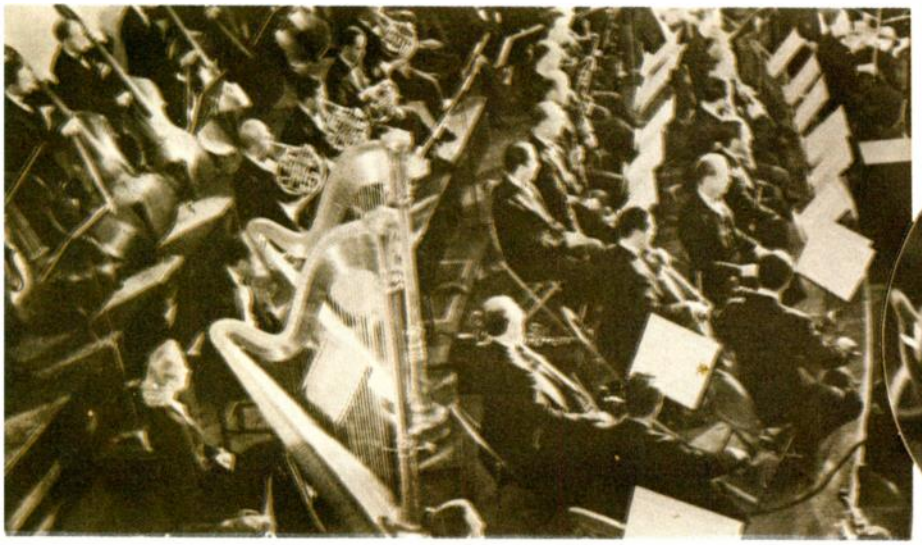
RADIO CORPORATION OF AMERICA

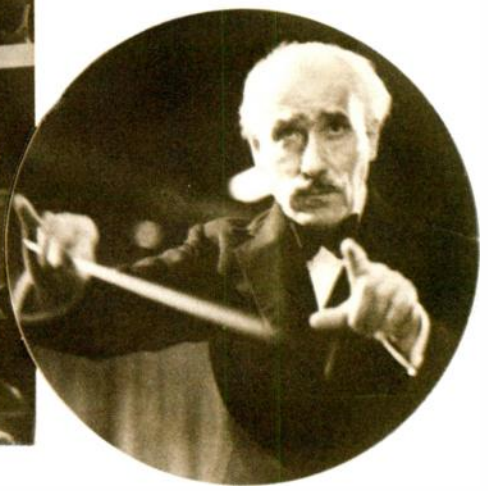
OWEN D. YOUNG, *Chairman of the Board* — JAMES G. HARBORD, *President*

York — WJZ and WEAF.* It was stated that the National Broadcasting Company would not only broadcast its programs through WEAF, but also it would make them available to other broadcasting stations throughout the country as far as it was practicable to do so.

It was recognized that the market for receiving sets in the future would be determined largely by the quantity and quality of the programs broadcast. The aim of RCA was to make available radio receiving sets of the best tonal quality at prices which would enable all to buy. Success in this achievement inspired David Sarnoff to remark, "The richest man cannot buy for himself what the poorest man gets free by radio."

The best available statistics indicated that 5,000,000 homes were radio-equipped, and that 21,000,000 homes remained to be supplied. The day had passed when the radio receiving set was a plaything; it had become an instrument of service — a household utility. There could be no doubt that the future of radio broadcasting would be dependent largely upon the character of the programs.





NBC Symphony Orchestra directed by Arturo Toscanini.

GROWTH OF NETWORK BROADCASTING

It soon became apparent that a single network service was not enough to satisfy the demands of the radio audience for diversified programs of national interest and importance. Station owners, particularly in cities where their competitors had made

*WEAF was purchased by RCA on July 1, 1926 from the Broadcasting Company of America, Inc., to which the station had been transferred by the American Telephone & Telegraph Company, and RCA assumed control on November 15, 1926.

program service arrangements with the NBC or "Red" network, pressed for network affiliations. To accommodate this demand and the public interest, less than two months after the first NBC network service began, a second network — the Blue* — with WJZ, New York, as the key station, was formed.

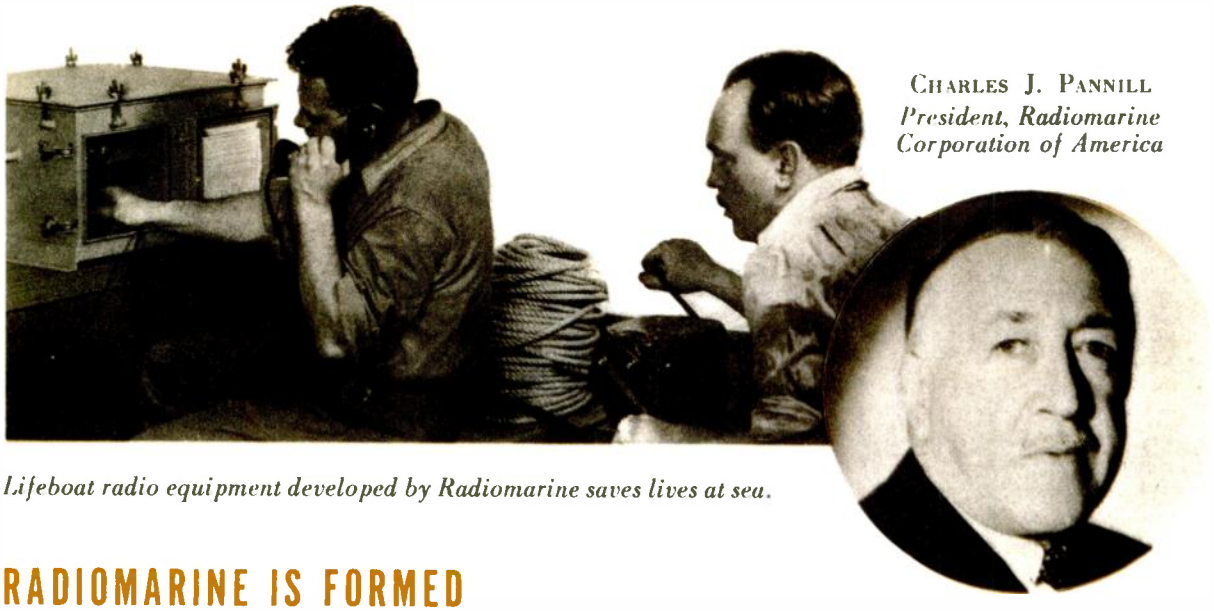
Gradually, the radio network stretched out across the country from the East and from the West, finally connecting at Denver so that the football game in the Rose Bowl at Pasadena was broadcast over a 4,000-mile hookup on New Year's Day, 1927. This was soon followed by the first coast-to-coast broadcast of the opera "Faust" from the stage of the Chicago Civic Auditorium; and by the first trans-continental, 50-station hookup which carried President Coolidge's Washington's Birthday address, the initial broadcast from a joint session of Congress. The return of Charles A. Lindbergh to the United States, after his historic flight to Paris, was broadcast by the largest network of stations ever assembled up to that time.

Again to illustrate the pictorial capacity of radio, RCA picked up radiophoto pictures and messages as they arrived from London and Honolulu at a Massachusetts Institute of Technology dinner on June 11, 1927, in New York.

ABOVE: *Early shipboard radio apparatus, as installed on the SS Minnehaha in 1904, featured a coherer with tape recorder and a spark-coil transmitter — a marked contrast with the modern, compact marine apparatus which utilizes electron tubes and establishes communication with land from any latitude-longitude on the Seven Seas.*

BELOW: *New console radio equipment designed by Radiomarine for shipboard installation combines three transmitters, three receivers and an automatic SOS alarm.*

*For 15 years NBC operated the "Red" and "Blue" networks. The "Blue" was organized as a separate company on January 9, 1942, becoming a wholly-owned subsidiary of RCA. Conforming with new regulations of the FCC restricting the ownership by one organization to a single network in the standard broadcasting band, the "Blue" was sold on July 30, 1943, by RCA to the American Broadcasting System, Inc.



CHARLES J. PANNILL
President, Radiomarine Corporation of America

Lifeboat radio equipment developed by Radiomarine saves lives at sea.

RADIOMARINE IS FORMED

Despite all these triumphs across the hemispheres, radio never relinquished or neglected its direct link with the ocean. The primary use foreseen for wireless in the Nineties was for communication to and from ships at sea. RCA had been engaged in marine radio communication since its formation. As the business expanded, the Radiomarine Corporation of America was formed on December 31, 1927, with Charles J. Pannill in charge. It has since served as a subsidiary of RCA entirely devoted to marine radio activities — to the production and installation of radiotelephone and radiotelegraph equipment on American ships, as well as the maintenance of communication with them through its coastal stations.

In 1927, RCA inaugurated its policy of licensing competitors to manufacture receiving sets and tubes. The inventions thus made available included not only those of RCA but also those of the AT&T, GE, and Westinghouse companies, and of many individual inventors in the United States, as well as those of the foreign radio organizations with which RCA had patent exchange agreements. Within a short time, the radio sets sold by these competitors exceeded — in number and in value — those sold by RCA. The availability of these radio inventions to other manufacturers has been an important factor in putting more radio sets into American homes than are used in all the rest of the world.

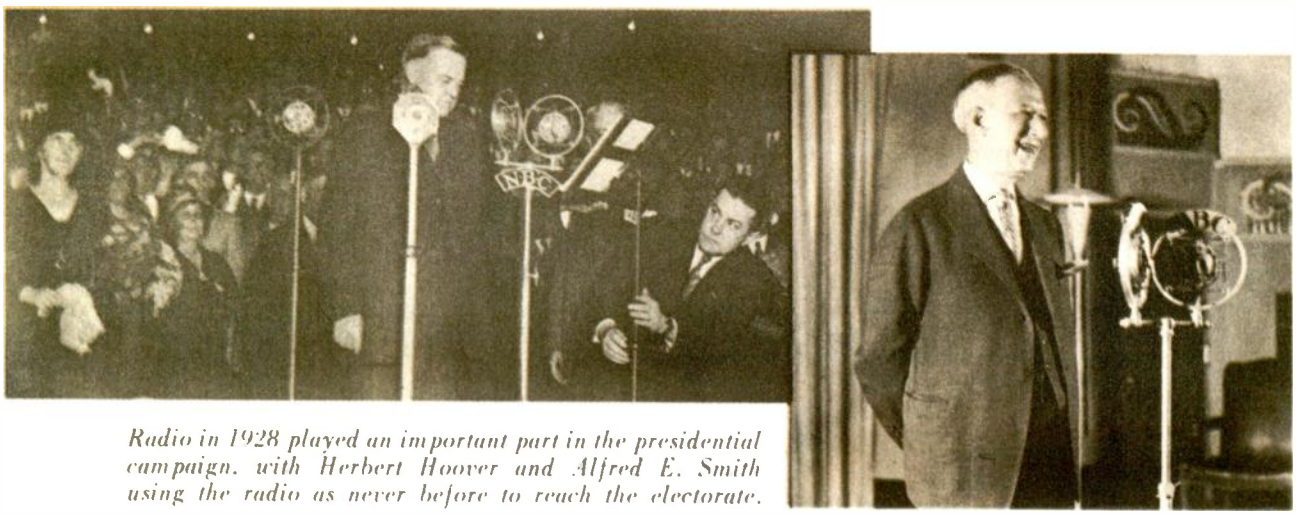
RADIO CHANGES POLITICAL TACTICS

Predictions made in 1924 that radio would revolutionize politics and play a vital part in the 1928 presidential campaign came true. As Herbert Hoover and Alfred E.

Smith campaigned across the country, the microphone went with them, and drastically changed the strategy of political rallies and the style of oratory.

It was estimated that by this time home-radio sets had multiplied to 8,500,000 from 3,000,000 in 1924, and the great increase from 29,022,261 to 36,879,440 in the number of votes cast was attributed to the interest radio injected into the campaign. The radio industry profited by the demand for receivers, as indicated by the fact that in 1928 the radio business was in excess of $500,000,000; in 1920 it had been less than $2,000,000.

In science, radio continued its advance. RCA introduced the screen-grid tube, permitting greater sensitivity of receiving sets with fewer tubes. Automobile-radios were introduced; new electron tube developments, including all-metal tubes, made practical more compact, efficient receivers. Listening-in on the highways was added to the pleasure of motoring. Soon millions of motor cars were radio-equipped, and success in this field led to the development of rugged radio equipment for mobile and mechanized military units as well as for aircraft.



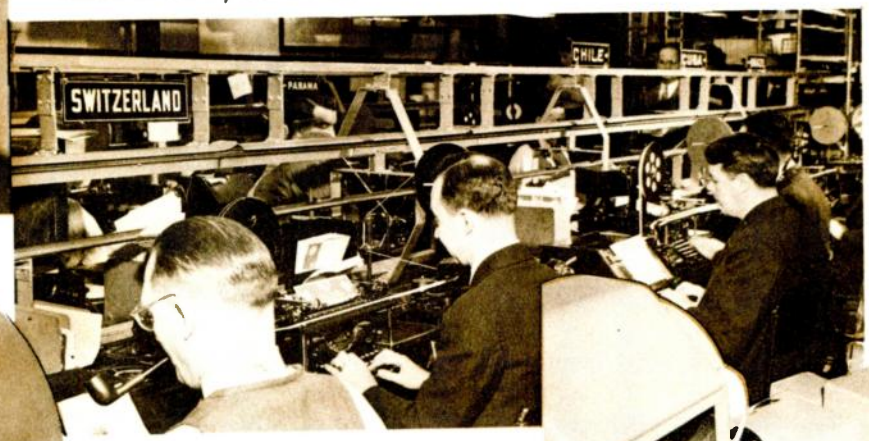
Radio in 1928 played an important part in the presidential campaign, with Herbert Hoover and Alfred E. Smith using the radio as never before to reach the electorate.

