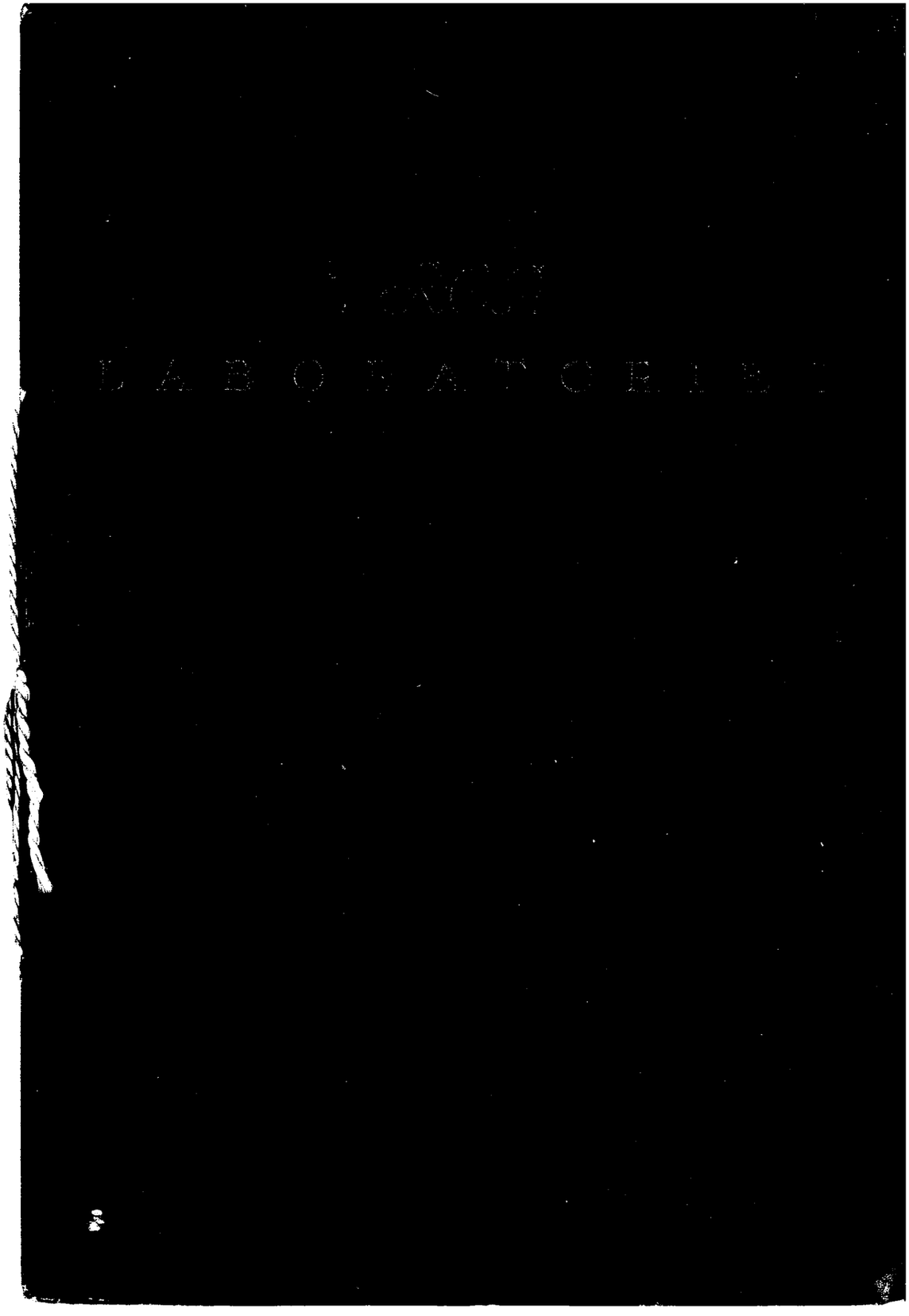
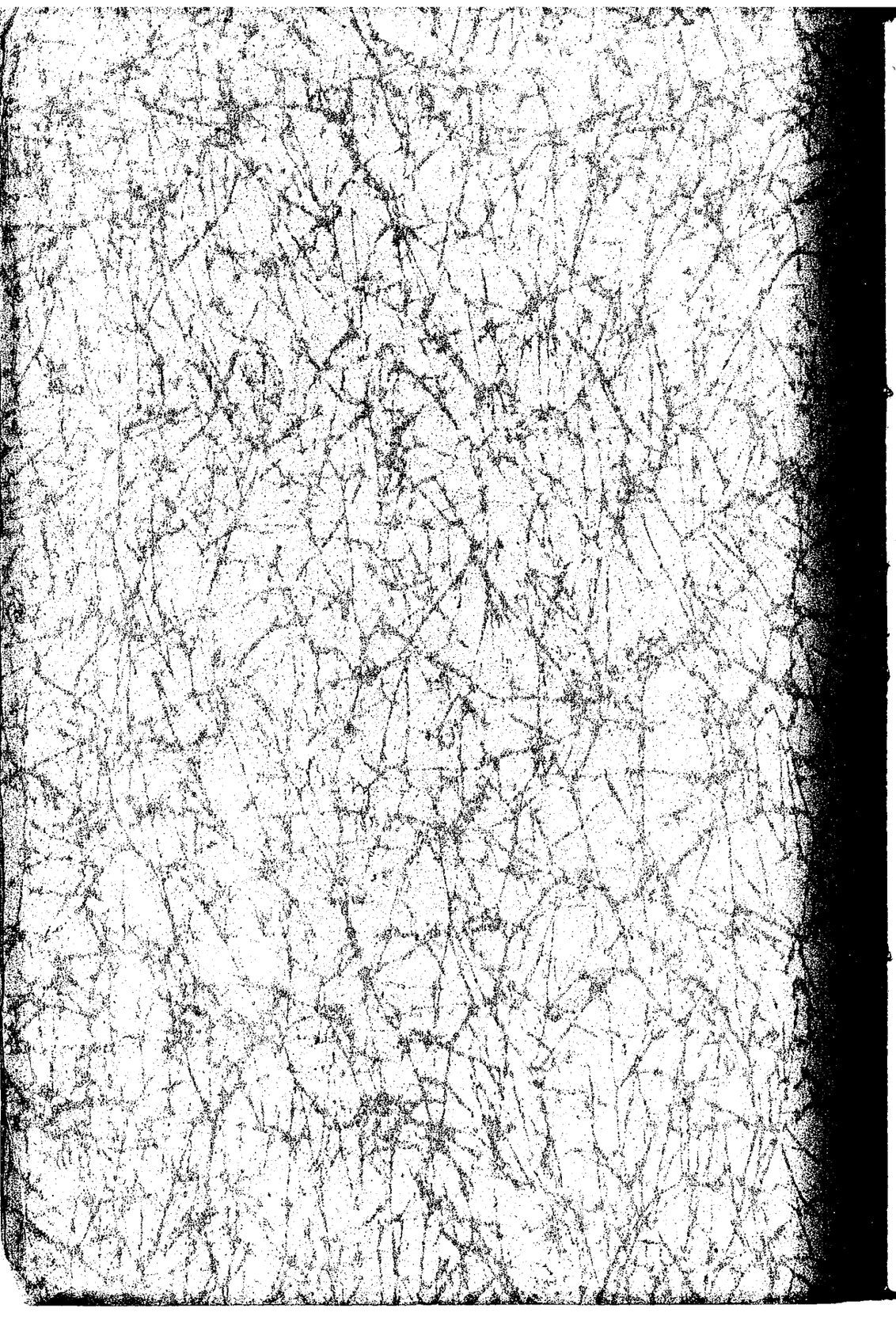




