RADIO AGE

RESEARCH - MANUFACTURING • COMMUNICATIONS • BROADCASTING - TELEVISION

RCA

JULY

1946

"Your office calling, Jack . . . It's important"

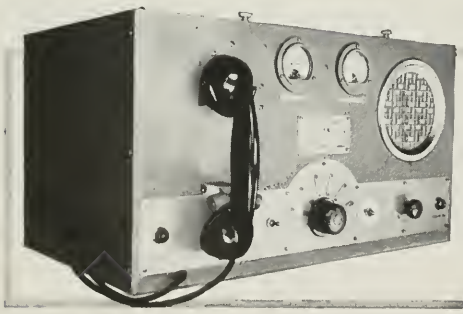
YOU CAN ENJOY extra hours of leisure aboard your pleasure craft . . . and still be within call of your office . . . when a Radiomarine radiotelephone links your boat to telephones on shore. Your business associates can reach you . . . you can contact your brokers, agents or salesmen—all while you relax aboard ship!

A radiotelephone helps you maintain your *personal* and *social* contacts, too. Ships' telephone exchanges—at principal coastal and inland ports—connect your craft with local and long distance telephones. Your home...clubs...friends—are all within quick and easy reach.

And should you ever need information or aid from the U. S. Coast Guard, you can radio them *direct* . . . as well as other ships equipped with radiotelephones. The truly dependable performance of Radiomarine equipment gives you *extra safety*, as well as more convenience aboard ship.

Radiomarine offers a complete line of radiotelephones for trustworthy two-way communications...radio direction-finders for taking bearings regardless of weather conditions . . . for vessels of all types, from luxury liners to pleasure craft.

Radiomarine service stations ring America's coastline—and serve the Great Lakes and Mississippi, too. There's a Radiomarine branch office in: Baltimore, Boston, Buffalo, Cleveland, Galveston, Los Angeles, Miami, Mobile, New Orleans, New York, Newport News, Norfolk, Philadelphia, Portland (Oregon), Port Arthur, San Francisco, Savannah, Seattle, St. Louis, Tampa and Wilmington (N. C.).



Model ET-8027

Compact, self-contained, 25-watt, 6-channel, 2-way radiotelephone complete with power unit and optional remote control unit. Styled and designed for use aboard pleasure craft and work boats. Operates from either 12, 32, or 110 volt D.C. supply systems.

Write For FREE Descriptive Literature— *Today!*

We will gladly send you illustrated literature on Radiomarine radiotelephone equipment and the address of your nearest Radiomarine Service Station. Address: *Radiomarine Corporation of America, Dept. 1C, 75 Varick Street, New York 13, N. Y.*

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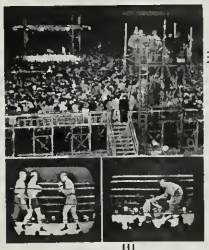
RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



COVER

cene at Yankee Stadium uring the Louis-Conn fight, rst heavyweight champion- hip match to be televised. BC's television cameras ere installed on the platform t the right. Below the Sta- ium view are two photo- raphs of the fight, taken irect from the screen of a levision receiver.

VOLUME 5 NUMBER 4 JULY 1946

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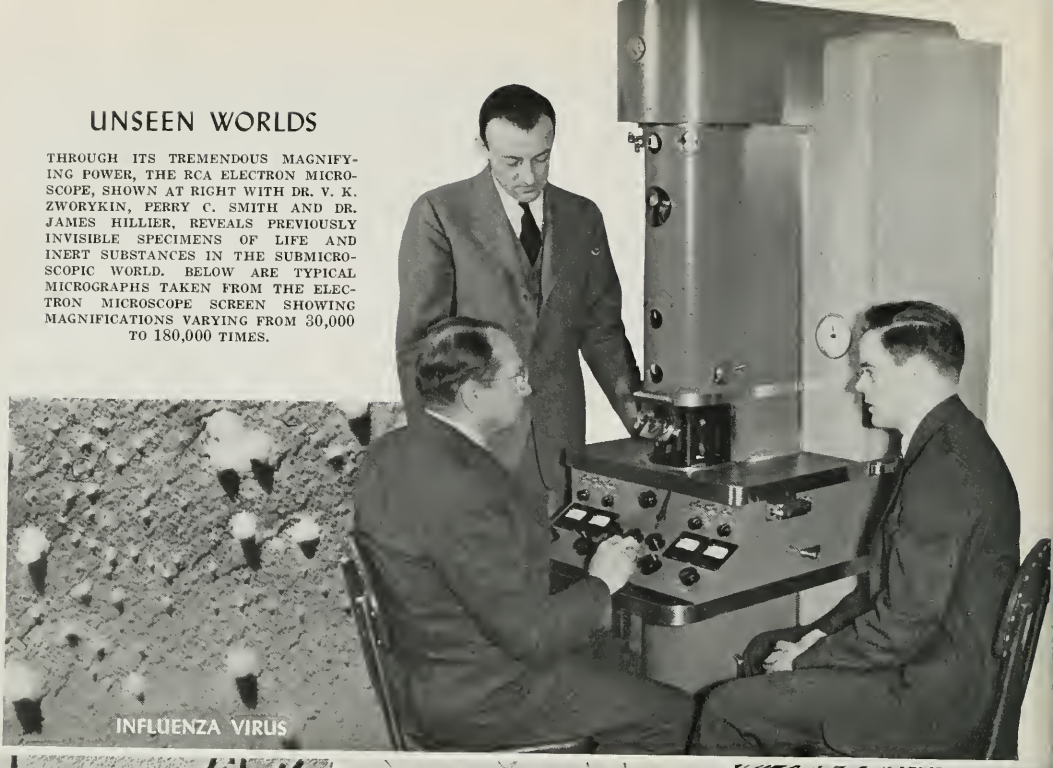
RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.
DAVID SARNOFF, *President*
LEWIS MACCONNACH, *Secretary* ARTHUR B. TUTTLE, *Treasurer*

Radio Age is published quarterly by the Department of Information, Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N. Y.

UNSEEN WORLDS

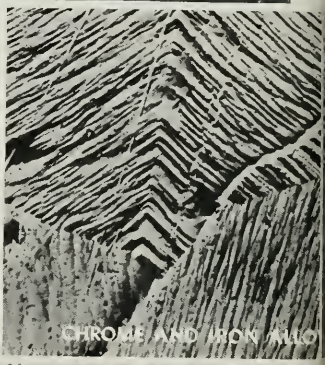
THROUGH ITS TREMENDOUS MAGNIFYING POWER, THE RCA ELECTRON MICROSCOPE, SHOWN AT RIGHT WITH DR. V. K. ZWORYKIN, PERRY C. SMITH AND DR. JAMES HILLIER, REVEALS PREVIOUSLY INVISIBLE SPECIMENS OF LIFE AND INERT SUBSTANCES IN THE SUBMICROSCOPIC WORLD. BELOW ARE TYPICAL MICROGRAPHS TAKEN FROM THE ELECTRON MICROSCOPE SCREEN SHOWING MAGNIFICATIONS VARYING FROM 30,000 TO 180,000 TIMES.