R.C.A.C. BECOMES A COMPANY

To increase efficiency and keep pace with the extension of service, R.C.A. Communications, Inc., was organized as a separate company on January 3, 1929, with William A. Winterbottom, Vice President and General Manager.* It became a subsidiary, instead of a department of RCA, engaging primarily in international message

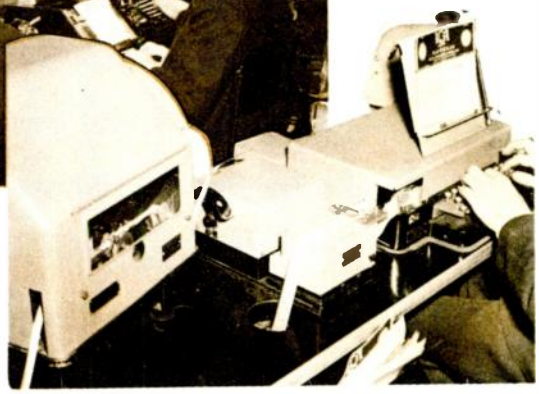
*Mr. Winterbottom died on July 8, 1944, and Lt. Colonel T. H. Mitchell, former Manager of the Southern California District Offices of R.C.A.C., was elected Vice President and General Manager.

The late William A. Winterbottom, who as Vice President and General Manager of R.C.A.C., guided the operation of RCA's world-wide circuits from 1919 to 1944, and played an important part in making the United States pre-eminent in international radio, and New York the communication center of the world.



Radiograms to and from all parts of the world stream along the RCA communication lines.

Lt. Colonel T. H. Mitchell, appointed Vice President and General Manager of R.C.A.C. in 1944.



(radiogram) communication. Success of the high-frequency alternators, rapid development of high-power transmitting tubes and the harnessing of short waves had greatly expanded world-wide communication. In 1927, paid words handled as transoceanic traffic totaled 38,662,500; in 1920 it had been 7,000,000.*

At the opening of 1930, radio was handling approximately 30% of transatlantic message traffic; 25% of South American and 50% of transpacific traffic. Brokerage offices on ocean liners were supplied Wall Street ticker service by RCA wireless. During the stock market crash, these wavelengths were extremely active. And so were the transatlantic wavelengths. In November, 1930, when an earthquake snapped twelve cables on the bed of the North Atlantic, radio efficiently and expeditiously handled a greatly increased volume of traffic.

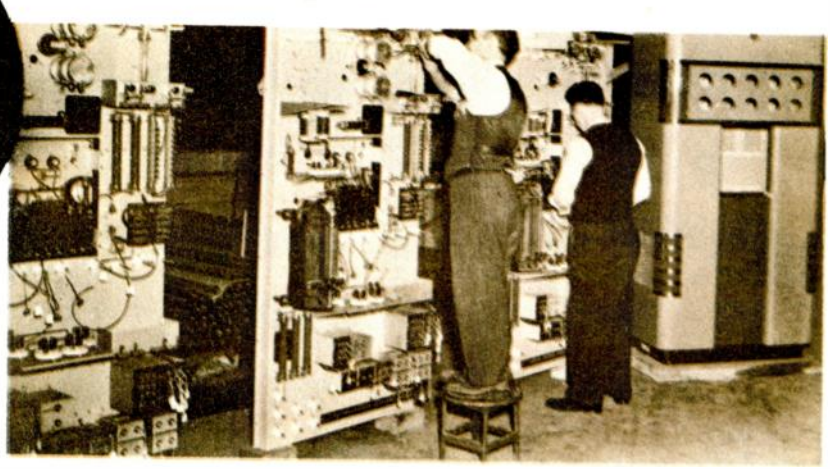
SARNOFF ELECTED PRESIDENT OF RCA

When, at the age of 39, David Sarnoff became President of the Radio Corporation of America, on January 3, 1930, the world faced economic chaos. The radio industry

*In 1943 R.C.A.C. handled 133,755,291 paid words.

FRANK M. FOLSOM
Vice-President in charge of RCA Victor Division

Radio apparatus of all types is produced by RCA; here 250-watt transmitters are being assembled.



had been badly hit by the business depression. RCA's income reflected the downward economic spiral; gross income of $182,000,000 in 1929 dropped to $127,000,000 in 1930; $102,000,000 in 1931; $67,361,143 in 1932 and $62,333,496 in 1933.*

So rapid were the developments and changes in the art of broadcasting that by 1929 it became apparent that RCA's business should be reorganized so that it could combine manufacturing with sales under a unified management. The agreements which were made at the formation of RCA provided that the General Electric Company and Westinghouse Electric and Manufacturing Company would manufacture the radio products and Radio Corporation of America would sell them.

Therefore, to obtain manufacturing facilities as well as an established phonograph and record business, RCA in 1929 acquired the Victor Talking Machine Company.**

"His Master's Voice" before the days of radio.

Thousands of phonograph records of "The Music America Loves Best" are produced by RCA Victor.

Phonograph in 1901.

*Since 1933 the gross income of RCA has expanded substantially, reaching $294,535,362 in 1943.
**RCA Victor in 1942 established a new peak of phonograph record production of 60,000,000 discs.

The catalogue of Victor Red Seal and Bluebird records of "the Music America Loves Best," performed by the great artists of the world, became an outstanding reservoir of entertainment. Agreements were made in 1930 whereby RCA acquired manufacturing facilities from the General Electric and Westinghouse companies. RCA's manufacturing activities date from 1930. In the latter part of 1933, the various units — the RCA Victor Company and RCA Radiotron Company — engaged in the manufacture and sale of RCA products were brought together as the RCA Manufacturing Company, a newly formed, wholly-owned subsidiary.*

THE ADVENT OF TELEVISION

All RCA activities in radio communications naturally led to television. In 1928 television station W2XBS, New York, was licensed to RCA, with the transmitter located at the laboratory in Van Cortlandt Park. As early as 1925, definite steps had been taken in the laboratory to test the possibilities of mechanical and electronic television as a service to the public. The Iconoscope, which became the "eye" of the television camera, was invented by Dr. V. K. Zworykin, Associate Research Director of RCA Laboratories.

Dr. V. K. Zworykin, in 1929, demonstrated the first electronic television receiver using the Kinescope, or picture-tube developed by him, which along with his invention of the Iconoscope — "eye" of the radio camera — made possible the RCA system of electronic television.

His patent application for this basic invention was filed on December 29, 1923. The Kinescope, which serves as the "screen" of home-television sets, also was developed by Dr. Zworykin. He publicly demonstrated the use of the Kinescope for reproduction

*Effective December 31, 1942, RCA Manufacturing Company, Inc., was consolidated with Radio Corporation of America, becoming the RCA Victor Division of the Company.

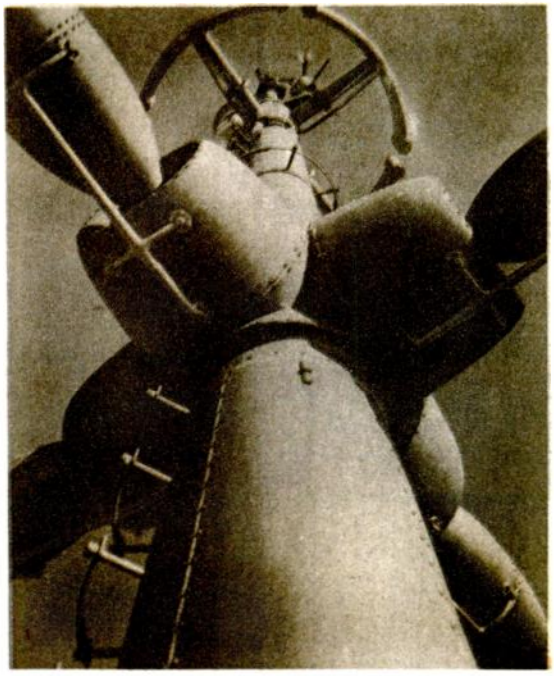
RCA Building, Radio City, New York, is a world-center of radio. It is the home of the Radio Corporation of America and the National Broadcasting Company.

of television pictures on November 18, 1929, at a meeting of the Institute of Radio Engineers at Rochester, N. Y.

Revealing success in its television experiments on January 16, 1930, RCA showed pictures on a 6-foot screen at the RKO-Proctor's 59th Street Theater in New York. The images were transmitted from station W2XBS, which had been moved from Van Cortlandt Park to 411 Fifth Avenue.

RADIO CITY IS PLANNED

Despite the economic slump throughout the world, research and pioneering continued. On April 30, 1930, Marconi, on board his floating laboratory, the yacht Elettra, near the Italian coast conducted a two-way radiophone conversation with David Sarnoff in New York. Progress on many fronts was in the news. Plans were announced for a $250,000,000 Radio City to be built on Manhattan Island by the John D. Rockefeller, Jr., interests, with the RCA Building to be the predominant skyscraper of this modern acropolis. World-wide broadcasting became more effective, and radio-telegraphy further extended its circuits on December 6, when RCA established direct radio communication with China, linking San Francisco and Shanghai. The year 1930 ended with television gaining space in the news, but it was still apparent that years of experimentation were ahead before a "television Christmas" would be made possible by Santa Claus delivering video receivers to the home.



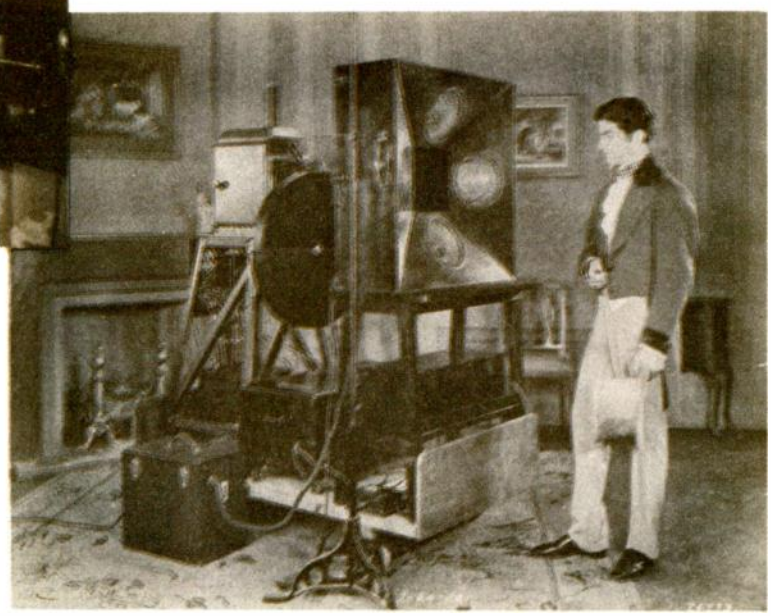
In 1931 the Empire State Building, New York's loftiest skyscraper became the site of the RCA-NBC pioneer television station; the antenna is atop the dome.

SKYSCRAPER FOR RCA-NBC TELEVISION

The year 1931, definitely took television out of the laboratory when it was announced that the Empire State Building, the world's highest skyscraper, had been selected by RCA-NBC as the site for a television station that would use ultra-short waves. The station began experimental field tests in October. Predictions of television possibilities were intensified, and some envisaged the Metropolitan Opera as a telecast. But this was a bit premature, for it was not until December 25, 1931, that "Hansel and Gretel" was the first broadcast directly from the stage of the Opera House — with sound but not with sight — through the combined NBC networks.

ABOVE: *In the late Twenties, Felix the Cat and Mickey Mouse whirled for hours on a phonograph turntable in front of television "eyes," while engineers in the field made reception tests.*

BELOW: *Television in 1928, as set up in the RCA-NBC experimental station W2XBS, New York.*



Further advances in television were revealed in 1932 when field tests of 120-line television were made by RCA at Camden, with signals relayed by radio from New York through Arney's Mount, New Jersey. The novel feature of this test, conducted on May 25, was that the pictures were automatically relayed for the first time, thus giving rise to the promise that such relay stations might some day dot the countryside

to "bounce" television pictures from city to city without the use of wire networks. These experiments and other tests that followed inspired Mr. Sarnoff to predict that radio eventually might dip into the mail bags and flash facsimiles of printed and handwritten letters as well as other documents, delivering them across the country and over the seas, thereby competing with the air mail.

The summer air in 1932 vibrated with the Republican and Democratic National Conventions and campaigns. Roosevelt and Hoover were the contestants as the Democratic band played "Happy Days Are Here Again." The final count was 22,821,857 votes for Roosevelt; Hoover, 15,761,841.*

As the radio cavalcade moved into 1933, the Roosevelt inaugural was broadcast internationally. Called the "Radio President" because of his excellent radio voice, Roosevelt seemed to be inseparable from radio. No President had ever made such use of the broadcasting facilities of the country. On March 12 of that year, in his first "fireside chat" on the Banking Moratorium, Roosevelt revealed the great power of radio in reaching the people. His "fireside chats" became historic, and before the end of 1933 he had delivered four of them.