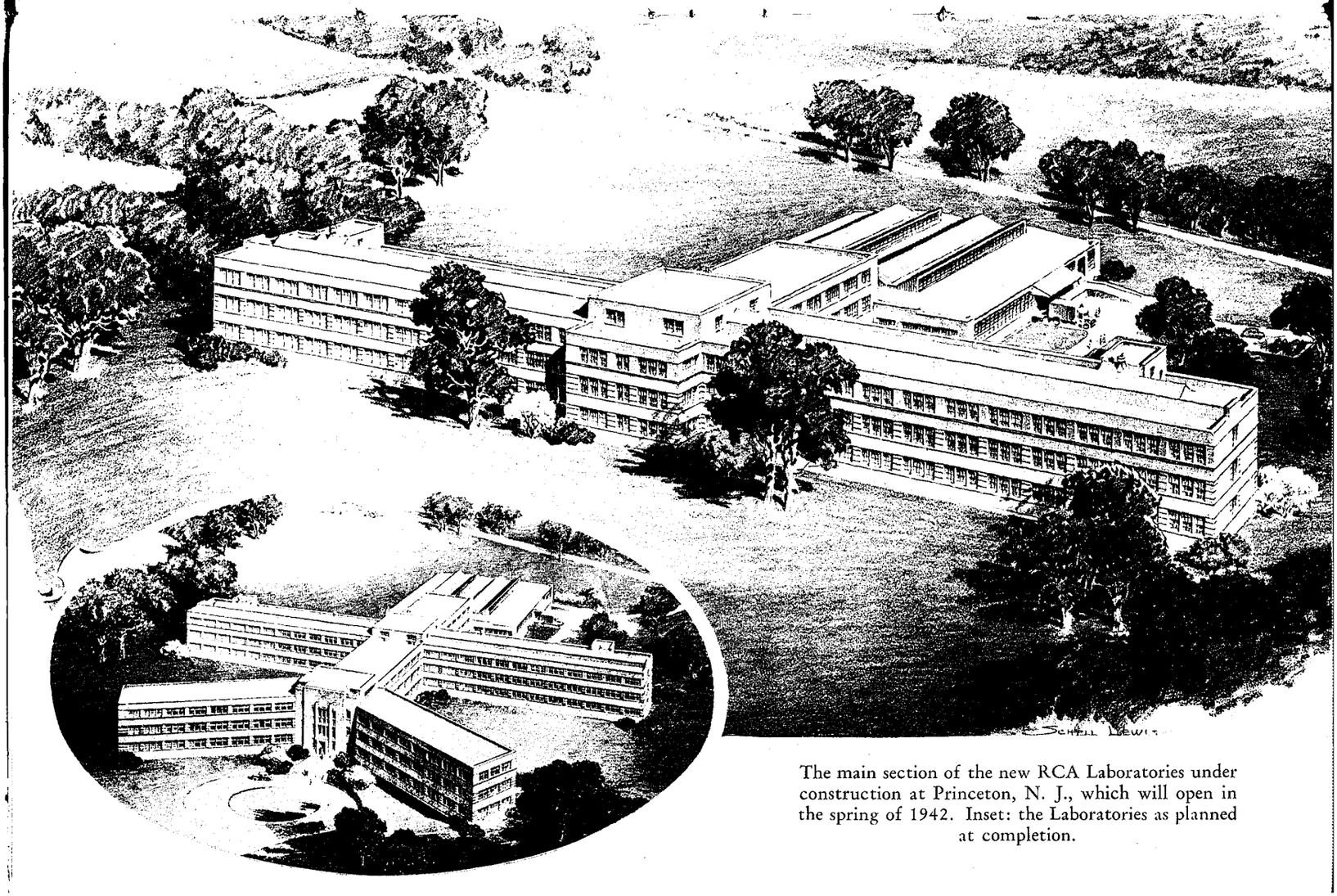
RCA LABORATORIES

Princeton, N. J.

A New Center of Radio Research and Pioneering

The primary aim of these Laboratories is to render service to mankind. To this purpose they are to be dedicated. SERVICE is the keynote — to increase the usefulness of radio and electronics to the nation, to the public and to industry.

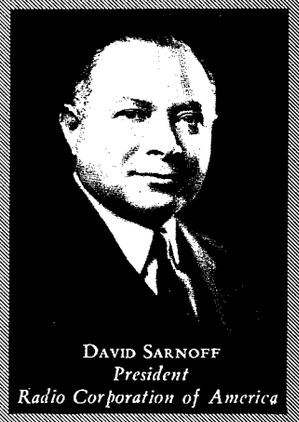
November 15, 1941



The main section of the new RCA Laboratories under construction at Princeton, N. J., which will open in the spring of 1942. Inset: the Laboratories as planned at completion.

RCA LABORATORIES

GENERAL JAMES G. HARBORD
Chairman of the Board
Radio Corporation of America



DAVID SARNOFF
President
Radio Corporation of America

OTTO S. SCHAIRER
Vice-President in charge of RCA Laboratories

RALPH R. BEAL
Research Director
RCA Laboratories

DR. C. B. JOLLIFFE
Chief Engineer
RCA Laboratories

DR. H. H. BEVERAGE
Director of Communications Research

E. W. ENGSTROM
Director
RCA Laboratories

ARTHUR F. VANDYCK
Manager of Industry Service Section

DR. VLADIMIR K. ZWORYKIN
Associate Director

DR. B. J. THOMPSON
Associate Director

RCA Laboratories at Princeton

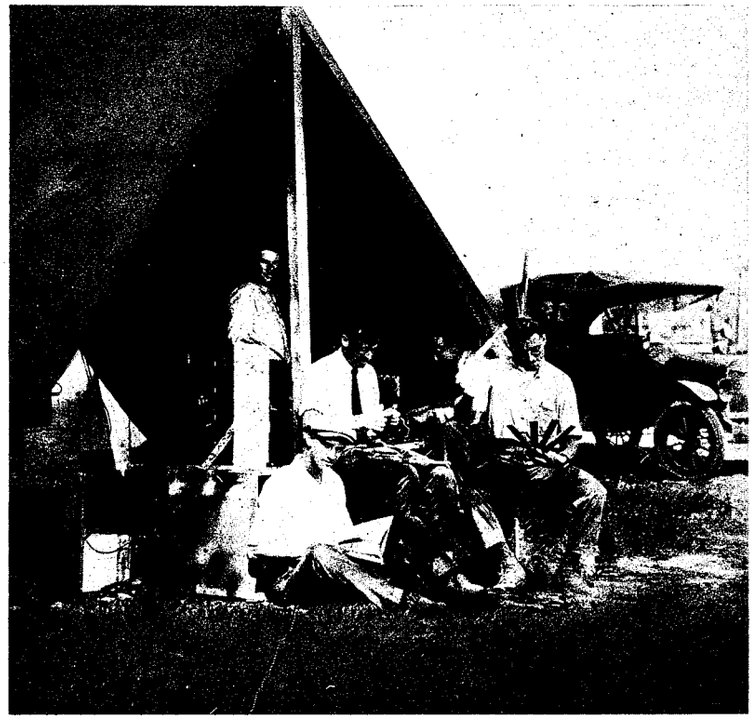
CONFIDENT that the future of radio will be far greater than its past, the Radio Corporation of America has laid the cornerstone for the world's foremost radio research center—RCA Laboratories—at Princeton, N. J.

This march of science extends back across the years. In 1919, when RCA was formed, its first laboratory was located in a tent at Riverhead, Long Island. Since then the cavalcade of progress has passed many historic milestones. Each was important in its time; each development contributed to the advance and increased efficiency of radio communications as a service to the public.

Now at Princeton, radio enters the new gateway to the future, hand in hand with its ally—the science of electronics. It was the magic created by electrons—infinitesimal bits of electricity—that lifted radio out of its mechanical era. Electronics took wireless out of the spark gap and put it in the vacuum tube; it lifted television off the mechanical scanning disk and put it in the Iconoscope, which gave electrical sight to radio.

UNITED STATES IS COMMUNICATION CENTER

The research, engineering, development and practical application of inventions and services made possible by electronics in radio shifted the communication center of the world to America. To maintain that position and to kindle progress in every branch of radio, the engineer knows that pioneering must never cease. Therefore, radio does not matriculate at Princeton in the expectation of a diploma of graduation. The course of science which radio begins at Princeton has no end; radio never graduates from pioneering. The engineer is always a student, for radio is a lifetime study. Radio progress ends only when research stops.



The first RCA Laboratory, in 1919, was in a tent at Riverhead, L. I., now the site of RCA's "Radio Central" for world-wide communication.

From a humble beginning in the Model-T era, the RCA research engineers went about their task with a determination to establish a world-wide radiotelegraph system that would give the United States preeminence in radio communication, independent of other countries in dealing with the nations of the world. Today RCA conducts direct radio service with forty-eight foreign countries.