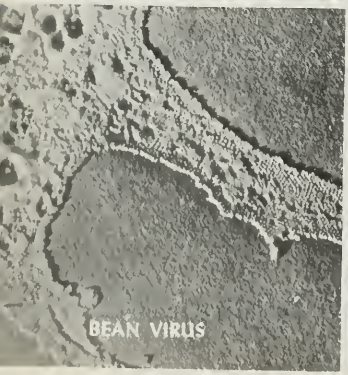
INFLUENZA VIRUS

TOBACCO MOSAIC VIRUS

VANADIUM PENTOXIDE

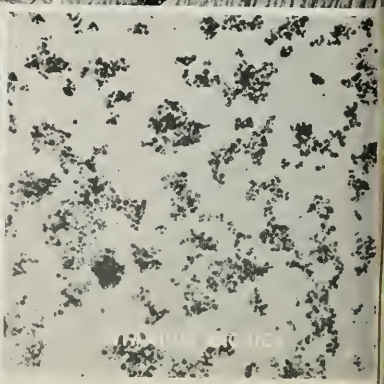


CHROME AND IRON ALLO



BEAN VIRUS

"PERFECT" DIAMOND FACET



The Atom's Challenge

WORLD LEADERS NEED THE SUPPORT OF AN INFORMED PUBLIC WITH A UNIVERSAL WILL TO PEACE IF HORRORS OF ATOMIC WAR ARE TO BE AVERTED, BRIG. GENERAL SARNOFF TELLS GRADUATES

Address delivered by Brig. General David Sarnoff, President, Radio Corporation of America, at Commencement Exercises, Bethany College, Bethany, W. Va., June 9, 1946.

MR. PRESIDENT, members of the Board of Trustees, the faculty, honored guests and the graduating class of Bethany College:

It is a great pleasure to be with you today, and to be honored by such distinction as you confer upon me. As one who has spent the greater part of his life in radio, it is particularly pleasing to me to be honored by Bethany College for I am mindful that your own Professor Amos Emerson Dolbear, American physicist and teacher at Bethany in 1867, was a pioneer in experiments which he described as "transfer of speech by communication without wires". He had the vision of a prophet, for he declared in 1870 that "mechanism is all that is necessary for the orator to address an audience in every city of the world at the same instant". Professor Dolbear stood on the threshold of wireless!

Those of you who are graduated from college this June step across the threshold of a new era—the Atomic Age. You go forth from these beautiful hills, and out of the pleasant valleys of West Virginia into a world struggling to recover from war. The peace that lies ahead brings you great opportunities and new responsibilities.

Global warfare left wide rifts yet to be bridged, and ragged ridges of misunderstanding that forbid men to cross freely from nation to nation in commerce and in friendship. Old boundaries marked in the geography books, when you started to school, have been erased. The peace conferences which are to draw the new maps for the school books of tomorrow have not convened.

The "One World", made possible by the achievements of science, has not yet been unified. While radio and aviation have shortened time and distance between nations and continents, they have not shrunk their social and political problems. It is the gigantic task of peace to create a world solidarity in which people everywhere may dwell together as good neighbors.

Knowledge and the Atom

World peace to be durable must be molded and preserved by statesmanship as well as by science. But statesmen and scientists alike need the support and understanding of an informed public with a universal will to peace, if we are to be spared the horrors of war in the Atomic Age.

Today the atom is universally recognized as a source of unprecedented power for good or for evil. History teaches that knowledge, too, is power. From the organized use of knowledge came the clues that led to atomic fission. Now the fate of civilization depends upon the wisdom that will enable man to control atomic power.

The eyes of the world will be focussed this summer on Bikini Atoll in the Pacific where American scientists, in cooperation with the United States Army and Navy, will perform one of the greatest experiments of all time as they study the violent effects of atomic bombs. It promises to be the greatest mass attack ever concentrated on a problem of science. Many novel instruments—airborne television, radar, radio-controlled planes and high-speed cameras will be mobilized to record results of the experiment.

PRESIDENT W. H. CRAMBLET, OF BETHANY COLLEGE, WITH BRIG. GENERAL DAVID SARNOFF, WHO WAS AWARDED DEGREE OF LL.D. AT BETHANY COMMENCEMENT EXERCISES IN JUNE.

BETHANY COLLEGE CHAPEL, SCENE OF COMMENCEMENT EXERCISES.

While this test will be made primarily for military purposes, the results may prove useful in other directions. It is possible that fundamental scientific information may be derived for application of atomic energy to industry and other peaceful purposes.

A Matter of Life or Death

Only a few countries may possess the knowledge essential to the production of atomic energy, but all countries possess the power to make atomic energy work for the good of mankind and to remove its threat to civilization. Science will go on and on, but whether it moves in the direction of life or death, of peace or war, of dictatorship or democracy, largely depends upon man. He cannot expect to control the behavior of the atom, unless he learns to control his own behavior in a world where one man's madness can make countless millions mourn. The heart and soul as well as the mind of man must function in this new age of science, if peace and freedom are to be secure.

American colleges and universities have emerged from the war to confront greatly changed conditions. Hundreds of thousands of young men and women, who in normal times would have gained new knowledge in the halls of learning, were called to the colors. When they marched to war, there was very little, if any, talk about atomic energy. In the physics classrooms you, of course, had heard of the atom and had learned that some day its energy might be harnessed for useful purposes. Suddenly, the atom flashed in the headlines. War marshalled the scientists, rushed research and with a terrific blast of bombs, opened the Atomic Age. Like lightning it came with a thunder of news that echoed around the world. Within one year millions of words have been written about it, and it has been on every tongue. Now scientists warn that the future of this planet revolves around the atom.

We are told that the discovery of the fission of uranium and its application in the atomic bomb are not isolated events. They result from an evolution in discoveries that go back to the end of the last century Neither are the laws of God and man, that can control this great new energy, isolated laws—they are woven in the fabric of civilization. This generation must apply them to make man the master and not the slave of the atom. We find hope in the fact that steam, electricity, the electron and other great forces of Nature have been harnessed and controlled.

Now the atom—so infinitesimal that it is invisible—raises the same challenge. If we fail, great cities may be blasted off the map and nations laid waste. The nuclear physicist holds the world in the palm of his hand. If civilization is to survive, that hand must be guided by intellectual understanding and international good will.

Role of the Liberal Arts

Through nuclear physics the world can continue its advance. If the sciences and the arts will work together, there also will come with the liberation of new energy the liberation of new knowledge and new wealth for the benefit of all the people on this earth. Any "chain reaction" to be started by atomic energy must be linked with a "chain process" in education and understanding that will knit all nations in friendship and peace. Here is the role of the liberal arts, for science alone offers no adequate safeguard.

The liberal arts—literature, history, religion, law and philosophy—represent the international sovereignty that must strive to protect civilization in a world over which the atom bomb is suspended. Technology needs the wisdom of theology and philosophy to bring about mutual trust and international unity.

It is an encouraging sign for the future of the United States that so many young men and young women have returned from the armed services to enter college. They bring with them a new zest for learning. Their travels, their experiences on the battlefields, on the seas and in the air, have impressed them with the great importance of education in world affairs. They know that from science spring social and political implications. They have ob-

served that invention does not find its place in the world within the walls of laboratories. Not until the work of the scientists is brought into the field to test its social aspects can the real value of discovery be established.

We have an outstanding example in radio for it was during the First World War that the radiophone began to talk. Suddenly it was realized that this device was not merely a new voice for use in war but a voice for service to people everywhere regardless of race or creed. The great industry of broadcasting became a new outlet for the liberal arts. Speech and music found new avenues of appeal and expression. Here was a new medium of communication — a new instrument of culture. Wisely the educators of America took up the microphone so that those who listened might learn.

Similarly, out of the Second World War, television has emerged greatly improved by wartime research and development. Now, science offers the liberal arts a new extension in communication that appeals to both ear and eye. Television intensifies the responsibility of the educator, the theologian and the broadcaster. Each day can be a school day on the air; all the country is a classroom.