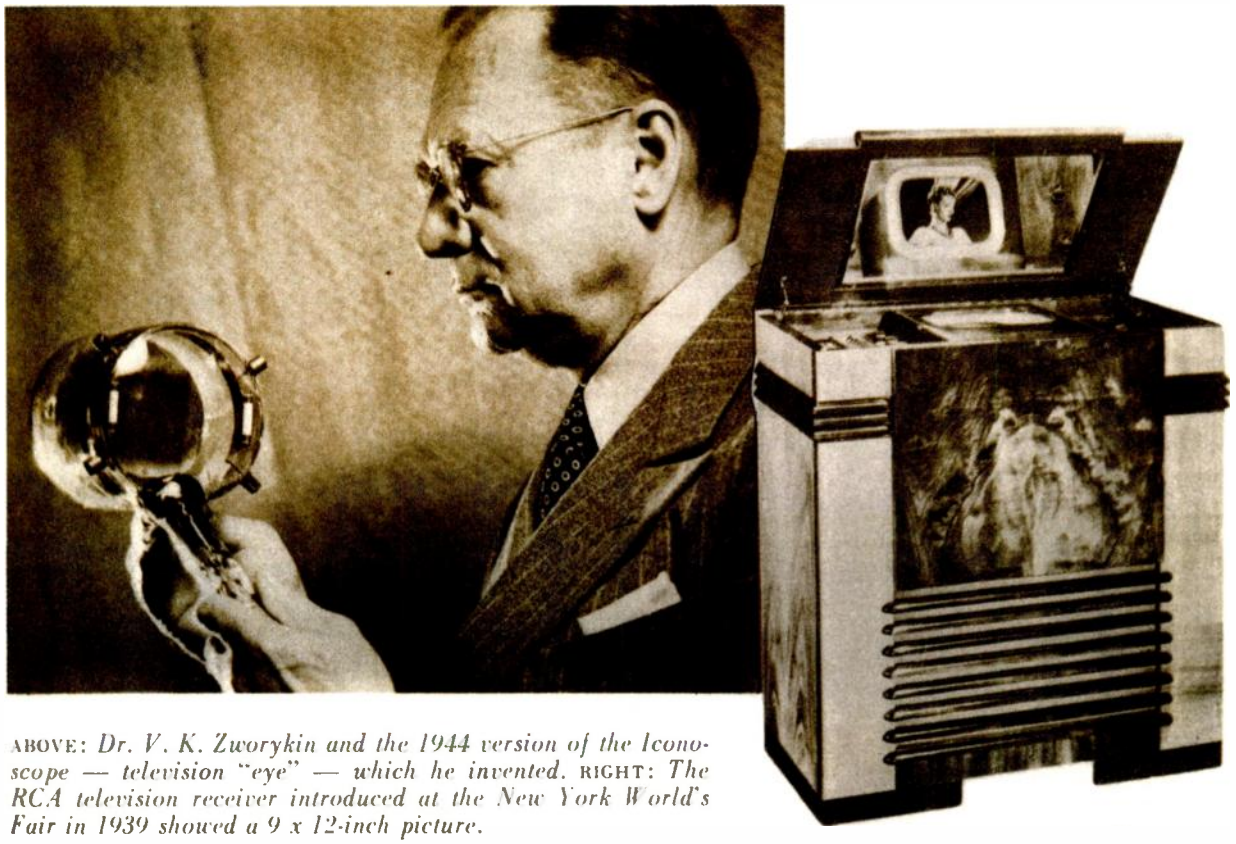
The television camera uses the Iconoscope as its "eye," perfected in RCA Laboratories.

*In 1920 (no broadcasting) vote totaled 26,705,346; in 1932 it was 39,816,522 or 3,000,000 more than in 1928. Receiving sets in the U.S. totaled 18,000,000 in 1932; 33,000,000 in 1936; 50,100,000 in 1940; 60,000,000 in 1944. Total ballots cast in 1940 were 49,815,312.

IMPORTANT STEPS OF PROGRESS

As a symbol of material progress, Radio City in New York was completed despite the depression, and on November 11, 1933, the new studios of the National Broadcasting Company were dedicated to the service of the American public. Scientific developments continued to emerge from the laboratories of RCA. A self-contained portable ultra-high frequency knapsack transmitter was built by NBC for use in broadcasts of outdoor events and for military scouting in the field. It was the forerunner of "walkie-talkie" and "handy-talkie" wartime radio outfits. The electron multiplier tube, capable of amplification hundreds of thousands of times within a single tube, was devel-

Knapsack transmitters and other portable equipment developed by RCA-NBC in the early Thirties were "grandfathers" of the walkie-talkie which found important use in the Second World War.



ABOVE: *Dr. V. K. Zworykin and the 1944 version of the Iconoscope — television "eye" — which he invented.* RIGHT: *The RCA television receiver introduced at the New York World's Fair in 1939 showed a 9 x 12-inch picture.*

oped and demonstrated by RCA engineers. An automatic SOS alarm for use of vessels not having a radio operator on constant watch was introduced by the Radiomarine Corporation of America. The first ultra-high frequency automatic radio relay circuit was opened by RCA between New York and Philadelphia, transmitting simultaneously facsimile and multiple radiotelegraph messages. Further to reveal the flexibility and tremendous range of radio, Marconi's 61st birthday was celebrated on the air in a broadcast which featured salutes from ships at sea, from Admiral Richard E. Byrd in the Antarctic and from the Graf Zeppelin flying over the South Atlantic.

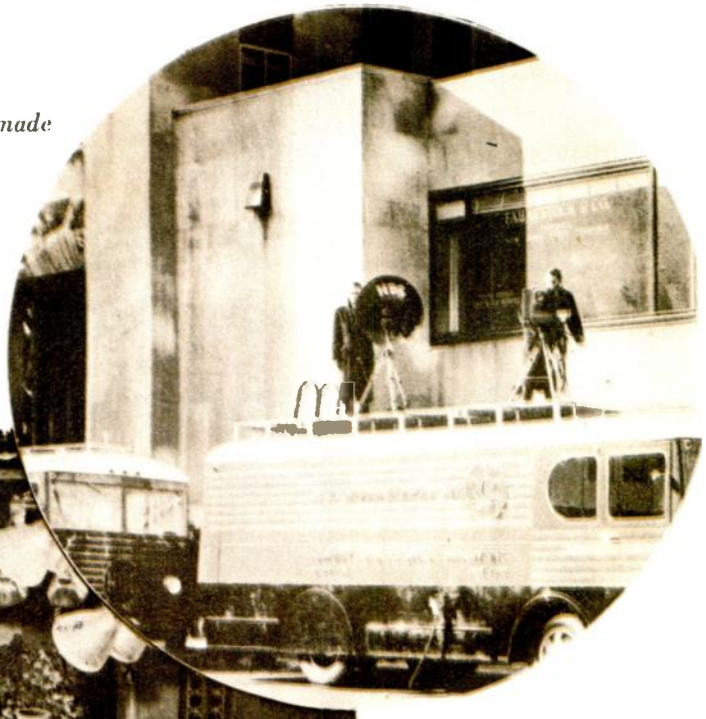
As evidence of its faith in the future of television, RCA on May 7, 1935, announced a plan to spend $1,000,000 for field tests of television.* At Camden on April 24, 1936, RCA demonstrated outdoor television with local firemen as the actors; the broadcast was on a 6-meter wave over the distance of a mile. This was soon increased. On June 29, RCA's television field tests got under way from atop the Empire State Building, and radio manufacturers were given a demonstration featuring radio artists and films, seen 50 miles away. As further indication of the widespread activity

*RCA has spent more than $12,000,000 in television research and development.

of radio, the NBC maintained two-way communication with a United States Army stratosphere balloon while listeners throughout the country heard the conversations. To another extreme, the rumble of Mt. Vesuvius was broadcast to America for the first time through a microphone suspended over the rim of the crater. Radio receiving sets were now all-wave; by merely pressing a button the listener could tune in, with the utmost precision. For the fourth time radio went to the national political conventions; the summer breezes pulsed with politics as Roosevelt and Landon campaigned on the wavelengths.

Ultra-short wave equipment for use by police and in the emergency field was developed and its use initiated by RCA.

RCA's compact two-way police radio apparatus is conveniently installed in the baggage compartment of the car.



RCA-NBC mobile television vans made it easy to televise outdoor events.

The NBC television studio in New York festooned with lights has a Hollywood setting.

HISTORY MADE ON THE AIR

The year 1936 ended with one of the most dramatic events which ever took place on the international stage. King Edward VIII abdicated. His farewell to the British people on December 11, following his renunciation of the throne, was heard by what was then believed to have been the largest audience that ever listened to a single voice.

The next day the first proclamation of King George VI to the British Empire was read on the radio by the heralds. On May 12, 1937, the Coronation of George VI and

Queen Elizabeth was a world-wide broadcast — the first such event to be on the air. At the same time, the first telecast of a coronation was estimated to have been seen by 50,000 televiewers over an area of 7,500 square miles in Britain.

Dr. Zworykin and his associates in RCA Laboratories kept up their constant development of television and perfected an electronic projector which "painted" television pictures on an 8 by 10-foot screen. For the first time, mobile television vans appeared on the streets of New York, developed by RCA and operated by NBC. These stations on wheels soon proved their usefulness by relaying outdoor track meets, baseball, football, prize fights and parades to the main NBC transmitter in the Empire State Building.

OMINOUS SOUNDS OF WAR

Over Europe the clouds of war were darkening. Reverberations of the impending storm thundered on the radio from Europe. Hitler on February 20, 1938, was heard in a 3-hour broadcast talking defiantly of the future — warning other nations "hands off" in a "steel and blood" speech. Prime Minister Chamberlain in an emotional international broadcast announced Britain ready to fight any power seeking to dominate the world by force. As "a man of peace to the depths of my soul," he pledged every

Modern history is made on the air — President Roosevelt and Prime Minister Winston Churchill were heard around the world in historic pronouncements.

effort to preserve peace until the last moment. Then, on September 30, 1938, all the world listened to him as he stepped from a plane at Heston Airdrome on his return from the meeting with Hitler at Munich, when he dramatically announced he had gained "peace for our time."

RIGHT: *President Roosevelt as photographed directly from a television screen on April 30, 1939.* BELOW: *President Roosevelt speaking at the opening of the New York World's Fair was the first Chief Executive to be seen and heard on the air at the same time; (A) the President; (B) television camera.*

BIRTH OF TELEVISION AS AN INDUSTRY

In America, the New York World's Fair opened on April 30, 1939. The ceremony, televised by NBC, featured President Roosevelt as the first Chief Executive to be seen as well as heard on the air.

Standing before a microphone at the RCA exhibit at the Fair, Mr. Sarnoff announced the birth of a new industry — television. "Now we add sight to sound," he said. "It is with a feeling of humbleness that I come to this moment of announcing the birth in this country of a new art so important in its implications that it is bound

David Sarnoff launching television as an industry at the New York World's Fair in the spring of 1939.

to affect all society. It is an art which shines like a torch in the troubled world. It is a creative force which we must learn to utilize for the benefit of all mankind. This miracle of engineering skill which one day will bring the world to the home, also brings new American industry to serve man's material welfare. Television will become an important factor in American economic life."

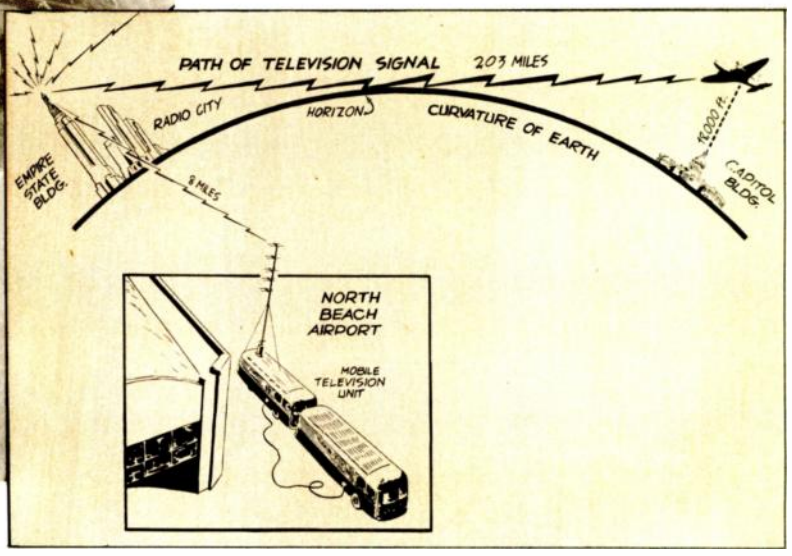
Events of "first magnitude" came fast after that. The Columbia-Princeton baseball game was televised by NBC as a "first" from the diamond at Baker Field. As far away as Schenectady, 130 miles from New York, people who had television sets saw

RCA Building at the New York World's Fair contained exhibits that revealed "the World of Tomorrow" in radio.

King George VI and Queen Elizabeth at the New York World's Fair. The Brooklyn Dodgers-Cincinnati Reds baseball game at Ebbets Field was televised as the first big league game to be seen on the air. The Fordham-Waynesburg football game in New York was the first gridiron contest to be telecast.

In order to follow the ultra-short waves which left the horizon on a tangent, RCA sent a television-equipped plane on a flight to Washington. It was found that the plane had to go up 18,000 feet over the Capitol to see television from New York, 200 miles away. Mr. Sarnoff sat before a television camera in Radio City and as he talked to the airmen, they saw him on the television screen in their plane. Continuing experiments linking television and aviation, RCA placed special camera and transmitting apparatus in an airliner, and on March 6, 1940, a bird's-eye view of New York City was telecast.

A year later, to test the usefulness of television at sea, RCA installed receiving sets on board the SS President Roosevelt and, while the ship was enroute to and from Bermuda, television pictures broadcast from New York were viewed clearly 250 miles at sea.



A radio-equipped airplane looked-in on New York by television from an altitude of 18,000 feet over the Capitol in Washington. Diagram illustrates the performance of the ultra-short waves.

WAR ON THE RADIO

Then war assumed an all-important place on the radio. Germany invaded Poland on September 1, 1939. England and France declared war on Germany, and all of the

momentous events that ensued had first place on the radio programs of each day; the world listened as news became history.