Through continuous research RCA has pioneered in every phase of radio, discovering the keys of science that have unlocked the gateways of ethereal communication from international short-wave radio to television. It is through long years of tireless scientific investigation in the laboratory and in field tests conducted on a globe-girdling scale that the usefulness of radio has been extended as a service to the American people. Never has a wavelength been found with a dead-end. And so research too goes on and on into the infinite of the imagination.

Broad Horizon of Radio Research

The success of research has come from the laboratory, not only across the wavelengths of communication, but also in radio manufacturing, marine radio, broadcasting, radiophoto, facsimile and television. The horizons of these services are ever-widening. New ideas borne and nurtured by research constantly are pushing forward frontiers, which in radio never get a chance to become old. It is research in electricity and electronics, in chemistry and physics, that keeps the sphere of radio spinning in its orbit of progress.

And now at Princeton, in an atmosphere conducive to clear thinking and experimentation, RCA will unify its laboratory activities by bringing together its several hundred research experts and engineers, whose aim will be to create new products and services in all branches of radio and electronics. On these New Jersey acres, against the inspiring skyline of "the spires of Princeton," new radio and electronic instruments will be projected for the good of mankind.

Like radio itself, RCA has grown because it kept research alive, and applied it to all that is useful in radio communication lest old methods become inefficient. In that way, radio has always advanced; in radio it well may be said there is always something new. That is because research has never been neglected. It is the very life-blood of radio.

To view the magic of radio, since RCA research started in a tent twenty-two years ago at Riverhead, is to behold a rainbow of progress that arches from the tip of Long Island to Princeton. As radio called for new inventions to expand its services, RCA established new laboratories at various localities. The first were those at Riverhead and Rocky Point, Long Island, which became the centers of research in international communications, featuring long and short waves, ultra-short and micro-waves. There new antenna systems were developed; there the high-frequency alternators and

DAVID SARNOFF, *President* of the RCA, and
OTTO S. SCHAIRER, *Vice-President* in charge of RCA Laboratories, at the ground-breaking ceremonies for the new radio research center of RCA, August 8, 1941, at Princeton, N. J.

powerful vacuum tubes first were tested in the transatlantic transmitters, as man studied the "ether" and caught the clues on how to harness it with greater efficiency. Research at these scientific outposts on Long Island made radio globe-girdling. It made long-distance communication dependable at all hours of day and night, for it was at Riverhead that the observers learned much about the sun's behavior in regard to radio waves, of magnetic storms, and how to juggle wavelengths to outwit nature in its attacks on the energy that man unleashes for communication.

NEW JERSEY IS THE "RADIO STATE"

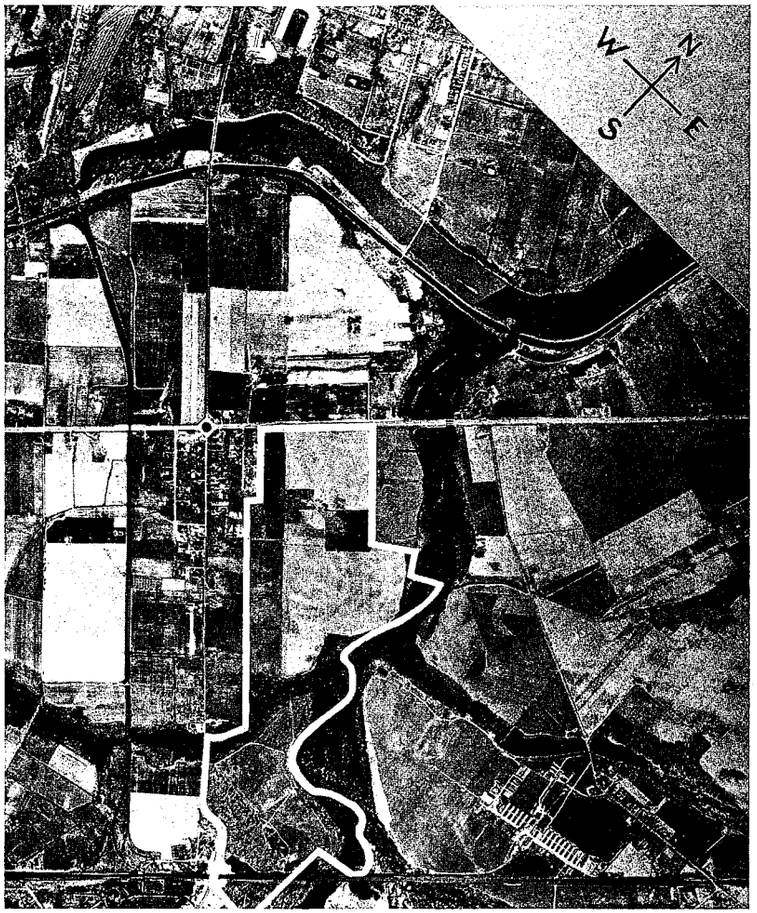
New Jersey has long been a center of radio. It might be called appropriately the "Radio State." Its shore-line has been dotted by historic wireless stations, and some of the great advances have been made in the air on and off the Jersey coast.

It was natural that RCA Laboratories should select Princeton as their new home. Aside from Princeton's many obvious advantages encouraging to research in radio, it is at a half-way point on the road between the RCA centers of manufacturing and electronic research at Camden and Harrison, N. J. Millions of radio sets, millions of vacuum tubes have gone forth from the production belts of those two industrial plants to serve millions of people, adding entertainment to their daily lives, bringing them information from afar. Now, these centers of research are to be unified at Princeton.

The goals attained at the Camden and Harrison laboratories will long be challenges to greater effort at RCA's Princeton laboratory. To surpass what has been achieved at Camden and Harrison, the aim must be high, for it was within these centers of science that electronic television was born, and also that new and outstanding benefactor of mankind, the electron microscope. From Camden, too, came the Iconoscope and Kinescope, the electronic "eyes" that put television on the air to stay. Success in the development of these magic "eyes," however, is shared by the research men of Harrison, for there the experimental tubes were fashioned.

Scientifically of great significance, yet less spectacular in a news sense, are hundreds of other radio and electronic developments achieved by RCA's research staff. Members of this science corps lifted the hand-wound phonograph from almost oblivion to a modern instrument of the immortals; research electrified the phonograph.

And the electron multiplier tube, which to the layman is likely to sound quite complex and scientific, is one of the noted triumphs of the Laboratories. It amplifies a feeble



Airplane view of Princeton, N. J., showing the site of RCA Laboratories outlined in white.

electrical impulse a million times or more; and because it is so powerful, it holds tremendous promise for the future.

Largely through the research that developed the microphone and vacuum tubes as instruments productive of mass communication in words and music, the old talking-machine and talkie film found their true voices. Superior methods of phonograph recording have given the public "the music you want when you want it," while in the motion picture realm RCA research in the Photophone has widely contributed to realism of sound. But the research that has given the phonograph disk and the movies natural voices extends far from the confines of the phonograph and film sound tracks, and off into the emptiness of space, for radio broadcasting nowadays is everywhere.

To provide facilities for constant improvement of program transmission and for operating on a high plane of efficiency, the National Broadcasting Company maintains a group of development laboratories at Radio City, New York. In effect, they constitute a "field laboratory," for much data is obtained from technical investigations and tests during routine operation. Many inventions and engineering advances have been adapted to the particular needs of the broadcasting art by NBC. It has explored the advantages of every new radiophone development to determine its value in public service broadcasting. Naturally, acoustics is an important study, and as a result of the lessons learned, outstanding contributions to studio design the world over have originated in Radio City.

Television and Radiophotos Advanced

There was a time, remembered now only by veterans, when radio research and development were concentrated on apparatus for ships at sea and for land stations along the shore, but as the uses of radio increased, research kept pace, spreading into diversified fields. Today, wherever sound is produced, transmitted and reproduced electrically, radio is a prominent factor of success. And now, as television adds sight to sound, radio research experts continue to expand and advance their knowledge as they bring to light a new science of electron optics. Through this science they have already put television on a theatre screen, presenting a clear, realistic 15-by-20 foot picture.

Demonstrating the practical utility of ultra-high frequencies, RCA has developed automatic radio stations for relaying television pictures and facsimile matter from point to point

or city to city, thereby erecting the signposts for an eventual television network.

The high-frequency spectrum is recognized by radio engineers as one of tremendous possibilities. Here, among technical advantages, fading is at a minimum and the ultra-short waves to a great extent are static-free. In this spectrum of tiny waves—offering broad channels for communication—new advances and services will be developed, as have television and frequency modulation. "UHF", therefore, will be one of the outstanding fields in which the new Laboratories will devote much study, experiment and development work. Micro-waves, measured in centimeters, definitely are considered by scientists as the gateway to the future of radio.