Science Has Paced the Arts

At this point it may occur to you that the liberal arts are much older than science, and you may ask why science dominates. The reason is that technological progress has bypassed the arts—science has run far ahead. In some parts of the world, the materialistic side of life has threatened to supplant the spiritual, as the dominating force.

Establishment of a true balance between these spiritual and material elements calls for a new kind of leadership. For instance, it is essential that we put the same emphasis on training young men and women for government as we do in qualifying them as engineers, doctors, lawyers and scientists. The liberal arts must provide the humanitarian charts and controls for the unending developments of technology.

As a result of wartime achievements in science, those of you who have pursued the liberal arts may wonder if you should have followed scientific instead of classical studies. You have no cause for regret. Science needs the wisdom that stems from the classics. Alongside the great names of the nuclear physicists, there will be listed new names on the roster of Fame—names distinguished in the arts because they will have helped to make the splitting of the atom a triumph for the progress of humanity.

Do not forget that discovery and invention in themselves are not as important as the uses to which they are put! Electricity can be used for destructive purposes or it can be utilized to light the world and to operate industrial machinery. Radio can be used to communicate around the world, to entertain and to educate, or it can be employed to guide winged atomic missiles in a shower of destruction. The airplane can be used for swift flight and pleasant travel between nations, or it can be used as an engine of terror. Man makes the choice.

The Graduate's Opportunity

You, as graduates, go forth from your Alma Mater into a world that seems fraught with danger. Yet it is alive with opportunity. Ahead of you lies great adventure in the arts and sciences which may be intertwined to provide greater abundance of the necessities of life and to advance the ways of peace. Those

(Continued on page 25)

CITATION

To Brig. General DAVID SARNOFF
at Awarding of Doctor of
Laws Degree by Bethany
College, June 9, 1946

Dean Forrest H. Kirkpatrick: Among the men who dream great dreams there are some who let dreams become their master, and then there are those who become the master of the dreams by making them come true. David Sarnoff is a man who has the capacity for great dreams and the courage, determination, and high sense of purpose to master those dreams, turning ideas and ideals into channels of usefulness and helpfulness.

More than any other man, he is responsible for making radio a great industry and a great art. More than any other man he has given leadership, in opening the doors of research, engineering and commercial utilization, for television. The same could be said of many forms of electronic development and communication services. But more than this, Mr. Sarnoff has been a great public servant—in war as an active officer in the U. S. Army Signal Corps, in education as a spokesman for better schools and colleges and as a member of the governing board of the largest university in this world, as a champion and sponsor of fine arts, and as a business statesman pointing the way for intelligent progress and high integrity.

Mr. Sarnoff has honored us by his presence and his thoughtful, discerning message today. The honors of this college always belong to men with the ability and vision that he brings to us. I pray therefore that he may be invested with our degree and diploma as Doctor of Laws, honoris causa.

President Cramblet: David Sarnoff, outstanding leader in a great industry and great art, distinguished by his service to our country in time of war and in time of peace, personification of the American Dream to all of us here at home and to millions beyond the seas. By the authority vested in me by the Board of Trustees, I confer upon you, Sir, the Degree of Doctor of Laws, with all the rights and privileges appertaining thereto.

THESE SCIENTISTS AT RCA LABORATORIES DIRECTED RESEARCH AND DEVELOPMENT OF THE IMAGE TUBE WHICH WAS THE "EYE" OF THE ARMY'S INFRA-RED NIGHT-FIGHTING WEAPONS. LEFT TO RIGHT: L. E. FLORY, DR. G. A. MORTON, DR. J. E. RUEDY AND G. L. KRIEGER.

MEMBERS OF THE ARMED FORCES DEMONSTRATE THE SNIPERSCOPE (TOP) AND THE SNOOPERSCOPE.

Seeing In the Dark

SNIPERSCOPE AND SNOOPERSCOPE, ARMY'S SECRET NIGHT-FIGHTING WEAPONS, MADE POSSIBLE BY INFRA-RED "EYE", DEVELOPED BY RCA

A MINIATURE image tube, distantly related to television's highly-sensitive Image Orthicon tube, developed by RCA Laboratories, Princeton, N. J., provided GI's in the Pacific with one of the most effective night-fighting devices of the war, according to Dr. C. B. Jolliffe, Executive Vice President in charge of the Laboratories.

Operating by infra-red rays reflected from objects under observation, the image tube, or "eye" was eventually adapted to various military devices, including the sniperscope, which was mounted on the barrel of carbines. A hand-held snooperscope, which soldier-patrols found particularly effective in reconnaissance after dark, was similarly designed.

Tube is Small and Compact

In its final standardized form, the image tube is less than two inches in diameter, and four and one-half inches long. Compressed in that space are a glass surface chemically treated to make it sensitive to infra-red rays, an electron optical system which focuses the rays, and a fluorescent screen on which the image appears for observation through a telescope ocular, or eye-piece.

Although the light-sensitive surface and the fluorescent screen are similar in many respects to corresponding units in the Image Orthicon camera tube, which was widely used in airborne television equipment, extensive research was necessary to meet the rigid requirements of the military devices in which the tube was to be used.

Research Was Started in 1930

According to Dr. Jolliffe, work on the infra-red image tube was started by Drs. V. K. Zworykin and G. A. Morton, of the Laboratories staff in 1930 during research directed toward the development of television camera tubes utilizing visible light. As the work progressed, it became evident that such tubes, sensitized to respond to infra-red rays, might have practical applications, especially in the military field. Results of their investigations were published in the Journal of the Optical Society of America, April, 1936.

One of the first experimental applications of the infra-red image tube was in night driving of vehicles. As a direct result of these field tests, RCA Laboratories continued its work on the image tube under contract with the Office of Scientific Research and Development.

Tests showed that the tube made it possible for the driver to follow a road while moving at normal speed in absolute visual darkness. An improved model in the form of binoculars, incorporating a more sensitive tube and a more powerful source of infra-red, permitted the driver of a scout car to speed at a rate of 40 to 50 miles an hour over good roads in complete safety.

As the size of the tube was decreased and the sensitivity increased, it was tested successfully in many special applications including the detection of infra-red marker lights and buoys in amphibious operations, and as an identification device for planes, and other forms of land and water vehicles.

Tube is Effective at 700 Yards

The reconnaissance possibilities of the infra-red telescope in combination with a searchlight which projected only infra-red rays, was recognized early in the work. One of the first models had a range of only 300 to 400 yards but as development continued, the range increased until it was possible to see a shore line and buildings along a

coast a mile away, and to detect—but not identify—trucks, tanks and other large vehicles at 700 yards.

At this point in the research, Dr. Morton and his associates, L. E. Flory, Dr. J. E. Ruedy and G. L. Krieger, of the RCA Laboratories staff, foresaw the value of the image tube when designed as a light-weight portable unit. Out of this line of development came the sniperscope and the snooperscope.

The sniperscope consists of a 30-watt infra-red lamp slung beneath the standard Army carbine with the image-tube telescope on top of the barrel. To observe a scene, the operator of a sniperscope aims his rifle in the normal manner and presses a button which feeds electrical energy from the back-pack to lamp and image tube. The infra-red radiations, striking objects in the scene, are reflected back to the sensitive image tube in sufficient strength to create a picture of the area on the tube screen. Total weight of equipment, including battery and generator in the knapsack, was 18 pounds.