Radio flashed Italy's entrance into the war on June 10, 1940; on the 14th, there came the announcement that the "German army is inside Paris." A week later, a stunned world listened to the historic broadcast from Compiegne when Hitler and his staff handed armistice terms to French plenipotentiaries in the famous Armistice Car of World War I.

Television cameras at Ebbets Field scan the Dodgers in action on the diamond.

TELEVISION CAMERA "EYES" CONVENTION

Television was blacked out in London, while developments were rushed in the United States as farsighted radio men saw the possibility of great use for television should war come to America. At Camden, RCA demonstrated color television to the Federal Communications Commission on February 6, 1940. From Madison Square Garden, hockey, basketball and intercollegiate track meets were televised by NBC, while plays and tabloid versions of opera and religious services were telecast from Radio City. The opening game between the Giants and Dodgers and the Ringling Brothers, Barnum and Bailey Circus were seen on the air. But the curtain dropped on May 27, 1940, when the FCC changed the rules it had previously announced to permit "limited commercial operation" and relegated television back to an experimental existence.

Without the advantages of commercial operation, experimental television con-

For the first time television cameras of RCA-NBC scanned a national political convention when they focused on the 1940 Republican conclave at Philadelphia. Wendell Willkie, the GOP standard bearer, and many other notables in the political arena were seen by the television audience in the New York area.

tinued, as the Republican Convention in 1940 was telecast through NBC, New York. Coaxial cable linked the camera in the political arena at Philadelphia with the transmitter at the Empire State Building in New York. Films of the Democratic Convention at Chicago were rushed by plane to New York for telecast. President Roosevelt was televised by NBC at a Democratic Rally in New York, and Wendell Willkie, the GOP candidate, was seen at a Republican Rally. For the first time, election returns were telecast by NBC when the camera scanned the press teletype machines as they tapped off the bulletins.*

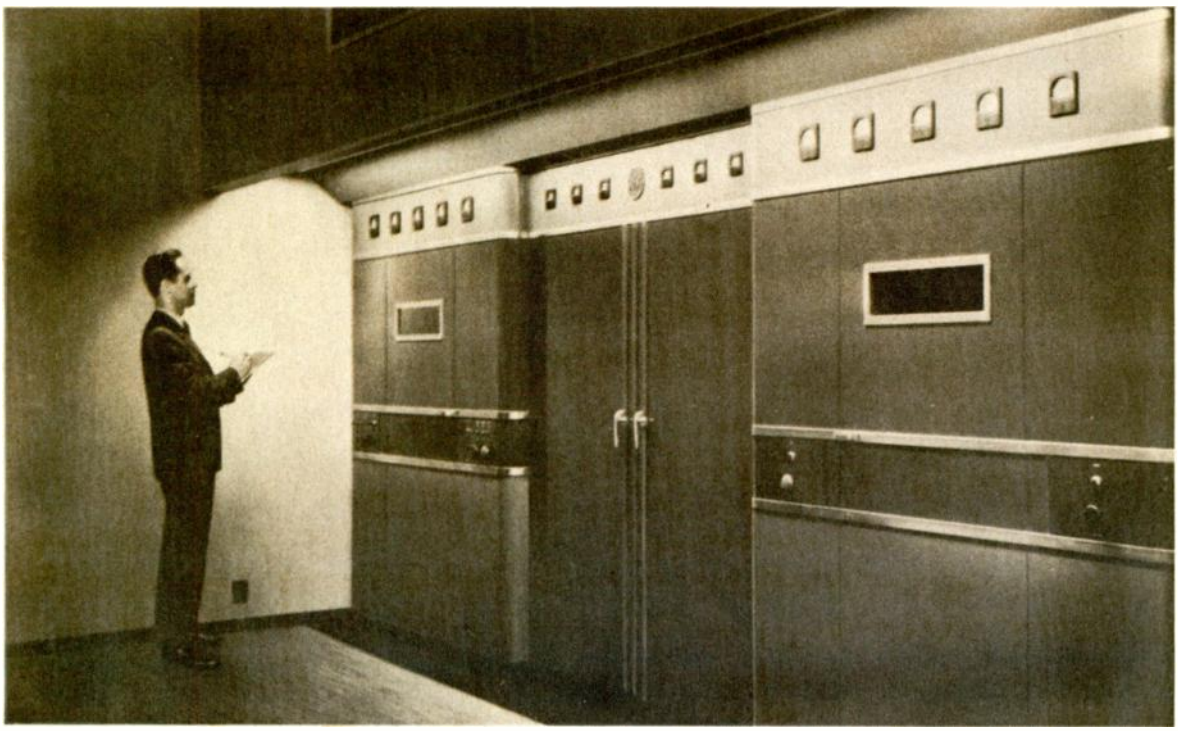
FM GETS UNDER WAY

Coincident with these developments in television, an energetic movement to develop frequency modulation (FM) as a public broadcasting service was instituted in the autumn of 1940 by the sale of FM transmitters and the introduction of FM broadcast receivers by a number of manufacturers. This development was retarded after the spring of 1941 by the needs of the Nation's defense production programs, until finally the production of radio apparatus for civilian use was stopped by Government order. There were, however, forty-three commercial FM stations and six experimental FM stations operating with a program service in a number of the principal cities of the United States.

*NBC also telecast films of the 1944 National Conventions: the newsreels were flown from Chicago to New York.

Early tests of frequency modulation which afforded valuable information as to its advantages and potentialities were made by RCA, and its pioneering in this field has never stopped. For many months during 1934-35, the RCA-NBC experimental television transmitter in the Empire State Building was used for extensive field tests of FM broadcasting under practical operating conditions.

RCA promoted FM broadcasting in many ways, and during the 1940 hearings before the Federal Communications Commission, advocated that FM broadcasting be



Modern FM broadcast transmitter designed by RCA engineers for the NBC station in New York.

authorized by the Commission on a full commercial basis. RCA sold FM broadcasting transmitters and made post-war plans to manufacture and sell FM receivers for the home as well as FM transmitters for broadcasters. RCA engineers developed an improved FM receiver, utilizing what is called the "Beers" circuit, which has superior noise-reducing properties, and provides better adjacent channel selectivity, thus adding substantially to the usefulness of frequency modulation.

NBC was the first company in the New York area engaged in standard broadcasting to engage also in FM broadcasting. In January, 1940, it installed an FM broadcasting transmitter in the tower of the Empire State Building, replacing its experimental FM transmitter. It has broadcast programs regularly since that time.

The year 1941 opened with President Roosevelt's third inaugural broadcast by more than 500 stations. The number of radio sets in the United States was estimated to total more than 56,000,000. New small tubes and associated devices developed by RCA, in 1939, extended development of portable radios to include camera-size, "personal" sets carried in the hand or on shoulder straps. Gone were the copper webs of antenna wires that had overspread roof-tops. Now loop antennas were used inside portable cabinets, while "fishpole" type antennas simplified auto-radio installations. The combination radio-phonograph gained in popularity as the vogue for "music you want when you want it" became increasingly popular. It was estimated that in the New York area there were approximately 5,000 combination radio-television instruments capable of all-wave broadcast reception.

Theatre television as developed by RCA projected the Soose-Overlin middleweight championship fight in May, 1941, at Madison Square Garden onto a 15 x 20-foot screen in the New Yorker Theatre.

A POST-WAR VIEW OF TELEVISION

As if to paint a pattern for the future, RCA on January 24, 1941, demonstrated to the FCC home-television receivers with 13½ by 18-inch translucent screens; television on a screen 15 by 20 feet in the New Yorker Theater; pictures automatically radio-relayed from Camp Upton on Long Island to New York; also facsimile multiplexed with a frequency-modulation sound broadcast. A month later, television pictures in color were first put on the air by NBC from the Empire State Building transmitter.

Experimental large-screen television receiver designed by RCA for home use shows a 13½ x 18-inch picture on a translucent screen which slides down into the cabinet when not in use.

Automatic radio-relay stations developed by RCA are used to "bounce" television programs and other communications on ultra-short waves from city to city.

But it was not to be the destiny of television that these developments should quickly come into the service of the public. War postponed them to the post-war era.

The FCC, however, on May 2, 1941, authorized commercial television effective July 1, and on that day WNBT, the NBC pioneer television station in New York began commercial operation.

Paralleling television developments, the first radiophotos ever received on this side of the Atlantic from Moscow were picked up by R.C.A. Communications, Inc., on July 8, 1941, and were printed in newspapers throughout the country.

RCA CONVERTS TO WAR

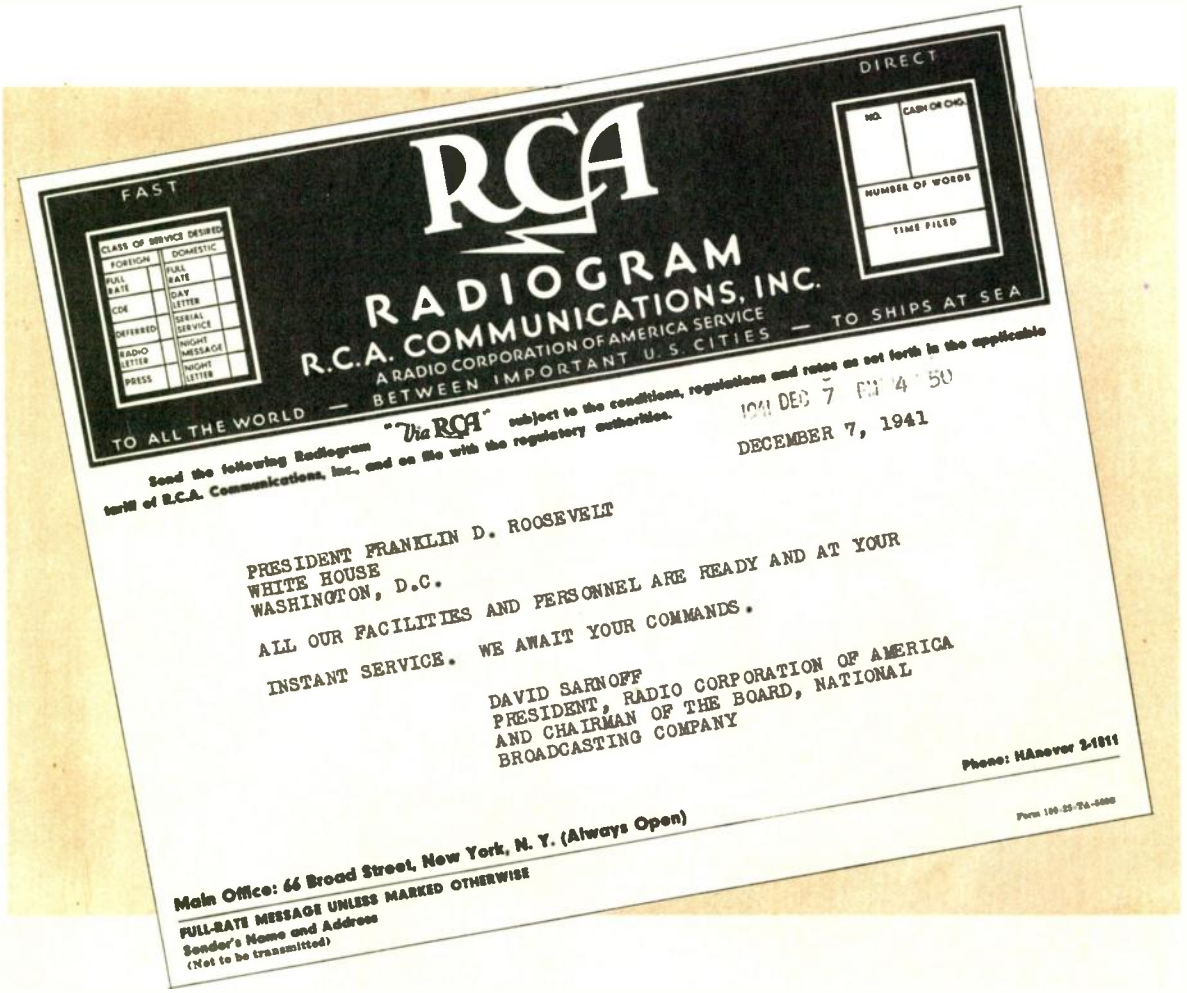
As early as September, 1939, RCA manufacturing facilities were being converted to supply equipment for the armed forces of the United Nations and for civilian defense. A program of conversion of plant, machinery and manpower from commercial to war production was planned and instituted. The process of conversion continued at a greatly accelerated rate in 1940-41.

To centralize its scientific research for national defense as well as for the post-war period, RCA in 1941 brought its research and invention activities together into a single division of the company, known as RCA Laboratories with Otto S. Schairer, Vice President in charge. On August 8, 1941, ground was broken for the new labora-

Officials of RCA at the ground-breaking ceremonies of RCA Laboratories on August 8, 1941, at Princeton, New Jersey.

Lieut. General J. G. Harbord laying the cornerstone of RCA Laboratories on November 15, 1941.

tory buildings at Princeton, New Jersey, designed to become the foremost center for radio-electronic research in the world. It was dedicated "to increase the usefulness of radio and electronics to the Government, to the public and to industry." The cornerstone was laid on November 16, 1941, less than a month before the flash from Hawaii that Japan had attacked Pearl Harbor.



FAST

DIRECT

RCA

RADIOGRAM

R.C.A. COMMUNICATIONS, INC.

A RADIO CORPORATION OF AMERICA SERVICE

BETWEEN IMPORTANT U.S. CITIES

TO ALL THE WORLD — TO SHIPS AT SEA

Send the following Radiogram "Via RCA" subject to the conditions, regulations and rates as set forth in the applicable tariff of R.C.A. Communications, Inc., and on file with the regulatory authorities.

1941 DEC 7 PM 4 50

DECEMBER 7, 1941

PRESIDENT FRANKLIN D. ROOSEVELT
WHITE HOUSE
WASHINGTON, D.C.