Research conducted by RCA has made it possible for American newspaper readers to see pictures from London, Berlin, Moscow, Tokyo and Buenos Aires, within a short time after the cameras snapped them. Through RCA, New York has become the hub of the radiophoto circuits, which can toss a photograph across the hemispheres in thirteen minutes.

Modern aviation would be impossible without radio. Airplanes as well as ships are guided by radio beams and carry communication equipment. Invisibly, their messages bespeak the value of research, while the streamlined modernistic "weather vane" atop the Empire State Building is the NBC television aerial—a lofty monument of progress.

Purposes of the Laboratories

Now, the cavalcade leads to Princeton, where RCA Laboratories will be the headquarters for all research and original development work of RCA, and for its patent and licensing activities. The new organization is planned to foster the growth of radio as an art and industry, and to meet the expanding demands of national defense.

Under the impetus of war emergencies intensive research always creates new instrumentalities, but further research and engineering are necessary to adapt them to use by the public. It may well be expected, therefore, that the new Laboratories, manned by outstanding scientists, will facilitate the creation and development of new services and products, which will provide new business and employment for the post-war period and far into the future.

"The achievements of modern radio are capable of increasing and improving industrial output in many lines," remarked David Sarnoff, President of the Radio Corporation of America, in announcing the organization of RCA Laboratories. "By the application of electronic devices to industrial processes, the Radio Age promises to electronize modern industry, just as the application of electrical devices to industry at the beginning of this century created the Electrical Age. By the establishment of the new Laboratories, radio quickens its pace alongside the older industries—electrical, steel, automobile, wire communications, chemical, metallurgical and others—which, through research, have contributed to the industrial leadership and progress of this country. It is through invention and the practical applications of research, that American ingenuity has raised the standards of living in the United States above those of any other nation."

With these goals in mind as an incentive to keeping America far afront in the science of radio, members of RCA's research staff will go to Princeton. There they will dream of a world run by radio. Masters of their dreams—as they have been in the past—these men will make new history in radio and electronics, for they live in the Electronic Age.

RCA Laboratories Are On Historic Site

ON HISTORIC New Jersey land surrounded by territory famous as a battleground of freedom, RCA Laboratories are being erected within sight of the spires of Princeton University. Radio communications are a powerful force in current history, in international relations, politics and education. From this laboratory at Princeton, the frontiers of learning will be extended as research continues to perfect television sight to accompany sound broadcasting.

The RCA Laboratories are situated at Penn's Neck on the Trenton-New Brunswick turnpike. Directly across that highway are the graves of some of the earliest pioneers, and beyond, across a valley of open farmland, is the University, which was founded in 1747. Two miles west of the RCA site lies the battlefield of Washington's victory in 1777 at Princeton. The 260 acres on which the Laboratories stand have been occupied by woodland and farms, tilled continuously since the first settlers. Even as late as 1940 the earth was set to staple crops. The old white clapboard farmhouse and barns, almost as old as their surrounding fields, stood back from the road which is now U. S. Route No. 1.

Pioneer Spirit Prevails

The pioneer spirit and its inspiration, the love of freedom, are closely associated with this region. The RCA Laboratories, dedicated in an hour of national emergency, are a fitting continuation of the tradition which lives here. This is the land of William Penn and the Quakers, of their tolerance and independence. This spot gave two signers to the Declaration of Independence. New Jersey bore the brunt of the Revolution. Also, it shares in the history of science, particularly with the work of the noted physicist and Princeton Professor, Joseph Henry, in the mystery of electro magnetism and electric induction. While experimenting in 1842, Henry noticed that in the discharge of a Leyden jar the phenomenon was of an oscillating nature (alternating current), and that the discharge would induce discharges in other circuits at considerable distances. Therefore, in the history of wireless, Henry is credited as the first in the United States to have produced high-frequency oscillations and to have called attention to the fact that the discharge of a condenser is oscillatory. He further observed that an electric spark about an inch long, thrown into a circuit of wire in an upper room, magnetized steel needles included in a parallel circuit placed in the cellar 30 feet below, with two floors intervening. The effect was attributed to electromagnetic induction; he had observed the essential phenomenon of radio—signalling through the air.

It was just about 100 years ago, at Speedwell, N. J., that Samuel F. B. Morse, with the technical and financial help of his earnest young co-worker Alfred N. Vail, put finishing touches to the Morse electric telegraph.

Princeton is an excellent choice for modern radio pioneers. The first settlers, combining their freedom with a practical, self-governing life, made Princeton a microcosm of the early growth of this Nation. They stood midway between the complete liberty of the southern plantation owners and the organized town-government of New England, the two lines of force which formed the strength of the Independence Movement. Princeton, placed on the main highway between New York and Philadelphia, two centers of rising American culture, was naturally the stopping place of many important persons who passed this way, including George Fox, founder of Quakerism, in 1672, Benjamin Franklin in 1723; also Paul Revere, John Adams, Lafayette, General Putnam and Anthony Wayne. The region, in this way, was early enlivened by daily contact with the news and activities of all the Colonies.

The first road, the only road through this area until 1804, went through Princeton following a former Indian trail. As

New Jersey developed, the road underwent various changes. To begin with, it was the Upper Assanpink Trail, a thread of communication among the Indian tribes; and later the old Dutch Trail of the Indian runners carrying messages for the first Dutch settlers. Then it became the Great Road from Trenton to New Brunswick, the Post Road, the High Road, the King's Highway, and the Lincoln Highway.

Until the coming of the Europeans, the inhabitants of this territory were the Delaware Indians. They lived and hunted on this land, and in the neighborhood of the RCA Laboratories' site, Chief Tamanend had a hunting lodge. He is the great chief who stands at the right of William Penn in the famous picture of the signing of the Pennsylvania Treaty. He also, unknowingly, gave his name to New York's Tammany organization.

Among the Old Settlers

Then came the explorers. Before the Declaration of Independence, what is now New Jersey was at various times under the flags of five European nations: Spanish, French, Swedish, Dutch, and English. The Province was named New Jersey by Sir George Carteret in honor of his former governorship of the Isle of Jersey. Furthermore, New Jersey, the first organized state in the Union, was organized in Princeton, where the Legislature returned in 1777 having roamed all over the region to escape the British.

As his share of New Jersey, William Penn in 1693 received two large tracts at "Princeton," one of them being 6,500 acres, part of which is now the RCA Laboratories' site. Penn owned the property until he died in 1718. Under Penn's influence many seeking religious freedom were attracted to West New Jersey. Four Quaker families came to Princeton in 1696 in their search for liberty. One of these families was that of Richard Stockton; the other three were the Clarkes, the Oldens and the Worths. Others to come later were Garrett Schenck and Jan Couwenhoven, who acquired 5,500 acres at Penn's Neck on May 14, 1730 by deed from the heirs of William Penn.

All these families, except the Stocktons, were at one time or another owners of the RCA property. The colony was named "Penn's Neck." In April 1773, Cornelius Couwenhoven conveyed to Samuel Worth the acres which stretched east from Stony Brook—now Lake Carnegie—to the RCA grounds and beyond. The trails that these pioneers cut through the forest and blazed on foot or horseback, led to the turnpike which runs in front of RCA Laboratories.

Princeton in Revolutionary Days

Stage-coaching, accommodations for passengers and the changing of horses demanded taverns. Several were built in and around Princeton. A famous one, called the Red Lion Inn, which stood until 1929, was built by Captain William Conover in 1807, on the corner across the turnpike from the RCA site. Before the Revolution another building of equal social significance had been built at Penn's Neck. That was in 1760. It was the first school, the oldest in the township, built by the concerted efforts "of all the able-bodied men of the neighborhood." And, incidentally, that school was also directly across the highway.

Washington, retreating from New York, passed through Princeton, December 1, 1776. He reviewed his troops from the house of Thomas Olden on the road to Trenton. Lord Howe, who believed the war was nearly over, gave Cornwallis the honor of finishing it, and Washington crossed into Pennsylvania on December 8, just in time to escape the pursuing foe. Cornwallis thereupon returned to Princeton, and sat with a large force waiting a convenient time to cross the Delaware River. During this month of occupation, the soldiers pillaged the neighboring farms and quartered themselves in the farmhouses, including that of Samuel Worth where the Laboratories stand.