Sniperscope Served as Gunsight

Thousands of these instruments reached the fighting front in time to demonstrate their effectiveness as weapons of modern warfare. Using a sniperscope-equipped carbine, a soldier could detect objects at a range of 150 to 200 feet in complete darkness while remaining completely invisible to the enemy. By aligning telescope and rifle, the sniperscope served as an accurate gunsight, making it possible to hit a target the size of a man at a distance of 75 yards, and at even greater distances against certain types of background.

The snooperscope consists of the same units mounted on a light handle for reconnaissance. Carrying snooperscopes, a patrol could observe enemy activities without revealing its presence.

In outlining some of the peacetime applications of the electron telescope, Dr. Jolliffe mentioned its possible use in observing industrial operations that must be carried out in total darkness, and as an aid in certain forms of police work such as the nighttime inspection of activities under suspicion.

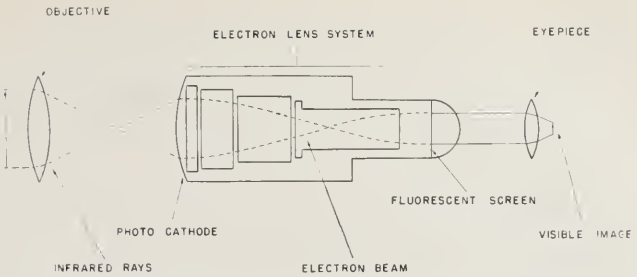
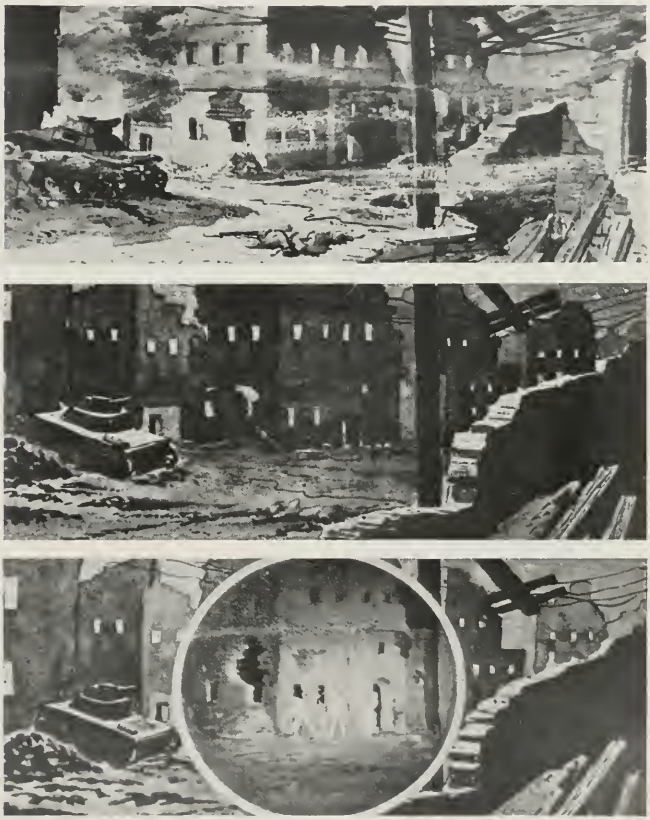


DIAGRAM OF IMAGE TUBE SHOWING HOW OBJECTS, ILLUMINATED BY INFRA-RED LIGHT, ARE MADE VISIBLE TO OBSERVER.

THE THREE ILLUSTRATIONS BELOW REVEAL THE PENETRATING POWER OF THE INFRA-RED "EYE". AT TOP IS A STREET SCENE IN THE DAYTIME; CENTER, THE SAME SCENE AS VIEWED BY THE UNAIDED EYE AT NIGHT, AND AT THE BOTTOM, IN THE CIRCLE, DETAILS OF A SECTION OF THE LANDSCAPE WHEN MADE VISIBLE BY SNOOPERSCOPE OR SNIPERSCOPE.



New Television Antenna

ENGINEERS OF RCA AND NBC DESIGN 61-FOOT STRUCTURE FOR STATION WNBT—SAME MAST ALSO SUPPORTS RADIATORS FOR FM AND EXPERIMENTAL VIDEO TRANSMITTERS

A NEW, specially designed 61-foot television antenna, topping the 1,250-foot Empire State Building in New York, was put into operation May 9 as NBC station WNBT returned to the air with an expanded schedule of sight-and-sound programs on Channel 4 (66 to 72 megacycles). While out of service, during the erection of the lofty mast and radiators, NBC also installed a new video transmitter, replacing equipment which had been in use throughout the war.

Special engineering was necessary to design and construct the new antenna, according to O. B. Hanson, NBC Vice President and Chief Engineer. The objective, he said, was to develop an antenna that would give high gain and at the same time permit broadbanding—a requirement for fine picture fidelity—in the frequencies between 66-72 megacycles. This was accomplished in the design of radiating elements and in the method of feeding these elements electrically.

Basic design of the new antenna was evolved by Raymond F. Guy, NBC radio facilities engineer, and Dr. George H. Brown, of the RCA Laboratories, Princeton, N. J., authority on antenna design. The system was developed and tested in the Princeton Laboratories, then disassembled and moved by truck to New York. Erection of the antenna atop the Empire State Building was accomplished by assembling the upper portions, raising them gradually through a hole in the deck of the building and adding the lower portions—a difficult operation on a deck only nine feet in diameter.

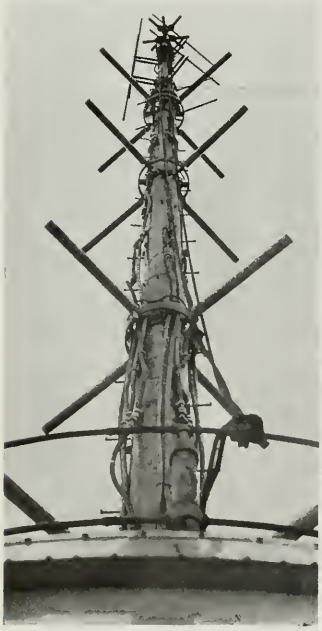
On a single supporting mast, there are three antennas which will radiate waves of four different frequencies, Hanson disclosed. The television portion consists of an array of 16 elements, all of which combine to concentrate toward the horizon the waves of two separate services, television picture and television sound. Another antenna will radiate the waves of NBC's pioneer FM station WEAF-FM, which has been using a temporary antenna since January. A 288-megacycle television test antenna at the pinnacle of the mast completes the array, and will be used in connection with research in the higher frequencies.

Hanson revealed that the 61-foot antenna, which is 26 feet higher than its predecessor, is the fourth to be used in the New York television facilities since 1931. The new system will deliver an effective radiated signal 100% more powerful than its predecessor.

Pioneers in Research

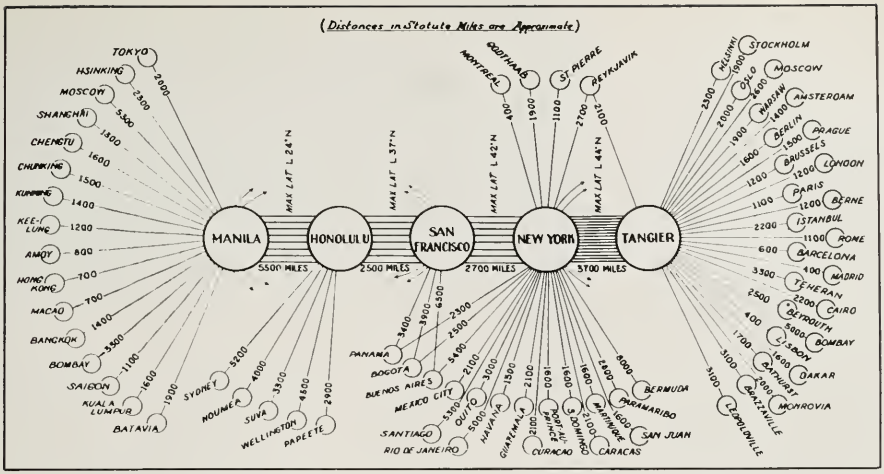
"NBC engineers have been performing pioneer research and development work in the field of television for more than 15 years," Hanson said. "The result of their labors has been the development of a practical system of television in which the public can have fullest confidence."