ALL OUR FACILITIES AND PERSONNEL ARE READY AND AT YOUR INSTANT SERVICE. WE AWAIT YOUR COMMANDS.

DAVID SARNOFF
PRESIDENT, RADIO CORPORATION OF AMERICA
AND CHAIRMAN OF THE BOARD, NATIONAL BROADCASTING COMPANY

Main Office: 66 Broad Street, New York, N. Y. (Always Open)

FULL-RATE MESSAGE UNLESS MARKED OTHERWISE

Sender's Name and Address
(Not to be transmitted)

Phone: HAnover 2-1011

IN SERVICE OF THE NATION

As President of RCA, Mr. Sarnoff, on December 7, sent a radiogram to President Roosevelt at the White House:

> ALL OUR FACILITIES AND PERSONNEL ARE READY AND AT YOUR INSTANT SERVICE. WE AWAIT YOUR COMMANDS.

In the final days of the year, war dominated every phase of radio activity. President

Roosevelt on December 8 was heard in an international broadcast asking Congress to declare war on Japan; again on December 11, against Germany and Italy. In each instance, the prompt response of Congress was heard by a world-wide audience.

The Radio Corporation of America now was at the service of the Nation in the most gigantic task ever assigned to industry. By the end of 1941, more than 100 manufacturers were licensed by RCA to use its inventions and patents, thereby stimulating competition and opening channels of supply for successful conduct of the war as well as for commercial use. RCA at the request of the War and Navy Departments entered into a license agreement with the United States Government, effective July 1, 1942, for the duration of the war and six months after cessation of hostilities. The Government was licensed under RCA patent rights to make, and to have others make, various types of radio apparatus for war use.

As one of the first steps to establish improved communications with the South Pacific, R.C.A.C. on December 25 opened the first direct radiotelegraph circuit between

On April 22, 1942, manufacture of civilian radios stopped, and the last instrument came off the RCA production line as the plants were geared for production of war equipment.

United States and Australia, soon to be supplemented by a direct radiophoto circuit.

The War Production Board notified the radio manufacturing industry that it must be converted 100% to war production within four months and that manufacturing of civilian radios must stop. The making of radios and phonographs for civilian use terminated on April 22, 1942.

RCA Laboratories, Princeton, New Jersey, one of the foremost centers of radio and electronic research in the world.

Otto S. Schairer, Vice President in charge of RCA Laboratories.

NEW RCA LABORATORIES DEDICATED

RCA Laboratories were dedicated at Princeton, New Jersey on September 24, 1942, at which time Major General Dawson Olmstead, then Chief Signal Officer of the Army, said:

"The RCA, like the Signal Corps, has pioneered in communications. For two decades it has been among the foremost in the new developments of the radio art. When

the Radio Corporation of America was formed in 1919 one of its main purposes was to establish a world-wide American radiotelegraph system that would give the United States preeminence and a degree of independence in radio communication. The present crisis proves the value of the company's developments in communications, broadcasting, research, engineering and manufacturing in rendering service of tremendous importance to our Government and to those nations who are our allies in this war . . .

"The Signal Corps plays a most important role in this highly mechanized war. It provides for our rapidly expanding army the most modern design for radio, telephone and telegraph communications equipment. And the RCA may well be proud of its contribution to the war effort in assisting and making possible for us the finest military communication system of any army in the world.

Charles J. Young, specialist in radio facsimile, directing an experiment by Harold C. Greig, at RCA Laboratories.

BELOW: *Cyril N. Hoyler, Dr. George H. Brown, and R. A. Bierwirth, of RCA Laboratories, with the electronic dehydrator which they developed to speed production of penicillin.*

Singing "The Star Spangled Banner," led by Miss Lucy Monroe, concluded the dedication of RCA Laboratories on September 27, 1942.

"It is well known that there has never been a time in its history when the research and experiment in RCA Laboratories slackened, or when new products and services were not in the process of development. The result of the work done by the men and women of RCA and the significant part in the hidden battlefront of research, is entirely worthy of America's finest pioneer traditions."

Commander A. M. Granum, representing the U. S. Navy, said:

"This enterprise is very close to the heart of the service. We have it impressed upon us daily when our fellow officers and men come in from the combat zones, what radio and electronics mean to them in conflict with the enemy. We realize we are in competition with our enemy not only in the field of combat but in their scientific and engineering research. In this competition we need teamwork. It is inspiring to see a laboratory of this sort set up where the best talent and genius of a great organization are brought together to work as one team."

Speaking as an army officer in active service, Colonel David Sarnoff said:

"Our admiration for these Laboratories is based upon more than their obviously fine qualities of architecture and construction. We are moved by the deep respect in

which we hold the virtues of scientific accuracies and intellectual integrity. These are virtues possessed to a high degree by the type of men who will work within these walls. These are the qualities which are helping to preserve our civilization and which in turn make our civilization worth fighting for.

"The day of victory will surely come, and the words 'Peace on earth, good will to men' will again ride the radio beams of all the world. The American men of science will draw upon their wartime research to develop finer and more useful products and services for peacetime purposes. Out of the ashes of war, they will bring forth implements for a new and better civilization."

The many activities of RCA Laboratories revealed how far radio was spreading into broader fields — electronics, acoustics, physics, mechanics and optics. At the same time, continuous laboratory research enabled the older, established services of radio to continue to improve and to keep in stride with the swift progress of the art. The electron tube became a master key to open new fields for scientific exploration, expanding the services of radio and the usefulness of its products in science, industry and the arts.

The first RCA laboratory, in 1919, was located in a tent at Riverhead, Long Island.

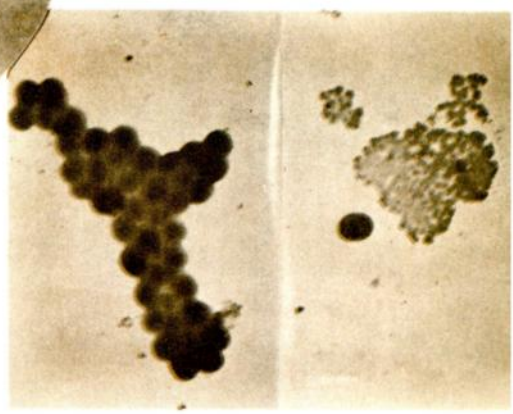
ELECTRON MICROSCOPE OPENS UNSEEN WORLDS

Among the greatest contributions which radio has made to the progress of the other sciences and to industry is the electron microscope, using electrons instead of light rays to penetrate the hidden mysteries of nature. This achievement has been developed by RCA Laboratories into an amazing instrument — the most revolutionary laboratory tool of the Twentieth Century. It has played an important part in wartime research.

Micrographs — pictures of bacteria taken through the electron microscope.

Streptococcus B. Haemolyticus magnified 43,000 times.

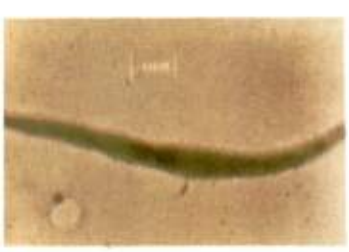
Syphilis bacteria magnified 31,000 times.



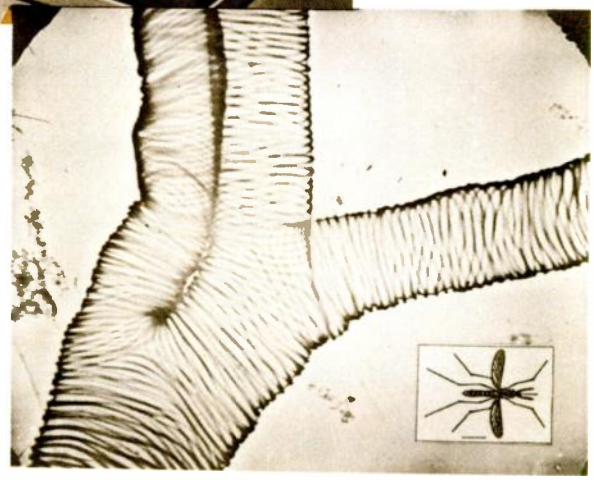
Grape-like cluster of bacteria as viewed through the electron microscope. RIGHT: *The same cluster as photographed after treatment with penicillin, showing how the bacteria were destroyed.*

Many times more powerful than the strongest optical microscope, it magnifies infinitesimal objects of the sub-microscopic world and permits photographic enlargement up to 100,000 diameters. Its usefulness in science, medicine, health, biology, metallurgy, chemistry, industry, and associated fields of research, extends its applications far into the post-war era. In laboratories, hospitals and universities the electron

Malarial sporozoite magnified 22,000 times.



The RCA electron microscope — one of the most revolutionary scientific instruments of the 20th Century — magnifies infinitesimal objects of the submicroscopic world and permits photographic enlargements up to 100,000 diameters.



Console model of the RCA electron microscope enables photographic enlargement up to 100,000 diameters, depending on the subject matter. RIGHT: *The windpipe of a mosquito magnified 65,000 times.*

microscope is a key to original exploratory work that is continuously bringing to light new knowledge. This instrument, which made it possible to photograph the influenza virus for the first time, has been developed in standard and portable form. An attachment or unit, known as a "diffraction camera," is also available for the standard or universal instrument, so that the microscope will not only magnify the structure of an infinitesimal object but will also actually determine the atomic design.

Still another new instrument, incorporating the electron microscope, was designed experimentally in RCA Laboratories. Called an electron micro-analyzer, it identifies the chemical elements in microscopic specimens. For example, if the nucleus of a bacterium contains iron, the micro-analyzer detects it.

RADIOTHERMICS—RADIO HEAT

Radiothermics is another of the new fields which has revealed great promise for war as well as post-war use. Application of radio-frequency heating to improve and speed industrial processes, reduce costs and produce better products, has rapidly come to the fore with RCA as a leader in this new technique.

Various fields in which radiothermic equipment can be used include: heating, drying, gluing, case hardening, annealing, riveting, welding, melting of rare metals, and in deactivating enzymes in food to be dehydrated. In the processing of laminated wooden propellers for aircraft, heat is required to set the adhesive. Radio-frequency heating does this work in minutes instead of the hours required to do it by steam. "Cakes" of textiles are dried quickly; rubber is "radio cemented" to wood or plastic; thermoplastic materials are seamed by a radio-electronic sewing machine. Applying radiothermics, Dr. George H. Brown and his associates, C. N. Hoyler and R. A. Bier-

The RCA electronic sewing machine seams thermoplastic materials.

Radio-frequency heat is used to detonate explosive rivets.

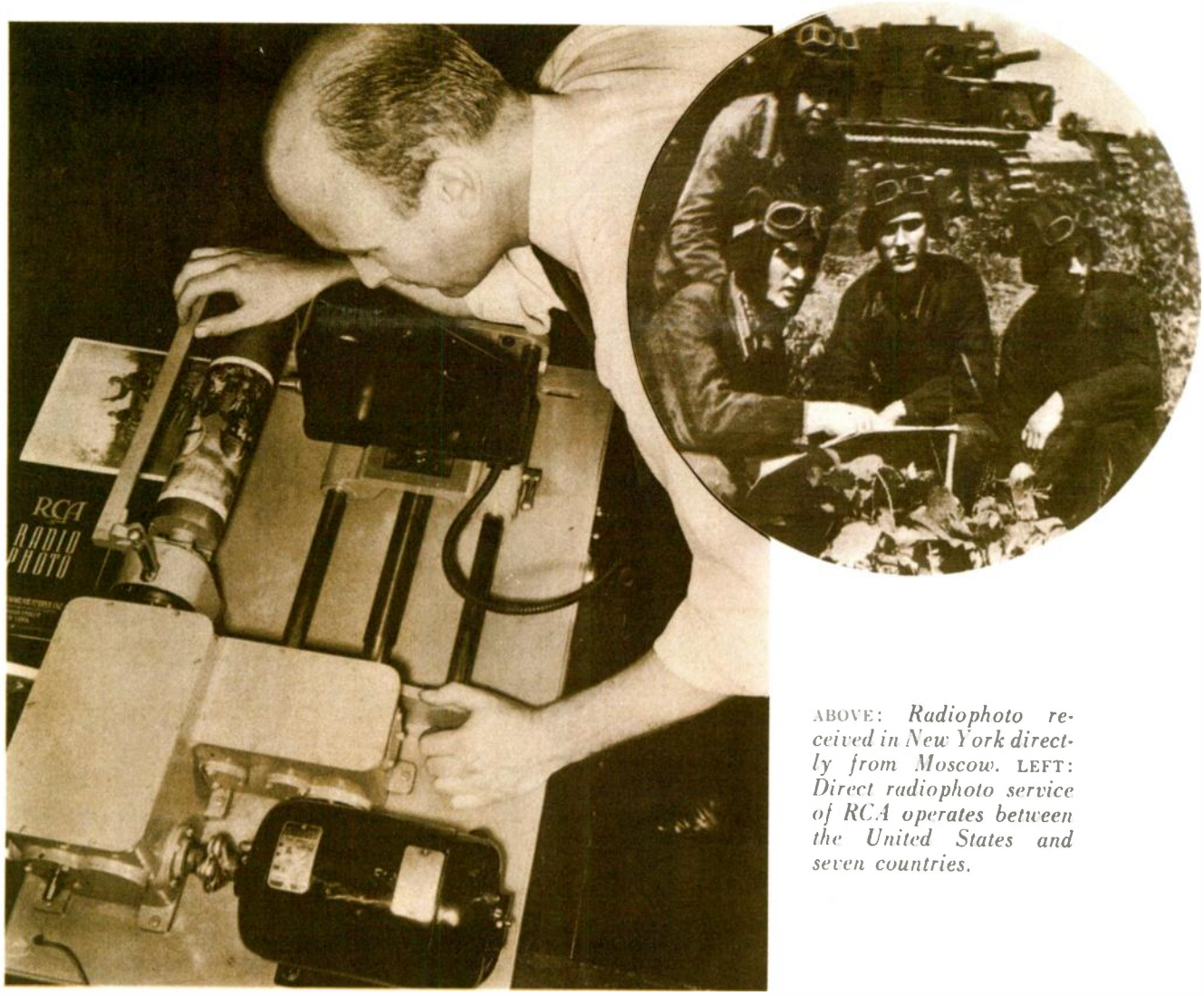
wirth of RCA Laboratories, succeeded in speeding the process of penicillin production, since radio-frequency drying provides a continuous process in the manufacturing procedure. Also the radio method of dehydration is lower in cost than the conventional freeze-drying process.