But a turning point in the War for Independence came on January 3, 1777, when the battle of Princeton was fought—one of the sharpest struggles of the war. The British were defeated. Although Princeton had to be abandoned and the

gloom of Valley Forge was still ahead, this battle was a crucial victory for the United States.

Later Princeton saw Washington and Rochambeau pass through on their way to Yorktown. Again, in 1783, Princeton had the honor for several months of being the capital of the United States, for the Continental Congress found refuge there and it remained to proclaim the final victory at Nassau Hall.

The present RCA property changed hands five times in the period between the Revolution and the Civil War. It was purchased by RCA from Sarah E. Olden, descendant of the pioneer Olden family, one member of which, Charles S. Olden, was the Governor of New Jersey during the Civil War. The deed to the property was conveyed to the Radio Corporation of America on March 11, 1941.

A few hundred yards east of the Laboratories lies Grover's Mill Pond, a favorite haunt of Grover Cleveland, who fished and hunted there. Woodrow Wilson, while Professor at Princeton, also frequented this region. Looking west from the Laboratories, the Delaware and Raritan canal cuts through the foreground of the scene. Abandoned today, this waterway had a picturesque and political life which ended in 1933; now the idle channel is choked, the banks covered with poplar and sumac.

Exploring in Electronics

In the pioneering spirit, New Jersey has long encouraged exploration not only of territory but of science and education. It was the home of Thomas A. Edison. There, in 1875, he discovered "etheric force," a new, unstudied form of electricity, so named because it diffused in all directions, while it also traversed metallic conductors. Otherwise it disobeyed established laws of electricity, lacked polarity and did not require a circuit or insulation.

Five years later, while developing the incandescent lamp, Edison noticed that a current flowed between the hot filament and a "plate" of tinfoil wrapped around or inside the glass bulb; the lamp not only shed light but a shower of electrons. Thus, Edison discovered the basic phenomenon of the electron tube, and it became known as "the Edison effect." In the Eighties, Edison patented a long-distance telegraph system, which he called "grasshopper" telegraphy, "carried on by induction" without wires. Since that day, along the New Jersey coast many of the pioneer wireless stations were built, and off the Jersey shore, Marconi conducted some of his first experiments on this side of the Atlantic. Sea Girt, Tuckerton, Belmar and New Brunswick are names historically associated with pioneering in wireless, as well as many of the pioneer broadcasts, including the Dempsey-Carpentier fight at Jersey City in 1921, which opened the eyes of the Nation to the remarkable possibilities of broadcasting. New Jersey is the home of electrical and telephone laboratories, of overseas radio stations, as well as radio manufacturers, including the RCA plants at Camden and Harrison.

Now, the modern age calls upon science to blaze new trails; the men of RCA Laboratories are pathfinders in the wilderness of electronics.

LAYING OF THE CORNERSTONE
OF
RCA LABORATORIES

PRINCETON, NEW JERSEY

NOVEMBER 15, 1941

Speakers

"RESEARCH—THE CORNERSTONE"

MR. OTTO S. SCHAIRER
Vice President in Charge of RCA Laboratories

"SIGNIFICANCE OF THE LABORATORIES"

MR. GANO DUNN
Member of Board of Directors, Radio Corporation of America

"OBJECTIVES OF RCA LABORATORIES"

MR. DAVID SARNOFF
President, Radio Corporation of America, speaking from S.S. Matsonia, enroute from Honolulu to San Francisco.

"RELATION OF RESEARCH TO NATIONAL DEFENSE"

MAJOR GENERAL JAMES G. HARBORD
Chairman of the Board, Radio Corporation of America

LAYING OF THE CORNERSTONE

The contents include radio apparatus and literature representative of the Radio Age.

"The Star Spangled Banner"

MISS LUCY MONROE

Address by Mr. Otto S. Schairer

LADIES AND GENTLEMEN: On behalf of RCA Laboratories it is my privilege and pleasure to extend to you a most cordial welcome to this ceremony. We trust that this will be but the forerunner of many happy meetings at this place.

In laying the cornerstone of these new RCA Laboratories we are symbolizing more than the laying of their physical foundations. Our deeper purpose is to recognize that scientific research is a basic factor in industrial and social progress.

These Laboratories will broaden and strengthen the base for the further development and growth of the radio and electronic arts. Just as their foundations are laid on solid rock, so research is the sound and secure foundation upon which the super-structure of the radio industry has been built and will continue to rise to greater heights. This, therefore, is an auspicious occasion.

However imposing these buildings will be, they will still be but little more than empty shells of bricks and mortar were it not for the scientists and engineers who will give life to them. We honor them especially by this ceremony.

They have already earned distinction for their contributions to science and industry and to social advancement. Their work has been a major factor in making possible radio telegraph and voice communication services which reach every nook and cranny throughout the world. They have pioneered television which adds sight to sound and will provide still another service of profound significance to mankind; and also electronic magnification which has opened an entirely new realm to science, industry and medicine. Their radio and electronic developments are vital to every phase of national defense and security.

These new services and products, and others to come from these Laboratories, will be powerful factors in rebuilding the country's economic and industrial structures when the present world conflict is over.

This is an ideal location for research laboratories. Even its atmosphere is stimulating and conducive to scientific discovery and creative work. Within sight is a great University distinguished for its many contributions to the arts and sciences—to the culture and progress of America. At Princeton, one hundred years ago the eminent scientist, Professor Joseph Henry, discovered principles basic to telegraphy and radio. And only a few miles further away at Menlo Park, one of the greatest inventors of all times, Thomas A. Edison, discovered the fundamental phenomenon of radio and electron tubes. Many of our neighbors are also engaged in scientific research directed to social betterment.

We shall endeavor to make ourselves worthy of the traditions of this area by contributing liberally to scientific knowledge, to industrial and social progress, and to employment of both labor and capital.

MR. SCHAIRER: *Since our industry is founded so largely upon research, engineering and invention, it is especially fitting that we should be addressed on this memorable occasion by a distinguished gentleman who is deservedly called "Engineer No. 1" of our country. He is the head of a great engineering firm which built the first transoceanic radio transmitting plant for the Radio Corporation of America. He is a director and consulting engineer of RCA, and a skilled radio telegrapher. He has made many inventions, and regards "research" as his middle name. He is President of Cooper Union for Advancement of Science and Art, is a fellow or member of numerous scientific and engineering societies, and has had many medals and honors bestowed upon him.*

By reason of his accomplishments and eminence, and his association with us, he lends lustre and distinction to the organization which will have its research headquarters in these Laboratories.

It is an honor and a privilege to present to you, Mr. Gano Dunn.

Address by Mr. Gano Dunn

WHAT we dedicate here today is more than an assemblage of stone and steel. Backed by a great idea, it is a new grouping of facilities and a new center of residence, that will constitute an exceptional theatre for what modern industry has come to call Research and Development.

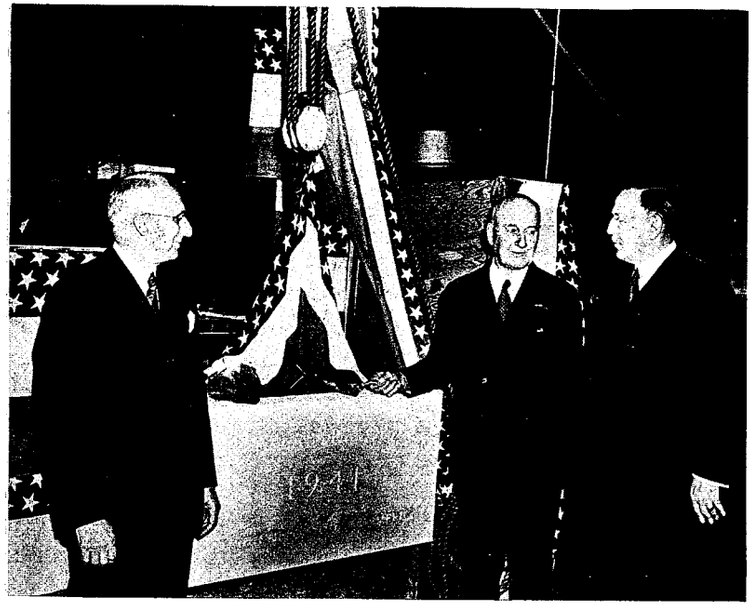
Under the spur of that idea, the Radio Corporation of America and all its associated services have resolved to commit themselves to the expenditures necessary for the purpose of bringing about a new cohesion and an enhanced activity among those elements of our productive forces who are gifted with what is ordinarily called creative ability, and what the poets call the divine fire of the imagination.