The transmitter which has served WNBT and its predecessors since early in 1931 has been replaced by a new RCA picture transmitter. The sound transmitter, also an RCA model, has been installed alongside.



LEFT: COMPLETED MAST IN POSITION ON EMPIRE STATE BUILDING TOWER. THE PIPE-LIKE EXTENSIONS AT THE LOWER END RADIATE WNBT'S SIGHT-AND-SOUND SIGNALS. ABOVE ARE THE T-SHAPED FM RADIATORS AND AT THE TOP ARE ANTENNA ELEMENTS FOR THE 288-MEGACYCLE EXPERIMENTAL TELEVISION TRANSMITTER.

BELOW: THOMAS BUZALSKI, ENGINEER IN CHARGE OF WNBT'S TRANSMITTER, POINTS OUT DETAILS OF THE NEW TELEVISION CONTROL SWITCHBOARD TO O. B. HANSON, NBC VICE PRESIDENT AND CHIEF ENGINEER.



PANDORA'S TAPE RELAY SYSTEM WILL PROVIDE RAPID RADIOTELEGRAPH MESSAGE SERVICE TO ALL PRINCIPAL CITIES OF THE WORLD, AS SHOWN ON THIS CHART.

The Pandora Plan

FAST, LOW-RATE INTERNATIONAL COMMUNICATIONS SERVICE IS OBJECTIVE OF LARGE SCALE PLANNING ALREADY UNDER WAY AT RCA COMMUNICATIONS, INC.

By T. H. Mitchell

Executive Vice President, RCA Communications, Inc.

CONVINCED that fast, low-rate international communications services must be available and readily accessible in all parts of the world, not only to governments but to individual citizens, RCA Communications, Inc., was prompted, several months ago, to instigate large-scale planning for the modernization and mechanization of its domestic and foreign stations and operations. A plan was developed and given the title, "Pandora Plan." A report on its progress recently was placed in the official files of the Federal Communications Commission.

The world's current requirement for communications is unprecedented. Physical, material, economic, political and moral reconstruction of devastated nations is forcing the rapid exchange of intelligence between nations and peoples in volumes never before recorded. If the ideals and precepts so recently consecrated on the battlefields are to flourish without hindrance, it is essential that nations and peoples be able to communicate freely.

Reconstruction agencies, financial and business firms and private individuals have greater need today than ever before for this service. Through expanded press and broadcast communications over international radio circuits the peoples of the various nations will reach a mutual understanding.

Pandora is designed to accomplish the provision of unprecedented high volume, low-rate international communications service through the organization of a globe-girdling tape relay system employing the 5-unit and 7-unit code perforated tape equipment with a telegraph printing system for transmission to the office which will make final delivery to the addressee.

Tapes to Carry All Messages

The receiving and transmitting terminals of radio telegraph circuits will be equipped with automatic typing reperforators which will receive and send messages in the form of printed and perforated tapes suitable for immediate retransmission to branch offices, or to overseas stations via international radio circuits.

At intermediate tape relay offices, the received tapes will be removed from typing reperforators and inserted into transmitter-distributors keyed to the onward relay radio circuit. In this way, the manual processing required between points

of origin and reception will be reduced to a minimum.

Such automatic relay of messages presents several advantages. Elimination of letter-by-letter manual processing at relay points will eliminate the element of human error between points of origin and reception, and will result in savings of operator time. Printing telegraph circuits are easily extended to distant points by means of regenerative repeaters installed at relay points. A regenerative repeater provides automatic electric relay rather than a manual relay of the perforated tape. It also restores the signal to its original undistorted form. Such extension makes possible the successful operation by the printing telegraph method of very long circuits—circuits which could not be operated satisfactorily on a twenty-four hours a day Morse basis. In addition, no entirely satisfactory method for tape relay has been developed for Morse operation.

Tape Relay Increases Speed

One of the most significant attributes of the tape relay system is the tremendous increase in speed of service which becomes possible when manual processing at relay points is eliminated.

A recent comparison of Morse and printer receiving circuits—the latter type circuit being on a tape relay basis—yielded the following figures:

	Morse	Printer	% Gain
Av. Words Per Operator Hour.	700	2700	285
Av. Speed of Service (Min.).	29	12	60
Errors Per Thousand Words	1.39	0.54	61

Training Time Reduced

Along with the reduced operating expenses, greater traffic volumes, increased speed of service and enhanced accuracy which accrue to any tape relay system, goes a remarkably reduced personnel training requirement. It requires many months to train a radio operator. Tape relay attendants can be trained in a period of weeks.

The trunk line belt of tape relay stations, as shown in the accompanying diagram, provides readily accessible alternate routes of communication and at the same time permits the speedy clearance of traffic out of central radio offices in gateway cities.

Concrete steps in the execution of the Pandora Plan, which already have been accomplished, were preceded by the drastic rate reductions which RCA Communications, Inc., placed into effect May 1, 1946.

The ultimate success of the Pandora Plan is, to a certain extent, geared to the pace with which the company's overseas correspondents are able to complete installation of the 7-unit and 5-unit tape relay method of operation. To facilitate these installations the RCA International Division will furnish engineering and operating assistance to foreign administrations.

It is anticipated that some foreign administrations will continue to use the Morse method of operation for several years. All traffic received in Morse form, from such administrations, will be transcribed into the 7-unit or 5-unit perforated tape form in order to facilitate its relay onward over the more efficient and rapid tape relay system. A system of "converters" for translating between Morse and 5-unit perforated tapes, and between 5-unit and 7-unit tapes, has been developed by the company's engineers, eliminating further necessity for manual processing or transcribing of these types of perforated tapes.

The world is earnestly hoping for a permanent peace, and one of the objectives of the Pandora Plan is to enhance that peace by means of accurate, fast, low-cost and direct worldwide communications. It would be a gross oversight to under-estimate the value of such a global communications system to the security of the democratic world.

HOW THE HANDLING OF RADIOTELEGRAPH TRAFFIC WILL BE SIMPLIFIED UNDER THE PANDORA PLAN IS PICTURED BELOW. AT LEFT IS A TYPICAL MORSE UNIT WITH OPERATORS FEEDING PERFORATED MESSAGE TAPES INTO INSTRUMENTS LEADING TO AUTOMATIC PRINTERS. AT RIGHT, A ROW OF MODERN "PACKAGE SETS," EACH OF WHICH PROVIDES COMPLETE FACILITIES FOR THE TAPE-RELAYING OPERATIONS OF A CHANNEL.

SCALE MODEL OF SONAR, EXHIBITED AT MUSEUM OF SCIENCE AND INDUSTRY IN NEW YORK, SHOWS HOW SYSTEM WOULD DETECT SUBMERGED ENEMY U-BOAT ATTEMPTING TO ENTER HARBOR.