NEW RADIO CIRCUITS AID WAR EFFORT

Although the war resulted in a substantial decrease in the volume of business communications between the United States and other parts of the world, there have been compensating factors which make full use of all available facilities of R.C.A. Communications, Inc. In furtherance of the war effort, RCA cooperates with the United States Government in providing transmitting and receiving facilities for use by the military and other departments of the Government.

During the early days of the war, new direct radiotelegraph circuits were established between the United States and Ecuador, Iran, French West Africa, New Zealand, Bermuda, New Caledonia, and Kunming and Chengtu, China. Additionally, service

Operators of R.C.A.C. at the sandbag-protected front door of the radio station they established at Naples — the first all-American-owned and operated commercial station in Europe, which went on the air February 1, 1944; a second RCA station opened on June 13, 1944, at Rome.



ABOVE: *Radiophoto received in New York directly from Moscow.* LEFT: *Direct radiophoto service of RCA operates between the United States and seven countries.*

with Iceland was resumed after a suspension of more than a year. Supplementing the New York-Rio de Janeiro circuit, communication was established between New York and Recife, Brazil. The Honolulu-Papeete (Tahiti) circuit was supplemented by a circuit between San Francisco and Papeete. Direct channels of communication also were opened between San Francisco and Panama, Bogota, Colombia, and between San Francisco and Buenos Aires. A circuit to Bombay, India, was opened in August, 1944.

New radiophoto services were inaugurated by R.C.A.C. between the United States and Sweden and Switzerland. Previously, radiophoto service was available to Argentina, Australia, Egypt, Great Britain and Russia, as well as from the Hawaiian Islands to the United States. The volume of news photographs and other matter handled by RCA radiophoto in 1943 was approximately 30 per cent greater than in 1942.

Working with United States military authorities, R.C.A.C. installed and on

February 1, 1944 began operating with its own personnel a complete commercial radio station at Naples to provide communication between the Italian theatre of war and the United States. This was the first all-American-owned and operated commercial radio station in Europe. A second RCA station went on the air at Rome on June 13, 1944, seven days after the Allied armies liberated the Italian capital.

The popularity of "Expeditionary Force Messages" as an inexpensive, standard-text telegraph service, available for use by members of the armed forces of the United States throughout the world and by their families and friends, is demonstrated by the fact that RCA has sent and received several million EFM messages — at an average of 5,000 daily. The charge for such a message is only 60 cents, regardless of origin or destination.

RADIO ON THE SEAS IN WARTIME

The facilities of Radiomarine Corporation of America continued to be devoted to the design, production, installation and servicing of marine radio apparatus for

Modern shipboard radio installations designed and installed by RMCA have a far-flung range in both transmission and reception.

Radiotelephone transmitters for ships at sea are produced by RMCA, as are direction-finders and other equipment so important for communication over the oceans.

Final inspection of a radio direction finder loop.

the armed services, for the Maritime Commission and the War Shipping Administration. During 1943 a new complete radio unit was produced and deliveries started. This installation comprised three receivers, three transmitters and an automatic alarm, all the radio equipment necessary for long-range ships, except the radio direction finder, which is located on the bridge. A new short-wave transmitter was developed for installation on Liberty ships for use in conjunction with apparatus previously furnished by the company to approximately 1,200 of these vessels.

Radiomarine also produces for the Government a large variety of radio transmitters, receivers and direction-finders for use on ships in the merchant, transport and combat services. In addition, it produces radiotelegraph and radiotelephone lifeboat equipment which has saved many lives at sea.

VOICE OF THE NATION AT WAR

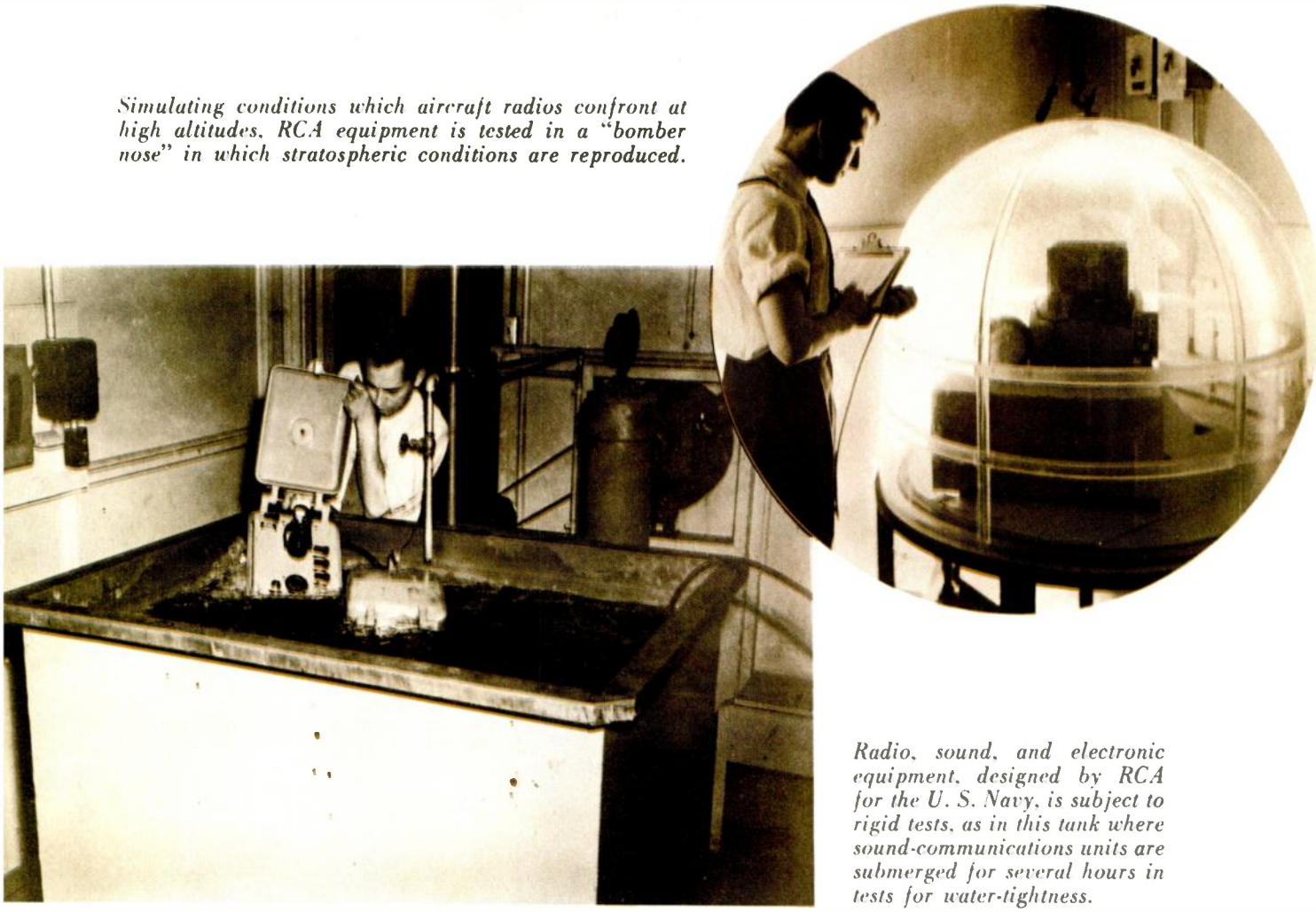
Radio broadcasting became increasingly important as the voice of the Nation at war. The Government and the armed services were afforded direct and simultaneous contact with the people of the United States and with other nations. This service was not available during the First World War. Two decades of development of the American system of broadcasting, based upon American traditions of free speech and free enterprise, prepared radio broadcasting for an unprecedented wartime role. Radio rallied the Nation, broadcast vital information, aided civilian morale, and helped to unite the American people in the single purpose of winning the war.

As a service to broadcasting, the R.C.A.C. Program Transmission Service, which delivers programs from overseas, found increased use as American stations and

From the endless stream of teletype copy special writers in the NBC newsroom digest and prepare the stories to go on the air.

One of the busiest places in Radio City is the NBC newsroom to which reports come in from all parts of the world for broadcasting to listeners everywhere.

Simulating conditions which aircraft radios confront at high altitudes, RCA equipment is tested in a "bomber nose" in which stratospheric conditions are reproduced.



Radio, sound, and electronic equipment, designed by RCA for the U. S. Navy, is subject to rigid tests, as in this tank where sound-communications units are submerged for several hours in tests for water-tightness.

networks turned to farflung sections of the world for news and eye-witness reports on the progress of the war. NBC alone has a staff of thirty-six news analysts, commentators and reporters regularly broadcasting up-to-the-minute, first-hand reports from strategic locations all over the globe.

Further participating in the war effort, NBC, under a contract with the Government for the full use of the short-wave facilities and personnel of its International Division, programs a daily average of 15 hours in eight languages — French, German, Italian, Swedish, Danish, Spanish, Portuguese and English. These programs include news, special events, well-known personalities, the whole field of entertainment, symphonic concerts and opera. Programs beamed to Europe are arranged and short-waved in collaboration with the Office of War Information; those to Latin America, with the Coordinator of Inter-American Affairs. Broadcasts especially designed for the entertainment of American troops abroad feature all the more popular programs regularly heard by listeners at home.

WORKERS WIN ARMY-NAVY "E" FLAGS

All divisions of RCA — research laboratories, manufacturing plants, broadcasting and communication facilities — are making substantial contributions to the conduct of the war. The company's production of radio, sound and electronic equipment for the armed forces of the United States and of the United Nations increased more than 100 per cent in 1943 over 1942. On July 1, 1944, RCA personnel numbered more than 42,000, of which 48 per cent were men and 52 per cent were women.

A considerable number of RCA executives, research men, engineers, and radio operators have been called into special service to fulfill wartime duties for their country. They have contributed greatly to keeping the global lines of communication open on all fronts. Up to the summer of 1944, more than 6,948 employees of RCA had joined the armed forces of the United States, and forty-seven of these men had given their lives to defend and preserve civilization and the American way of life.

Governmental recognition of the war production achievements of RCA's many thousands of workers is evidenced by the fact that six Army-Navy "E" flags, and eleven stars, each representing an additional six months of continued excellence in accomplishment, have been awarded. Four manufacturing plants of the RCA Victor Division fly the "E" flags, presented as follows: Camden, N. J. (1942), which has added three stars; Harrison, N. J. (1942), two stars; Indianapolis, Ind. (1943), one star; and

Lieut. General J. G. Harbord, Chairman of the Board, addressing the Annual Meeting of RCA stockholders in May, 1944. Army-Navy "E" flags and the Maritime "M" pennant awarded RCA were on display.

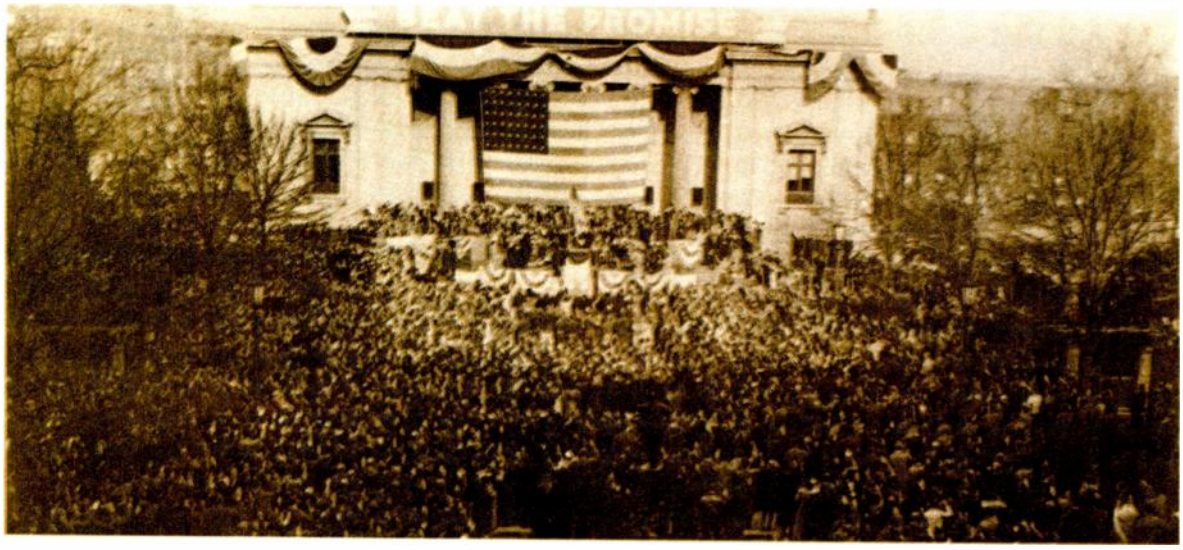
President Roosevelt, at the White House, presents to Edwin C. Tracy the WPB's highest wartime award for Individual Production Merit; another RCA man, Stanley Crawford (left background) received a Certificate of Individual Production Merit.