The great idea behind all this activity is that, in our field, research is the price of continued success; and that the results yielded by research are not speculative but certain.

Here we are planning to cultivate the germ out of which will constantly spring new growths for the future commercial activity of our various enterprises.

In concentrating so much of our capital and our attention upon these Laboratories, we are giving physical evidence of our conviction that only by continuing to cater to new opportunities for public service and thereby opening up new frontiers for industrial activity, will the prestige and position of RCA be maintained, and its continued commercial prosperity defended.

In men as well as in money, we are putting up a stake here, in the confidence that the future of our associated companies depends to an acute degree on the emphasis we put on the will to create new things, in addition to the ability to maintain in the arena of competition the continued production of existing things.



Major General J. G. Harbord, officiating at the cornerstone of RCA Laboratories; (Left) Otto S. Schairer, (Right) Gano Dunn.

In the production of existing things, account must be taken of the fact that the needs and tastes of the public change along with the changes that take place in the thoughts and habits of our national life. Unless kept alive and sensitive to these changes through adequate research facilities and possessed of the ability to anticipate them, industries like ours, as has happened to other industries in the past, are in danger of being left behind, stranded on a blind conservatism that was realized too late.

In respect to the creation of new things as well as the improvement of existing things, are we justified in making the present expenditures which, if history repeats itself, are but the beginning of further expenditures which RCA will lavish in the future upon scientific investigations and their engineering applications to useful purposes? The answer is that we are absolutely certain of the fruitfulness of research and that, in building these laboratories, we are only casting our bread upon the waters.

I want to stop here a moment to second the admirable suggestion made on the occasion of the first meeting of our staff here last March by our inspiring and research-devoted President David Sarnoff, who is now returning from Honolulu. He recommended that we do not fall into the popular error of describing the great quest of our Grail as *re*search. *Re*search has jocularly been dubbed as something you do when you don't find the answer the first time.

*Re*search is something quite different from the re*search* to which I am referring, of which the fruitfulness is never defeated.

In the realm of human relations, we have long believed "Ask and it shall be given you; seek and ye shall find; knock and it shall be opened unto you." Also in the field of scientific research our text is true, and in addition its truth is mathematically demonstrable, as I shall later illustrate.

There is a branch of mathematics called the doctrine of chances or the mathematics of probabilities. According to this, the relationship of certain phenomena to each other which appears to be accidental and unpredictable in single instances, approaches a definite law and becomes predictable when the instances become sufficiently numerous. There are even scientists who maintain that the fundamental laws of nature themselves are only statistical averages in which the instances approach infinity.

As an illustration of this and what I shall spectacularly call the certainty of chance, with a view to its bearing on the certainty of the fruitfulness of research, it is common knowledge that life insurance companies cannot tell whether a certain man will die during a given year. That is a matter of chance. But in a group of a thousand lives, they can tell exactly how many will die.

As a further example, take the case of a short straight rod or piece of wire which, after being thrown into the air at random, falls upon a hardwood floor. In its first fall, no one could predict whether it would fall athwart of the seam

between two boards or lie wholly on one board. That is a matter of chance.

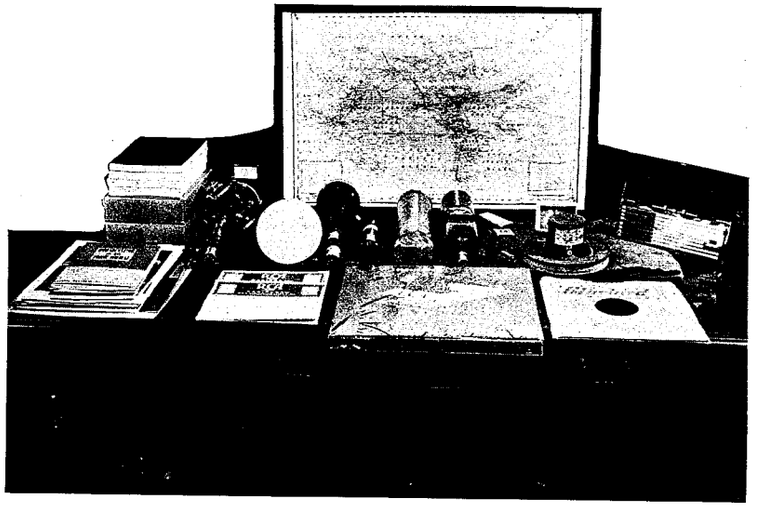
But if it is picked up and thrown again and again and again until the number of throws gets up into the thousands, a law will begin to emerge between the number of times it falls athwart a seam and the number of times it falls wholly on a board. Those numbers will invariably approach a fixed ratio to each other. While in the case of a single throw the way the rod will fall is unpredictable, in the case of many throws the average is definitely predictable. In fact it is inescapable and inevitable, and from it can be derived the ratio between the circumference and the diameter of a circle more accurately than the Greeks knew it. The fall which in a single instance was a matter of chance, has in the average of many instances become a matter of certainty.

That this principle applies to the work of our Laboratories has been demonstrated in the past by the enormous development of the radio art and other arts.

From the date of the physical demonstration of ether waves by the spark gap of Heinrich Hertz, invention after invention has followed the assiduous application of intense attention. In other words, the rod of investigation and research has been thrown into the air such a vast number of times that the average of the results of its fall has been the certain and irresistible progress of the various radio arts.

Where a problem has been attacked on a sufficiently broad front for a sufficient length of time and with a sufficient intensity of purpose coupled with the devotion of adequate resources, practically never has the answer failed to appear.

I well remember delivering a lecture not so many years ago in which I announced that Marconi had been able to send wireless telegraph signals a distance of fifteen miles. When the need for greater distance pressed, signals were sent around the earth. When the need for telephoning through the ether appeared, the radio telephone was forthcoming. When the need for reaching millions of listeners simultaneously was evident, broadcasting emerged. When the need for the telegraphing of pictures arose, facsimile was born. And when



Contents sealed in the cornerstone of RCA Laboratories include radio apparatus and literature representative of the Radio Age.

the need for visual broadcasting began to be felt, television stood tip toe on the mountain top.

I must not omit to add with pride to this inadequate list that similarly, when the wavelength of light had imposed for years an obstinate limit to man's vision in the world of the infinitely small, our own Dr. Zworykin and his staff brought forth the electron miscroscope, enlarging a hundred times the world which our eyes can actually see.

We are at this very moment in the presence of a need which has not yet given birth to its progeny. I refer to the unlocking of the sources of electric power that have been proved to lie within the atom. That these sources will be unlocked I have no more doubt than the doubt that would have been associated with the other developments in applied science that I have just rehearsed. All these vividly support the truth of our text "Seek and ye shall find."

The certainty of the fruition of research does not apply in the field of pure science in the same way that it applies in the field of applied science. Pure science may be defined as science

pursued without a commercial or any other objective. Its single motive is the satisfying of man's quest for truth for its own sake. It is the research which springs from the God-given characteristic of that drive of the human mind called intellectual curiosity. It is said to be research in which there is no smoke in the flame.

The pure scientist roams where he will in a heaven of working hypotheses created by his own mind. What he finds can never be patented, for discoveries of the laws of nature or its materials are unpatentable.

But what he finds is the food on which research workers and engineers feed in the field of applied science. What he finds is the seed corn out of which future fabulously rich harvests are grown.

While it is principally for workers in applied science and engineers that these Laboratories are built, there may be among them discoverers of new laws or materials of nature, because the type of man in whatever field whose mind is fertile is not the type to accept commercial limitations for his dreams.

He may count on the encouragement of RCA and of his fellows, because who can ever tell to what use may be put tomorrow some apparently useless pure science discovery of today.

So much for the inevitability of the results of scientific research and for the justification of that resolve and declaration of policy to which RCA is committing itself in the building of these Laboratories. RCA is convinced that, vitalized by the men who will work in them, they will become the right-hand temple column of its future; and RCA intends to see that they shall never lack for men, money and moral support, for RCA recognizes that on these Laboratories depends its continued success.