Sonar: U-boat Nemesis

SCIENTISTS, ENGINEERS AND PLANTS OF RCA PLAYED VITAL PART IN DEVELOPMENT OF SECRET UNDERWATER SOUND SYSTEM

NAZI U-boats, singly and in deadly wolf-packs, were threatening in 1943 to sever the lifeline of supplies to our armed forces by sinking nearly 100 Allied ships a month when the skill and ingenuity of American scientists and engineers came to the rescue with sonar, a highly sensitive underwater sounding system. In the secret development of this system, it now can be revealed, the Radio Corporation of America played a vital part.

From the introduction of sonar to the end of the war, the hunters became the hunted, and convoys crossed the ocean with minimum losses in ships, men and materiel. According to Navy figures, the system accounted for the sinking of nearly 1,000 enemy submarines, the damaging of hundreds of others and the frustration of countless attacks.

Sonar — which takes its name from abbreviation of the words Sound-Navigation- and Ranging — was used effectively in numerous ways. These included the detection and location of submerged submarines by echo-ranging, the ascertainment of depth, underwater listening and the long-range underwater fixing of positions for rescue work. Sonar equipment operates on the principle that sound waves propagated in water are reflected to their source if they strike a solid body, in much the same way that sound waves in the air produce an echo when they strike a cliff.

In sonar echo-ranging, sound waves are propagated in the water by equipment installed in a surface vessel or submarine and the echoes reflected by the target are received by the same equipment. Direction of the target is indicated by the position of the sonar projector at the time the echo is received, and distance is determined by the time interval between sending of the signal and reception of the echo. Sonar echo-sounding (depth finding) is accomplished in the same way, but the sound waves are directed vertically down, the target being the bed of the ocean.

Contributors to Sonar

Two RCA divisions contributed to the development and manufacture of the sonar equipment employed by the Navy. The RCA Laboratories Division, Princeton, N. J., applied its pioneering experience in optics, magnetism, electromagnetics and acoustics to the project, and the RCA Victor Division, Camden, N. J., engaged in developing, improving and building the apparatus.

Initiating its work on sonar at the request of the Navy in 1934, RCA Victor later became one of the major suppliers of underwater sound equipment. It provided some of the first sonar echo-ranging and echo-sounding devices acquired by the Navy and, in 1939, received a Navy contract for advanced models in which maintenance problems were substantially reduced by incorporation of a new type of relay timing control which RCA developed.

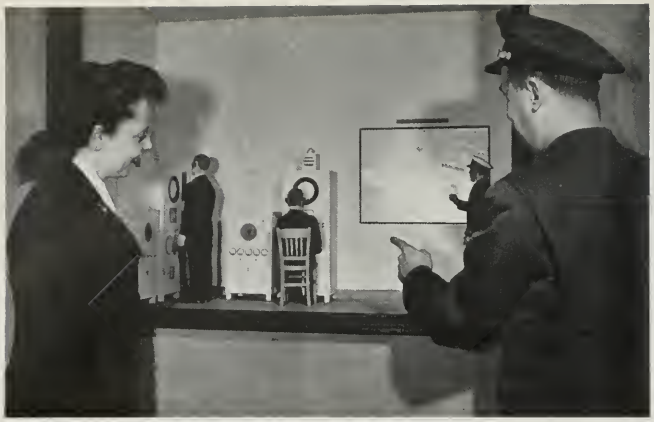
The following year, RCA responded to the demand for simplified sonar equipment of smaller size and lighter weight by developing magnetostriction ranging and listening equipment for use on patrol vessels, such as submarine chasers.

Further improvements resulted in the development of echo-ranging and listening equipment which featured a reduction in size and weight, radical circuit improvements which greatly simplified operation, fingertip control, revolutionary projector design, and improved types of indicator mechanisms for increased accuracy and ease of reading.

Size and Weight Reduced

By a unique application of magnetic principles, RCA was able to design a projector about 85 per cent smaller and lighter in weight than those employed with earlier equipments, and at the same time achieve an improvement in performance. The smaller, lighter projector also made possible a reduction in the size and weight of gear used to train the projector.

In 1942, RCA Victor developed the monitoring and searching system known as "Harbor Echo-Ranging and Listening Equipment," or by the shorter name, "Herald" equipment. This equipment was installed ashore except for the projector and training gear, which were installed under water in the harbor and connected to the shore station by cable for remote training control and conduction of signals. It was designed to furnish greater defensive protection to our harbors



MODEL OF SONAR HARBOR-DEFENSE CONTROL ROOM WHERE INFORMATION PICKED UP BY NAVY'S SUPER-SLEUTH WOULD BE RECEIVED AND EVALUATED.

and the entrances to our inland waterways by providing a means for detecting the approach of enemy surface and submersible vessels.

Meantime, the company designed and built additional echo-sounding and echo-ranging and listening equipment. The latter was designed for medium-sized vessels such as lightweight aircraft carriers (baby flattops), destroyer escorts, and patrol craft.

Target Followed Automatically

Development of the Bearing Deviation Indicator was achieved and it was adopted by the Navy as standard equipment. This equipment consists of an electronic scope which indicates visually and accurately when the sonar beam tends to lose contact, whether the target is to the left or to the right, and how far in either direction, facilitating the reestablishment of contact. Later, RCA developed an adapter unit and special circuits permitting the use of BDI devices with earlier sonar equipments.

Participation of RCA was revealed in the development of the Radio-Sono Buoys which came into use early in 1943 and greatly implemented the anti-submarine campaign by providing a means through which a plane, sighting a surfaced U-boat, or detecting it by radar, could maintain contact after it submerged. These buoys, which float in the water after being parachuted from planes, can detect submarine noises by means of a suspended hydrophone, and the noises activate the buoy's radio transmitter. The resulting transmissions, when received by nearby surface ships, indicate the U-boat's area, which can then be swept by sonar beams for accurate location and attack.

RCA made important contributions in the development of the magnetostriction ranging and listening equipment, now established as standard for heavy ships and for all Navy sonar training schools. RCA received a Navy contract early in 1943 to build these equipments, incorporating all the latest devices and techniques of sonar practice.

Developed "Ear" for Submarines

During the last year of the war, RCA designed and produced a highly-directional listening device for use on submarines. This device is capable of picking up sounds over a wide frequency range (both audible and supersonic), from any source and from great distances, without disclosing its own location. Such equipment facilitated submerged excursions into Japanese held waters, including Tokyo Bay.

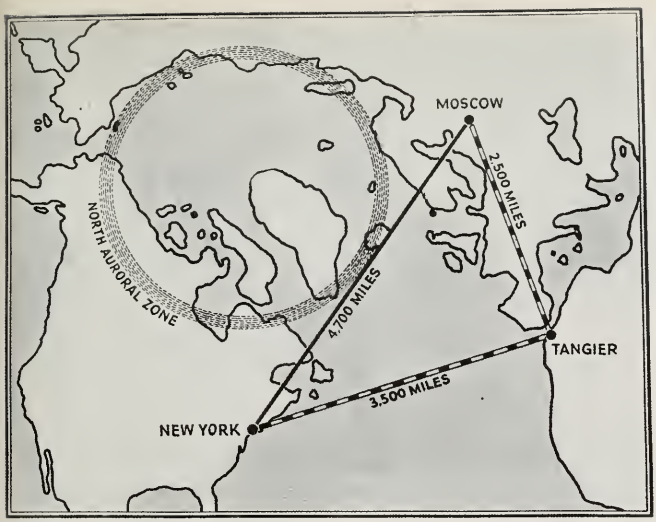
Practice with sonar listening devices, it was pointed out, enabled operators to distinguish the sound of a patrol boat from that of a destroyer or battleship and to recognize the distinctive "voices" of other craft. It was also possible to judge from engine and propeller noises the approximate speed of an enemy ship and the type of engines propelling it.