Lancaster, Pa. (1944). The "E" flag of RCA Laboratories, Princeton, N. J. (1943), has two stars. The Army-Navy "E" of Radiomarine Corporation of America (1942) has three stars; that company also has the U. S. Maritime "M" pennant with three stars, and the Victory Fleet flag.

The Certificate of Appreciation of the War Department was presented to R.C.A. Communications, Inc., on June 23, 1944, "for its excellent cooperation and patriotic service to our country in the present world-wide conflict." Similar certificates were awarded to the late William A. Winterbottom, who as Vice President and General Manager of R.C.A.C., was cited for "services of immense value" to the Signal Corps; also to Dr. Harold H. Beverage, Associate Research Director of RCA Laboratories, and C. W. Latimer, Vice President and Chief Engineer of R.C.A.C., for individual contributions to the war effort.

MESSAGES OF APPRECIATION

The patriotic efforts of the workers have been further recognized by many commendatory letters and messages from officials of the Government and officers of the armed forces.



Wartime rally "Beat the Promise Campaign" at RCA Victor Division, Camden, New Jersey.

Lieut. Gen. James H. Doolittle, Commander of the 8th Air Force, told in a message the part RCA equipment performed in the famous first raid on Tokyo, saying:

> Now it can be told officially: Radios you helped to build aided us to bomb Tokio and half a dozen other Japanese cities. Through those radios we issued commands between ships that sent our bombers on their marks. Through those radios we cheered each other on as our bombs crashed into vital Japanese naval and military installations and heard the hysterical Japanese broadcasters, too excited to lie, screaming about the damage we had done. We who made flight deeply appreciate the assistance given by you who made the radios.

Major Gen. H. C. Ingles, Chief Signal Officer of the Army, wrote to Colonel Sarnoff:

> I regard the Signal Corps and its contractors as a team, and our team has been charged with the enormous task of providing the Ground Army and the Air Forces with vital communication equipment of all kinds * * * Your splendid performance in the past gives us entire confidence that your company — from President to the newest messenger — will meet the increased load we ask of you, particularly during these coming months.

Gen. Douglas MacArthur, Supreme Commander in the Southwest Pacific, in 1942, sent this Christmas Day message to "the men and women of RCA":

> On this sacred day of our Lord, we, the soldiers on the firing lines give thanks to you, soldiers on the production line, for the sinews of war that make victory possible * * *

Vannevar Bush, Director of the Office of Scientific Research and Development, in a letter dated January 12, 1942, said that no one who has followed the influence of new techniques in the world conflict could doubt the importance of vigorous prosecution of research and developments on instruments, weapons and processes of war.

He added that the contributions of RCA Laboratories in this respect, under contracts with the OSRD, "are in the fields of the utmost importance in the war program, and I want to express my own appreciation of the group and individual effort which is being exerted in your organization."

The late Frank Knox, Secretary of the Navy, directed this message to RCA production personnel on January 29, 1942:

> The splendid achievement of the Radio Corporation of America Manufacturing Company of Camden, its management and its employees in producing an ever-growing output of material for the United States Navy, is characteristic of the vigor, intelligence and patriotism which have made America great * * *

Robert P. Patterson, Under-Secretary of War, on Army Day in 1942 telegraphed a message to the employees of RCA:

> You who have done your full duty on the production line share that tribute with American fighting men. Our soldiers are on the offensive over Europe, in North Africa and in the Pacific. With your continued support the Army will keep that offensive rolling until victory rewards our efforts.

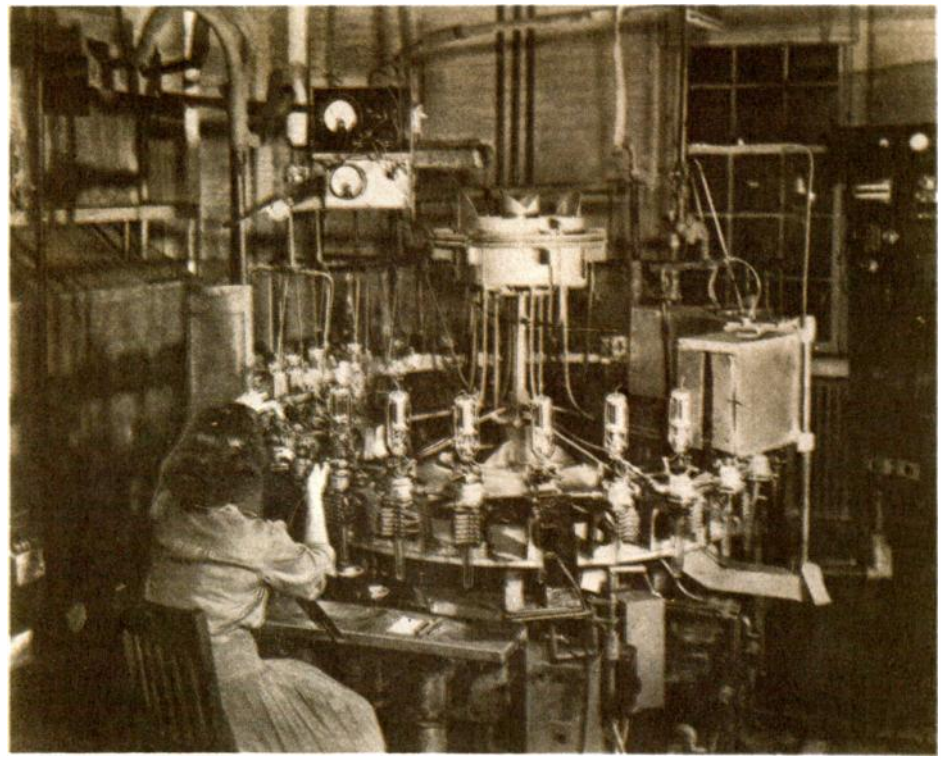
The men and women on the RCA production front were delighted to hear from Rear Admiral E. L. Cochrane, U.S.N., Chief of the Bureau of Ships, that the radio

Marine Corps communications unit standing by for orders at radio and telephone sets behind a seawall on a beach in the Marshall Islands.

SIGNAL CORPS PHOTO

Interior view of radio and pilot compartments in a Navy patrol bomber.

SIGNAL CORPS PHOTO



Thousands of radio-electron tubes of all types are produced daily by the RCA Victor Division, with electronics playing an important part in the manufacturing process as well as in the performance of the tubes.

equipment of their manufacture was cited for dependable performance in a combat report from the USS O'Bannon, veteran of five major surface actions in the Pacific. The RCA radio equipment, according to Admiral Cochrane's message, enabled the "O'Bannon" to maintain vital communication with other units of her task force at all times during battles in which she helped to sink a Jap battleship, three cruisers and six destroyers. And the Admiral added, "the Navy counts on you for equally efficient radio equipment for many new warships soon to join the fleet."

Major Gen. James A. Code, Jr., Assistant Chief Signal Officer, USA, in a letter dated December 31, 1942, to Colonel Sarnoff, expressing gratitude, said:

> As the year draws to a close, the old American custom is to take a look at the record and total up the score. In this total is found your loyalty, friendship, counsel, and untiring efforts permeating the successes we have known.

Gen. Dwight D. Eisenhower, Supreme Commander of the Allied Forces in the European theatre of operations, in a message addressed to "the men and women of RCA" said:

> On this Thanksgiving Day [1942] let us thank God for the American industry, labor and management which has given us the weapons and the equipment with which to conduct our North African campaign. More power to you.

Rear Admiral Joseph R. Redman, Director of Naval Communications, in a letter to Colonel Sarnoff, in December, 1943, wrote:

> During the year now ending, you and the personnel of your company have rendered the Naval Communications Service splendid cooperation and assistance. Your resourcefulness and quiet efficiency in the performance of all tasks associated with Naval Communications have been of invaluable aid.

Edward L. Bowles, Expert Consultant to the Secretary of War, in expressing appreciation for still another phase of RCA's patriotic work — the lending of certain members of its personnel to the Government for special duties — said:

> On behalf of the Secretary and the Army, I wish to express our gratitude for the splendid piece of work Dr. Beverage (Dr. H. H. Beverage, Associate Research Director of RCA Laboratories) did recently in connection with the inspection trip North * * * The instructive assistance you have enabled us to give to this aspect of our operations confirms my belief that much can be accomplished by drawing on the specialized talent that exists in industrial and engineering centers.

RCA AIDS RADAR DEVELOPMENT

Basic research work on radar was instituted by RCA Laboratories as early as 1932, when experimental equipment was constructed. What was probably the first application of radio-location principles to aviation was achieved by RCA through equipment built and installed in its own plane in 1937, in connection with research on collision-prevention apparatus.

Speaking at the presentation of the Army-Navy "E" award to RCA Laboratories on June 17, 1943, Rear Admiral Harold G. Bowen said:

> We are living in an age of mass production, but mass production cannot exist, cannot compete without commercial research, nor can commercial research exist without mass production to defray its cost.

Rear Admiral Harold G. Bowen, U.S.N., presenting the Army-Navy "E" Flag to RCA Laboratories on June 17, 1943, said: . . . "The keystone to the whole industrial structure of a country is the commercial research laboratory, and no cost or effort should be spared in peace or in war to make sure that, first, this fact is generally recognized, and, second, that the progress shall never be interrupted."

Ever since the invention of radar, the Navy and the great electronic laboratories have been in constant and fruitful contact. Our associations with RCA in this respect have been of long duration and most satisfactory.

The story of radar is such an astounding story that it is regrettable that all the history of this development cannot be made public at this time. In the history of technology, no war was ever developed so rapidly and no art was ever prosecuted at the same time in all branches — namely, research, development and production. Certainly no such complex art was ever brought to a state of usefulness so soon. This, of course, was due not only to the position of technology in the United States, but also due to — first, the threat of impending war, and later, the war itself. . . .

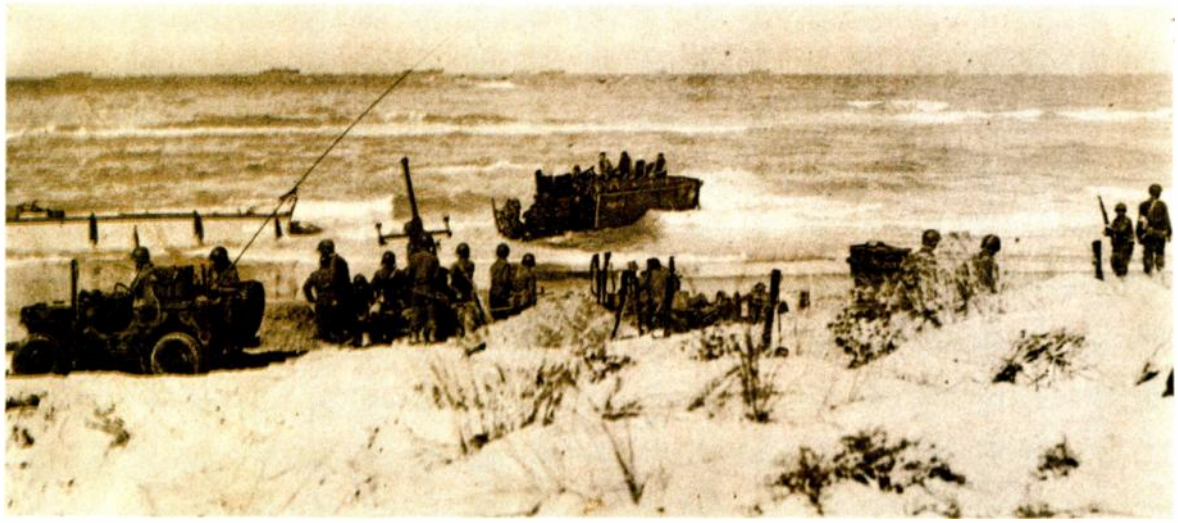
There is no question but that radar has changed the whole course of history. The Battle of England was won because the British had radar of their making which prevented the Germans from surprising the British planes on the ground. You can be assured that radar has played a highly significant role in our successful operations to date. The whole electric and electronic industry and all of its laboratories have played their part in this phenomenal story. Only in the United States could such a phenomenal development proceed so rapidly and result in such phenomenal production.

MAGNITUDE OF THE WAR TASK

The magnitude of the world-wide communication task in wartime is seen in the fact that protected supply lines extend more than 56,000 miles to every continent to reach the more than 3,700,000 American soldiers outside the United States. The Army and Navy operate global communication systems, and, of course, instantaneous and dependable contact among the United Nations is a vital necessity.

Radio goes with the anti-aircraft guns and other equipment brought ashore from the landing barges when beachheads are established.

SIGNAL CORPS PHOTO



Col. David Sarnoff discusses plans for handling press by radio and cable on D-Day, with J. H. Brebner, Director of the News Division, British Ministry of Information, London.

The demands to radio-equip an Army of more than 7,000,000 men, a great two-ocean Navy and an ever-expanding Air Corps of thousands of planes gave the radio industry of America an unprecedented task. It called for millions of electron tubes ranging from the size of an acorn to giant water-cooled tubes. Transmitters and receivers had to be built in many different models for special performance ashore, afloat and aloft. All of these devices had to be designed and installed to withstand the rigors of warfare under all conditions of weather and climate. Also needed were direction-finders for both planes and ships, a vast array of antennas, radio altimeters, navigating instruments, sound-recording apparatus, radio facsimile, test instruments, cathode-ray tubes and industrial sound systems.

Since the war began, RCA has handled a great amount of research and engineering for the armed forces. More than 150 new electron tubes and approximately 300 different new types of apparatus have been built by RCA since the beginning of the conflict. Previously they had not been manufactured by anyone. Volume of products and services of RCA manufacturing plants increased to approximately $222,000,000 in 1943, or 73% over 1942, and unfilled orders on July 1, 1944, totalled approximately $300,000,000.