In this address I have not intended to draw a sharp distinction between research workers and engineers, because although their functions are somewhat different, they largely overlap. But I have intended to draw a distinction between those in both classes who possess creative ability and those who do not.

Roughly speaking, the research worker brings the laws and materials of nature to the creation of a working device. He is usually the inventor—the man who accomplishes a new result where nothing was there before. The engineer then comes in and, with a genius no less imaginative and creative, simplifies and modifies the device to adapt it to the economics of manufacture, to stability of performance in the hands of the public. He introduces beauty of appearance contributing to saleability, and adjusts it to all the other factors that bring in the relationship of dollars.

The present research agencies of RCA are scattered. Many workers are at Camden, others are at Harrison, Rocky Point, Riverhead and New York. While on account of the necessity of operating in the field some of these will have to remain where they are, the bringing together of the majority of them at Princeton to touch elbows in these new Laboratories will, I am certain, have very important results.

The tangible results are the obvious ones of reduced cost of operation, improved efficiency, greater flexibility and facility for concentration upon particular problems. There will also be the improvement in many cases of living conditions and material surroundings that this new center will afford.

But there are other less tangible but none the less important advantages accruing from union here. Ralph Waldo Emerson once said: "Let one man in a company be wise and all are wise, so great is the contagion."

Creative engineers and research workers are peculiarly sensitive to ideas, and there cannot fail to come about a mutual infection of each other, with ideas in the field of their life work, when they are thrown together in this new center. Mutual illumination will enhance the work of each. There will also be an inspiration and general intellectual stimulation that will come from nearness to the great University with whose intellectual fellowship our workers cannot help becoming identified.

Princeton University has long been a torch bearer in the field of science, whose flame cannot help lighting some of the torches which these Laboratories inevitably will produce.

When the men from the scattered laboratories come to work together at Princeton, I am confident that there will come about an increased enthusiasm and a real contagion of ideas that will lead to even more brilliant work in the future than those creative spirits have produced in the past, and that these Laboratories will stand out in the years to come as the Nation's and probably the world's most pregnant center in the almost unlimited further development that is foreseen for the radio art.

MR. SCHAIRER: *Now we turn westward by telephone and radio across the prairies and over the Rockies; out across the Pacific to a latitude some 4,800 miles beyond the horizon of Princeton. Far west of the Golden Gate the steamer Matsonia is bound from Honolulu to San Francisco. It will be several days before she docks, but we can travel to her decks by radio, there to find the man who is the best friend and supporter of radio research in the world. He is the man whose vision and courage, whose inspiration and leadership have brought us to this historic milestone in radio at Princeton. Only the long arm of radio has the power to take a few minutes from his well-earned vacation. So now if he will receive our invisible messenger bearing our invitation to speak to us from the Pacific, we shall be honored and delighted to hear our President, Mr. David Sarnoff.*

Address by Mr. David Sarnoff

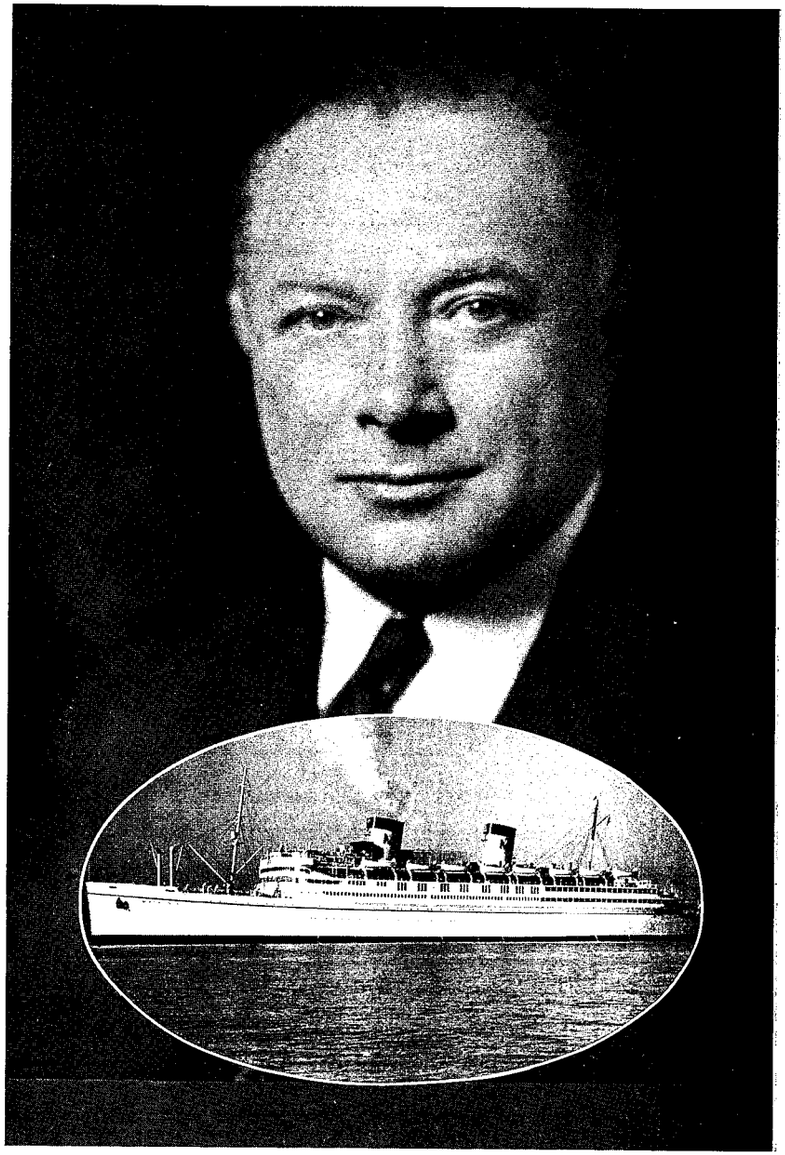
I AM very happy to have this opportunity to attend by radio the laying of the cornerstone of RCA Laboratories at Princeton.

I send my heartiest greetings to General Harbord, to Mr. Gano Dunn, whose inspiring address I have just listened to on the ship, to you Mr. Schairer, and to my other associates and friends gathered on this occasion. I wish I could be with you in person on this historic occasion.

It is a tribute to our radio scientists and engineers that my hearing you and speaking to you from a ship on the Pacific Ocean five thousand miles away seems nothing out of the ordinary. Miracles are the stock-in-trade of radio, and have become part of the daily routine of living for countless millions of people.

Tonight millions of listeners all over the world will hear an outstanding radio program, in observance of the fifteenth anniversary of the National Broadcasting Company. It is significant that we should lay the cornerstone for these laboratories on the same day that NBC celebrates the conclusion of fifteen years of network broadcasting.

Both research and broadcasting are dedicated to public service. The research laboratory serves the public through the power of the human mind to translate the laws of nature in terms of useful services and products. The broadcasting network serves the people through the ability of men and women to express ideas and emotions in terms of human understanding.



David Sarnoff participated in the RCA Laboratories cornerstone ceremonies by radio from the S.S. *Matsonia* on the Pacific.

Research and broadcasting are only two of radio's many-sided activities, yet they illustrate the reason why radio holds great fascination for all of us as a field of endeavor. Human nature, like radio, is many-sided. It is a complex fabric woven by both the mind and the heart. The breadth and scope of radio kindles alike the enthusiasm of the artist and the scientist in equal measure. Most of us in radio, while we may not claim to be artists or scientists, nevertheless share their enthusiasm, and find a deep satisfaction in helping to make their talent and genius of benefit to people everywhere.

We all deplore the fact that radio, the instrument of sympathetic understanding and inspiration, can be perverted to uses which are dark and destructive. That, however, is the fault of the player, and not the instrument. Where radio has been misused, it is human nature which has failed. Art and science have succeeded.

No student of world history can believe that such failure is anything but temporary; a hesitation but not a halt in the forward march of civilization.

If the RCA Laboratories were being built in a world free from voices of hate and threats of aggression, they would have but a single purpose: to improve existing services and products and to create new ones, in the peaceful pursuits of communication, industry and science. That purpose holds good, and will be a constant objective of RCA Laboratories.

But a more immediate pressing goal confronts us. As Dr. Samuel Johnson once put it, "The future is purchased by the present." We cannot build for peace until we have first insured the conditions which make peace possible. We must first do our part to maintain the freedom essential to the creative genius of scientist and artist alike, and to the social and economic welfare of all people.