Sonar equipment proved an aid to navigation as well as detection of enemy vessels, inasmuch as echo-ranging can be used to locate reefs and shorelines and to obtain other data necessary to navigation.

ENGSTROM JOINS GROUP TOURING SCANDINAVIA

E. W. Engstrom, Vice President in Charge of Research, RCA Laboratories Division, Radio Corporation of America, will sail from New York on August 10 aboard the Swedish American liner *Gripsholm* as a member of the Scandinavian Research and Industry Tour, sponsored by the Royal Swedish Academy of Engineering Research. The tour has been arranged to provide research and industrial executives of the United States first-hand views of technological, industrial and management advances in the Scandinavian countries, with the further objective of opening a two-way flow of scientific information across the Atlantic. Mr. Engstrom has been chosen as the representative of the fields of radio, electronics and communications.

E. W. ENGSTROM



MAP SHOWS HOW TANGIER RELAY STATION BY-PASSES AREA OF SEVERE MAGNETIC STORM IN SPEEDING TRAFFIC FROM NEW YORK TO MOSCOW.

NEW STATION AT TANGIER BY-PASSES MAGNETIC STORMS

Powerful, Automatic Radio-Relay Insures High-Speed Message Traffic on New York-Moscow Circuit Without Interruptions.

ESTABLISHMENT of a powerful automatic radio relay station in the International Zone at Tangier, by-passing one of the world's worst magnetic storm areas and providing a new high-speed communications route between New York and Moscow, was announced in May by Thompson H. Mitchell, Executive Vice President of RCA Communications, Inc.

By means of the Tangier relay station, Mr. Mitchell said, RCA engineers have taken a major step in solving the problem of providing uninterrupted service between the United States and the Soviet Union. He pointed out that the direct New York-to-Moscow route passes so close to the North Auroral Zone, or magnetic storm area, that short-wave radio signals fail to get through when sun-spot generated storms occur.

The new alternate path is 1,300 miles longer than the direct route, but this means an increase of only 1 143 of a second in travelling time for the radiotelegraph signal which has the speed of light, Mr. Mitchell said. The system is designed to employ an eight-channel multiplex installation, capable of transmitting messages over four channels in each direction simultaneously. Provision for teletype conference service has been made at each terminus for the convenience of the Russian and American governments.

Predict Magnetic Storms

The magnetic storms resulting from the occurrence of sun spots can now be predicted in advance of the actual disturbances, and the circuit New York-to-Tangier-to-Moscow provides a route which circumvents the most highly disturbed region of the auroral zone through which signals over a direct route from New York to Moscow must pass, it was explained by Henry E. Hallborg, Research Engineer of RCA Laboratories, who is a world authority on geomagnetism.

"One of the worst trouble areas," he said, "is the North Auroral Zone —a ring 60 miles above the earth's surface around the North Magnetic Pole. It is approximately 700 miles wide and is caused by radiation from the sun attracted to the pole. During normal conditions of the ionosphere, radio signals pass through it, but when sun spots appear, the width of the ring may

RELAY STATION AND TOWER ERECTED NEAR TANGIER BY RCA COMMUNICATIONS, INC., TO INSURE UNINTERRUPTED SERVICE TO MOSCOW.

ABOVE: MOROCCAN NATIVES BREAK ROCKS AND PREPARE ROADWAYS LEADING TO NEW TANGIER RELAY STATION. AT LEFT: AN AMERICAN CONSTRUCTION SUPERVISOR RELIES ON A CAMEL-TAXI TO REACH THE STATION SITE OVER ROADS MADE IMPASSABLE TO CARS AND TRUCKS BY HEAVY RAINS.

spread to as much as 2,800 miles in diameter. At such times, the ring becomes turbulent and overlaps the direct path between New York and Moscow. RCA has taken a major step toward solving the problem with the installation of the Tangier station."

Construction of the relay station at Tangier was under the supervision of Thomas D. Meola, of Skaneateles, N. Y., European Manager of RCA Communications. He arrived in Morocco last November to acquire a site for the project, and remained until successful tests had been completed.

Heavy Rains an Obstacle

Mr. Meola and his associates had to overcome many obstacles before they achieved success. One was heavy rain which made it impossible to use motor transport in moving materials to the building site. Improvisations had to be made, he said, and at the peak of construction the working force included 532 Arab men, 464 Arab women, 70 European tradesmen, 30 Americans, one Englishwoman, 400 donkeys, 300 horses and 197 camels.

Many of the camels had never been thoroughly domesticated, Mr. Meola reported, with the result that from time to time they would break loose and rush through the construction site knocking over piles of lumber and scattering workmen left and right. Such interruptions retarded progress, but the work went on.

By March 28, the station was in shape to begin operating tests with New York. Signals were picked up at the RCA receiving center at Riverhead, L. I. and two-way teletype contact was established on April 1. Since then successful tests have been conducted over the full length of the new communication route.

NBC PROGRAMS WIN THREE TOP AWARDS

Three first awards and four honorable mentions were won by National Broadcasting Company programs at Ohio State University's 16th Institute for Education by Radio held in Columbus, Ohio, in May. Two additional first awards and one honorable mention were taken by NBC affiliated and managed-and-owned stations.

"The Eternal Light," produced by the Jewish Theological Seminary of America, took first award in the religious classification. Winner in the women's program division was NBC's "Consumer Time." "The Baxters," produced by the National Congress of Parents and Teachers, won first place in the section dealing with personal and family problems.

Honorable mentions for NBC were given to "The Catholic Hour," among religious programs; "The National Farm and Home Hour," for agricultural programs; "The Pacific Story," for "furthering international understanding," and "Home Is What You Make It," for programs of personal and family problems.

KPO, NBC managed-and-owned station in San Francisco, took first award in the classification for school programs for junior and senior high schools with its series, "Standard School Broadcast."

WWJ, NBC's Detroit affiliate, also joined the winners' ranks, for its "This Is Your Story" series. This title was won in the classification of programs interpreting the work of civic and service organizations. The program is produced by the American Red Cross Recruitment, Detroit Chapter.

WHAM, NBC's Rochester, N.Y., affiliate, received honorable mention for its "People in the News" program, among school broadcasts for intermediate grades.

TUBE WEIGHS 1/15th OUNCE

Miniature Size of Vibrotron Opens New Fields in Design of High-Fidelity Phonograph Pickups and Microphones.

THE Vibrotron, a miniature metal electron tube weighing only one-fifteenth of an ounce, which converts mechanical motion directly into corresponding variations in current flow, has been developed in RCA Laboratories at Princeton, N. J., and Harrison, N. J. In announcing the new development, L. W. Teegarden, vice president in charge of the RCA Tube activities, said that the new tube "will find wide application in future designs of phonograph pickups, in microphones and in industrial equipment where the translation of mechanical motion to electron circuits is desirable for purposes of control or measurement."

Although the new tube is not yet in production, Mr. Teegarden disclosed that a limited number would be made available to manufacturers of electronic equipment who are interested in experimenting with it for use in future products.

The Vibrotron, according to Mr. Teegarden, is the result of accumulated experience in the manufacture of metal tubes and in research by RCA scientists in many electronic fields. Experience gained in developing small electron tubes for use in proximity fuses, which were used by our armed forces to control shell bursts, contributed importantly to the solution of many problems encountered in this new development.