D-DAY ON THE RADIO

Never in history was such an array of radio facilities concentrated on a single event as on D-Day, June 6, 1944.

Radio had several important roles in this greatest triphibious assault of all time. Invisible life-lines of communication knit the tremendous striking force into a com-

LEFT: *With history in the making on D-Day, General Sir Thomas Blamey (right), Commander-in-Chief of the Australian Imperial Forces, and Major D. H. Dwyer, called at the NBC newsroom to get up-to-the-minute bulletins from news commentator Don Goddard.*

RIGHT: *A flash from NBC at 3:32 a.m. EWT, on June 6, 1944, signaled to all America that H-Hour and D-Day had arrived — the Allied invasion of Europe was under way! The newsroom became a beehive of activity.*

pletely coordinated operation on the Channel, on the beachheads and in the air — all moving with split-second precision. Globe-encircling radiotelegraph circuits linked the United Nations in the colossal task of liberation. By radio, "the war of nerves" was carried to the enemy, and through microphones General Eisenhower and other leaders of the Allied cause broadcast instructions to the peoples of Nazi-occupied Europe. Short waves carried the news to all countries while the broadcasters at home gave the American people a dramatic running story of the mighty battle. President Roosevelt on the radio led the country in prayer.

After many months of preparation and anticipation of handling the greatest running story of all time — the invasion of Europe by the Allied forces — R.C.A. Communications facilities and the broadcasting network of NBC flashed the news around the world. It was not long after Communique No. 1 was released from General Eisenhower's headquarters at 3:32 A.M. Eastern War Time that the news spread like lightning. NBC correspondents who had witnessed the invasion broadcast eyewitness accounts to all America at breakfast time.

Again, as when war was declared in Europe, when Pearl Harbor was attacked and when the United States declared war on the Axis and on Japan, radio was at the

forefront in reporting news and history in the making. "Somewhere in England," Colonel David Sarnoff was on duty as Special Consultant to the Communications Branch of the Public Relations Office, Supreme Headquarters of the Allied Expeditionary Force.

Success of the initial invasion onslaught was disclosed by Prime Minister Churchill, who reported to the House of Commons that all was proceeding according to plan. His early report that 11,000 planes, more than 4,000 vessels, 600 warships, 10,000 mine sweepers and thousands of soldiers were used in the invasion, gave an indication of radio's gigantic assignment. The military success revealed how well the men of science and production workers had succeeded in equipping the Allied forces with the finest radio-electronic apparatus in the world.

Thousands of television set owners and wounded soldiers and sailors at ten service hospitals in the New York area, where RCA-NBC installed television sets to entertain recuperating service men, witnessed the battle pictures of the invasion as filmed by Signal Corps cameramen. These newsreels flown to New York by the U. S. Army Air Corps were telecast on June 17 — eleven days after D-Day — by the NBC station WNBT.

SIGNAL CORPS PHOTO

Communications section of an automatic weapon gun crew uses both radio and telephone.

Portable radio set used in Marine-Army landing operations.
SIGNAL CORPS PHOTO

RCA TODAY

TWENTY-FIVE YEARS of achievement in the service of the Nation and the public have made the monogram RCA a symbol of progress in the Radio Age. The letters "RCA" are the initials of Radio Corporation of America, the parent company of the RCA Victor Division, National Broadcasting Company, R.C.A. Communications, Inc., Radiomarine Corporation of America, R.C.A. Institutes, Inc., and RCA Laboratories.

Today the Radio Corporation of America is owned by approximately 225,000 stockholders — individuals, business organizations and institutions of various types, representative of a wide range of interest throughout America. The gross income of the company in 1943 was $294,535,362; net profit before Federal income taxes $36,316,452; Federal income taxes $26,124,000; and net profit after Federal income taxes $10,192,452.

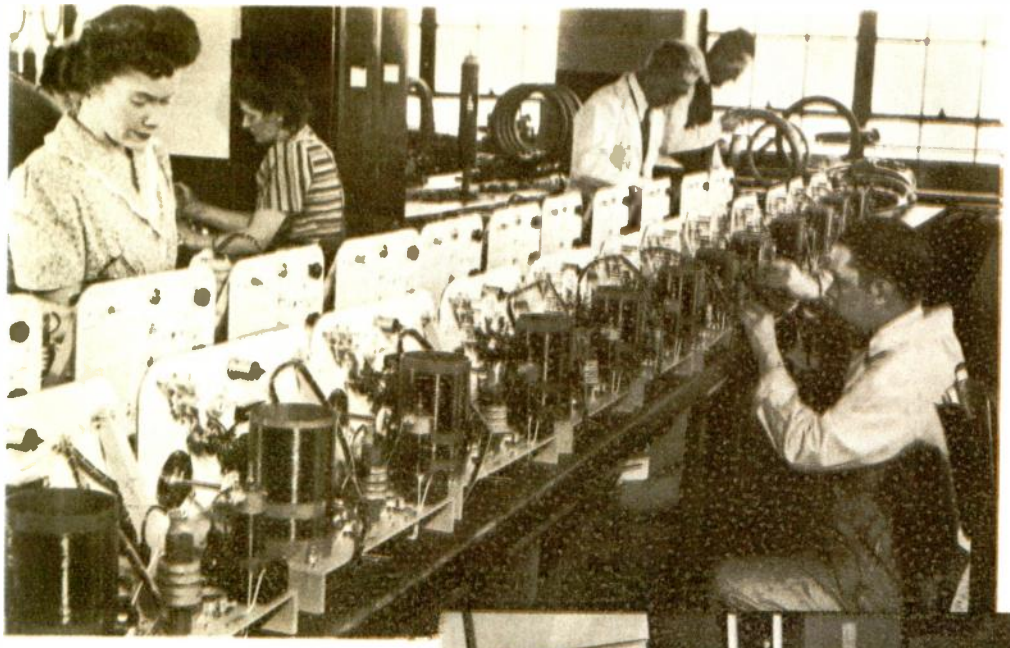
Manufacturing plants of the RCA Victor Division are in operation at Camden and Harrison, New Jersey; Indianapolis, Bloomington and Monticello, Indiana; Lancaster, Pennsylvania; and Hollywood, California. The plants at Camden, Harrison, Indianapolis and Hollywood were acquired in 1930; Bloomington, 1940; Monticello, 1941, and wartime production for the U. S. Navy began at Lancaster in 1942.

In the international field, RCA operates subsidiaries in Canada, England, Australia, India, Argentina, Brazil, Mexico, and in Chile. The RCA Victor Company, Ltd., at Montreal, with more than 3,000 employees, is one of the largest privately owned suppliers of radio and electronic war equipment to the Canadian Government.

The RCA "personal" radio, made possible by the development of tiny tubes and miniature components, appeared prior to the war, and was a forerunner of wartime portable equipment.

U. S. NAVY PHOTO

RIGHT: *The radio handie-talkie — a combination transmitter and receiver — is of great value to soldiers and sailors.*



Lifeboat radio-equipment moves along the production lines of the Radiomarine Corporation of America. The loops seen in the background are radio direction-finders.

An array of RCA transmitting tubes ready for packing, for duty around the world.

In the field of broadcasting the National Broadcasting Company owns six stations —WEAF, New York; WMAQ, Chicago; WTAM, Cleveland, WRC, Washington; KOA, Denver; and KPO, San Francisco. The complete NBC network comprises 146 stations, of which 140 are independently owned and affiliated with NBC by contract. These domestic stations are supplemented by two international short-wave transmitters, WRCA and WNBI, at Bound Brook, New Jersey. In addition, NBC beams short-wave programs to Europe and South America over stations owned by others.

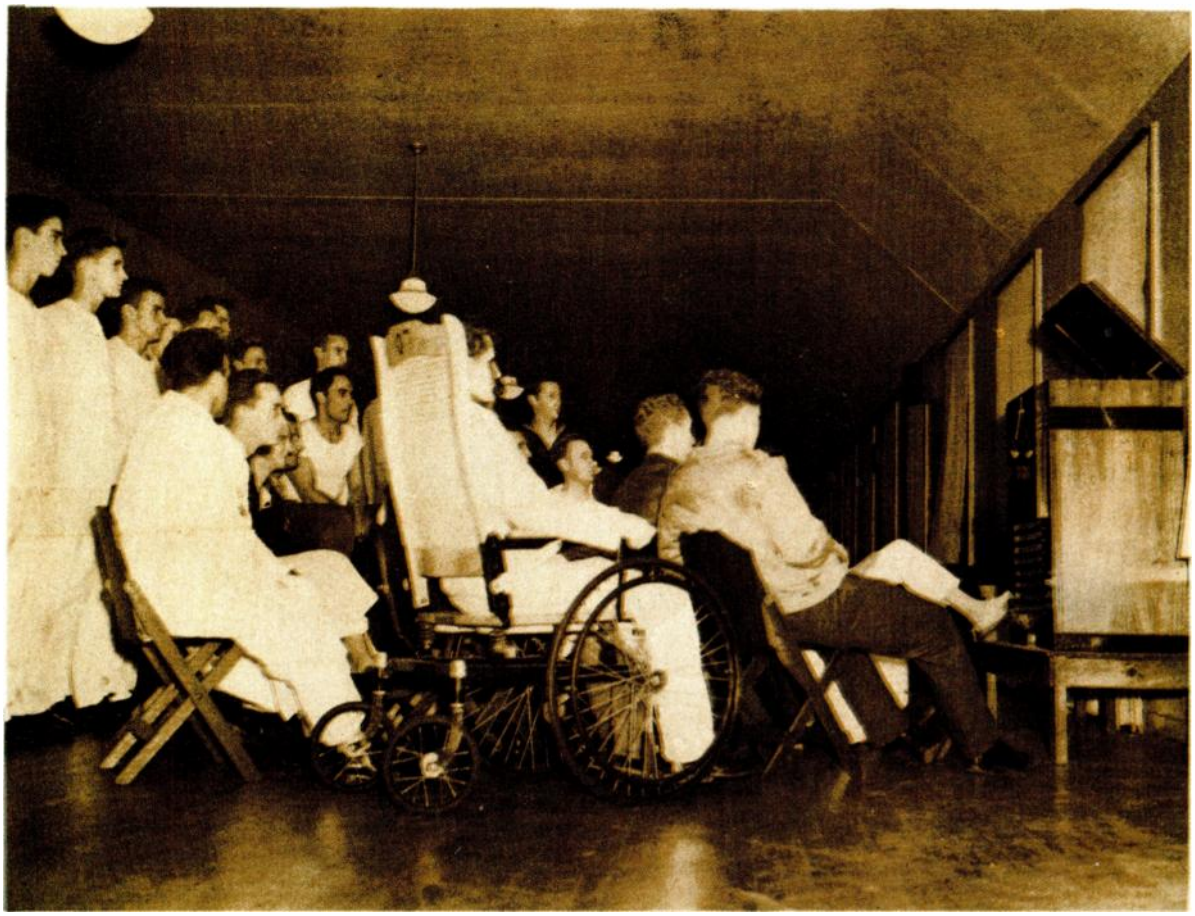
R.C.A. Communications, Inc. operates circuits to more than fifty countries and radiophoto circuits to seven countries, as well as from the Hawaiian Islands.

Radiomarine Corporation of America, in normal times, operates an extensive coastal radiotelegraph communication service with ships at sea. During the war it has continued to operate the radiotelephone and radiotelegraph shore station at St. Louis, Missouri, for communication with river craft, and its Great Lakes stations maintain radio service with vessels on the lakes. Coastal stations at New York and Lake Worth, Florida, are also in operation.

The RCA Institutes has trained more than 20,000 men to be radiotelegraph operators in the 25 years since it became part of the company. It was founded in 1909 as the Marconi Institute and functioned as a department of the Marconi Wireless Telegraph Company of America until the formation of RCA.

ABOVE: *An RCA direction-finder installed in the chart room of an ocean liner spots the location from which radio signals originate.*

BELOW: *Compact, self-powered radio sets prove their great worth among sailors afloat in rubber life-rafts, for with a kite antenna they can signal their position on the sea.*
U. S. NAVY PHOTO



Wounded sailors at St. Alban's Naval Hospital being entertained by RCA television sets, picking up NBC telecasts.

RCA Laboratories at Princeton, New Jersey, were planned as the world's greatest center of radio research and pioneering. During the war, the research and experimentation have been fully devoted to the war effort. They are a foundation for the future and an ever-growing source of new knowledge. For twenty-five years, RCA has been an outstanding example of the alliance between science and industry.

The RCA trademark is recognized around the world as the mark of quality in engineering, production and merchandise; it is the brand of efficiency and dependability in radio communications. It is the signpost of progress in the application of radio principles. It marks the way to the development of inventions and new products as well as the operation of services for the benefit of all people.

Yesterday the world read the news. Today by radio it hears the news. Tomorrow by television it will see the news — events as they happen. Beyond the horizon lie international television, color television, and peacetime applications of radar.

Man is learning how to harness waves and vibrations far beyond his range of hearing and sight. Today radio is the ear of navigation and aviation; tomorrow radio-electronics will give the mariner and the aviator all-seeing eyes. Radio makes possible world-wide telephony; tomorrow radio promises pocket radiotelephones. The electron microscope has made the molecule visible; tomorrow the electron telescope may reveal the farthest star. Scientists dream of inter-stellar communication and the transmission of electrical energy by radio for power, light and heat, as well as for intelligence. The fairy tales of today will be the realities of tomorrow.

RCA is confident that the next quarter of a century will far surpass in magnitude the achievements of its first twenty-five years. The Age of Television is ahead. To that great invention and the unlimited promise of radio-electronics, RCA dedicates its resources and facilities in service to the world and its people.

RCA


RCA