Unless this immediate objective is attained, our long-term objective could not be achieved. For the only art or science or industry that is fruitful is that which is free. The only happiness which art, science and industry can provide is the happiness of free men and women.

We therefore pledge the unremitting efforts of RCA Laboratories to the national defense of the United States. We meet today with the solemn resolve that the cornerstone we lay here at Princeton shall help support that great cornerstone which went into the building of our nation: the freedom of the men and the women of America.

MR. SCHAIRER: *Generalship is essential to push forward the front lines of science. To lay the cornerstone of these Laboratories, as a bulwark of national defense, as well as a rock upon which to build the future of our country, it is most appropriate that the hand which wields the trowel should be that of a distinguished soldier. As a sergeant early in his career he was recognized "as a most promising youngster any regiment would be fortunate to get." The United States Army's great Chief of Staff after he laid down his sword at the end of World War I, became our Chief of Staff. Unselfishly and incessantly he has labored with loyalty and resourcefulness for our organization and the progress of radio. To lay this cornerstone, symbolic of making America foremost in radio research, I have the honor and pleasure of presenting our Chairman, Major General James G. Harbord.*

Address by Major General J. G. Harbord

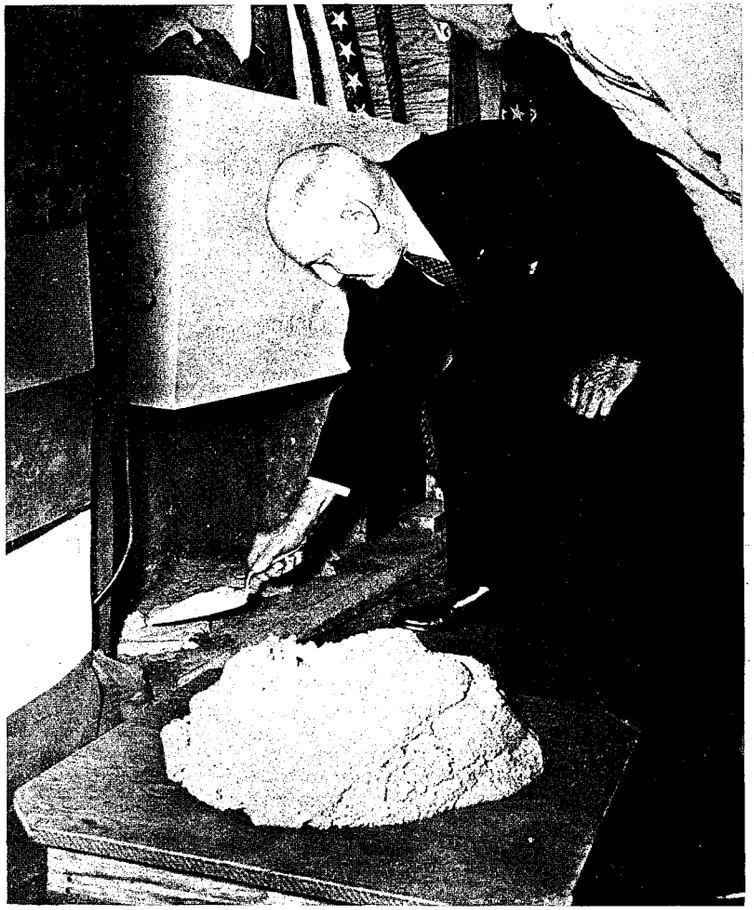
YOU efficient and loyal workers who are "beating the promise" for national defense need no further reminder that the first great task of the new RCA Laboratories is to help protect our country's safety in this critical period of history. Many of you are working personally on defense apparatus, which cannot for military reasons be described publicly. But all of us can take pride in the knowledge that our company is answering the call of national defense with credit and distinction.

The point I should like to emphasize is that the phase of scientific research which at the moment takes second place, and rightly, during the emergency, is also enormously important to our nation's welfare. This phase is the creation of new devices, and the enlargement and perfection of the existing radio and electronic services, for the post-war period which lies ahead.

When the danger to freedom is removed by the defeat of war-mongering dictators—and their ultimate defeat is certain—the peace-time industrial application of scientific research will become a more vital factor than ever before.

Exactly twenty-three years ago, as head of our Services of Supply in France, I was faced, immediately following the Armistice, with some part of the task of throwing a huge war production machine into reverse without stripping the gears. Knowing something from personal experience of the battle area, too, I can assure you that the sudden switch from a war economy to a peace economy has perils for a modern nation scarcely less dangerous in their own way than the perils of a division fighting in the front line.

The problems of a quick economic about-face are even more difficult now than they were then. In 1918 we had a



Major General J. G. Harbord uses a silver trowel to spread the mortar in laying the cornerstone of RCA Laboratories.

reservoir of prosperity, built up through practically uninterrupted decades, ready to be tapped. In 1918 we had practically no social and economic unrest. We had indulged in no experimental departures from our tested and trusted principles of government. In 1941 we have only recently emerged from an economic depression, and have not yet emerged from the social, economic and political uncertainties that followed in its wake.

In our national effort to prevent a serious post-war slump, a strong ally will be the creation of new services, new industries and new employment by the scientific laboratories of American industry, of which we shall make the RCA Laboratories such an outstanding example.

The late Frank A. Vanderlip once said, "A conservative is a man who does not believe that anything should be done for the first time."

There are no conservatives in scientific research. There are no conservatives in radio. Every phase of our industry—research, communications, broadcasting and manufacturing—has progressed because it has dared to pioneer—to be the first to do what it has done.

If the work for which these Laboratories are designed could be compressed into one phrase, it might well be: "Doing things for the first time."

We shall now put our cornerstone in place, with the fervent determination that the pioneering results which will be accomplished for the first time in these Laboratories shall serve greatly in the defense of our country, and in the rebuilding of a stronger nation in the years to come.

MR. SCHAIRER: *The sealed box now being placed in the cornerstone contains radio and electronic devices, as well as literature of the present Radio Age, so that those who may open it, perhaps a century from now, will have at hand the keys of science which today we use to open new gateways of progress. The contents include: Iconoscope, Kinescope, cathode-ray tube, special types of electronic tubes, microphone, an acorn radio tube and electron multiplier, a loudspeaker, a compact personal radio receiver.*

Among our guests today is a charming concert singer of the stage, opera and radio. We are happy that Miss Lucy Monroe is here to favor us with another of her superb renditions of "The National Anthem."

THE products and services of the Radio Corporation of America are provided by the following divisions and wholly-owned companies:

RCA Manufacturing Company, Inc.

- RCA Victor and RCA Radiola Receivers
- Radio Tubes
- Broadcasting Transmitters and Studio Equipment
- Television Receivers, Transmitters, and Studio Equipment
- Equipment for Radio Communication and Facsimile Systems
- Aircraft and Airport Radio Equipment
- Police Radio Systems
- Radio Laboratory and Test Equipment
- Apparatus and technical services for the U. S. Government
- RCA Victrolas (radio-phonographs)
- Victor and Bluebird Records
- Photophone Sound Equipment for Motion Picture Studios and Theatres
- Public Address Systems
- Sound Systems for Educational and Industrial Uses
- 16 mm. Motion Picture Projectors for Educational and Home Use
- Equipment for Amateur Stations
- Electron Microscopes

National Broadcasting Company, Inc.

- National "Red" Network
- International Broadcasting Service
- NBC Concert Service
- National "Spot" Advertising Service
- National "Blue" Network
- Television Program Service
- Recorded Program Service

R.C.A. Communications, Inc.

- Radio Telegraph Service between United States and 48 Countries
- International Program Service
- Radio Telegraph Service between 12 leading cities in United States
- International Radiophoto Service

Radiomarine Corporation of America

- Radio Telegraph Service between Ships and Shore
- Radio Direction Finders
- Marine Radio Telegraph and Radiophone Transmitters and Receivers
- Automatic Radio Alarms

R.C.A. Institutes, Inc.

- Technical Instruction in New York and Chicago, in Radio, Television, and Electronics
- Publication of Scientific Papers on Radio and Television subjects, through RCA Institutes Technical Press

RCA Laboratories and Patent Department

- Research and Advanced Development in Radio, Television, Electronics, Sound Recording and Reproduction.
- Administration of Patents and License Agreements. Laboratory and Technical Service to Licensees.