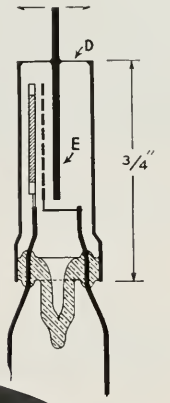
Complete Tube is One Inch Long

The Vibrotron is a three-element metal tube about one inch in length and one-quarter inch in diameter. Leads for supplying voltages to the elements within the tube are brought out through a glass seal at one end. At the other end, a flexible metal diaphragm permits transferring external motion to a movable electrode inside the tube.

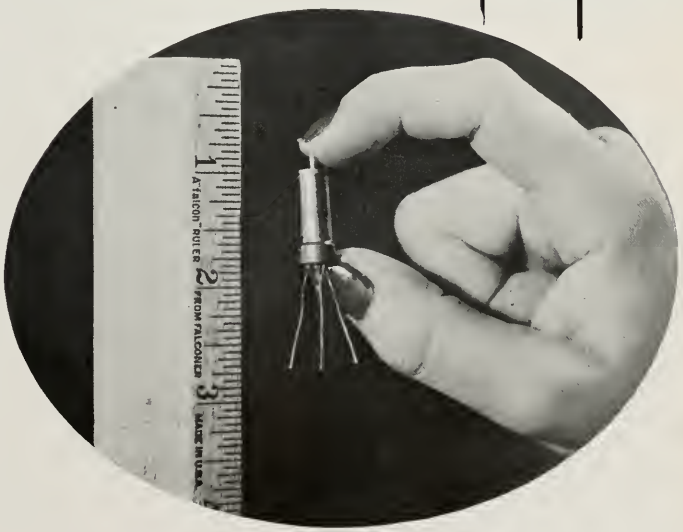
Dr. Harry F. Olson designed and built a preliminary model at the RCA Laboratories, at Princeton. Soon afterward, the project was transferred to the RCA Victor tube development section at Harrison, where the work was continued by George Rose.

In early models, difficulties were experienced with the selection of a suitable diaphragm to provide for the transmission of the external mechanical motion to the inner electrode without introducing distortion. This problem was solved by the use of an extremely thin metal diaphragm—about half the thickness of a human hair—which serves as a flexible window in the tube envelope. By means of this vacuum-tight metal diaphragm, the rod or lever is free to vibrate without distortion over a wide range of audio frequencies.

When used in a phonograph pickup, the tube will perform up to the highest requirements of fidelity and sensitivity. At the same time, it provides for a system having low acoustic noise and needle "chatter". Life tests have demonstrated the ability of the tube to withstand severe treatment over long periods of time and to be especially stable under temperature and humidity changes. The tube operates as an integral part of the pickup head and the radio phonograph amplifier, without preamplifier or coupling transformer. It can be used with a very light-weight pickup arm with corresponding reduction of wear on the record grooves.



BELOW: THIS VIEW SHOWS THE COMPACT SIZE OF THE VIBROTRON. PROTRUDING THROUGH THE TOP OF THE TUBE IS THE ROD OR LEVER WHICH TRANSFERS MECHANICAL MOTION FROM THE OUTSIDE INTO THE HIGH VACUUM OF THE INNER CHAMBER, AS PICTURED IN THE SKETCH AT THE RIGHT

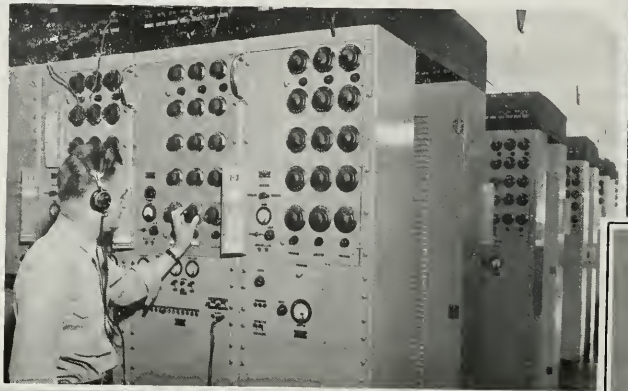


RIVERHEAD · NEW YORK

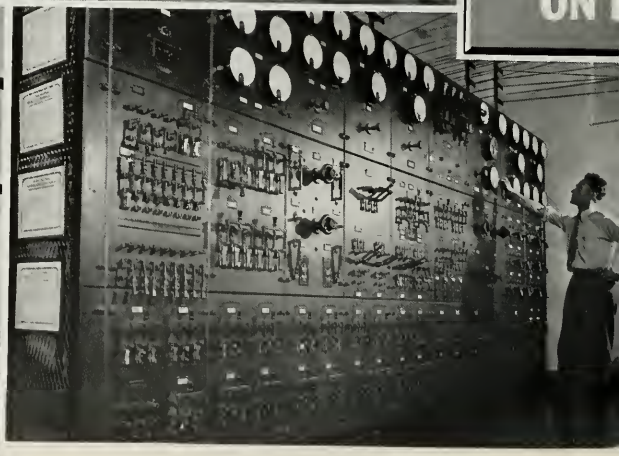
RADIO MESSAGES FROM AROUND THE WORLD COME INTO THIS RECEPTION CENTER AT RIVERHEAD.

THE OSCILLOGRAPH PROVIDES A "PICTURE" OF THE PERFORMANCE OF RECEIVERS.

RADIO SIGNALS FROM THREE ANTENNAS ARE FED INTO DIVERSITY RECEIVERS WHICH COMBINE THE INCOMING WAVES TO PRODUCE A SINGLE STEADY SIGNAL.



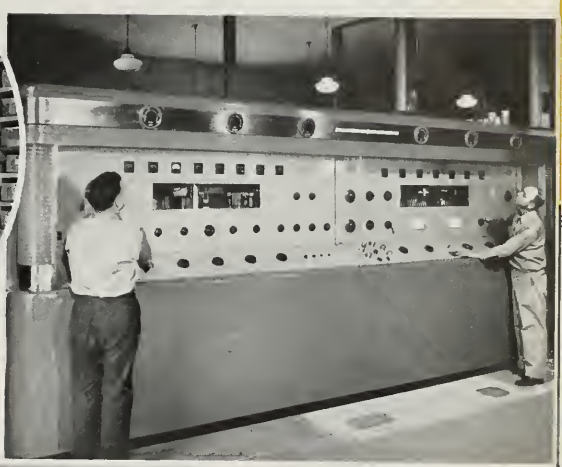
THE WIRES ON THESE POLES COMPRISE A RADIO RUNWAY FROM MANY NATIONS.



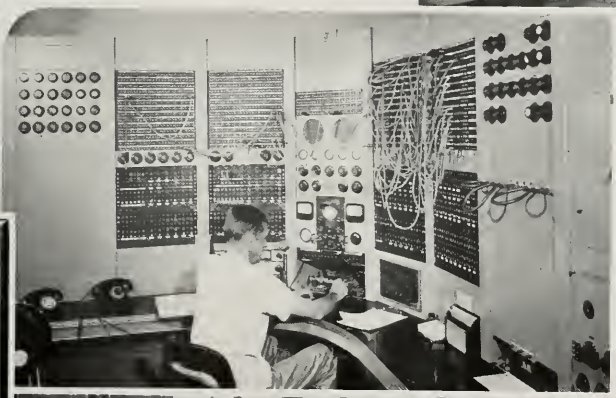
THE POWER CONTROL BOARD OF RCA "RADIO CENTRAL" ON LONG ISLAND.

ROCKY POINT · NEW YORK

LARGE WATER-COOLED ELECTRON TUBES EMPOWER THE "VOICE" OF THE POWERFUL TRANSMITTERS AT ROCKY POINT.

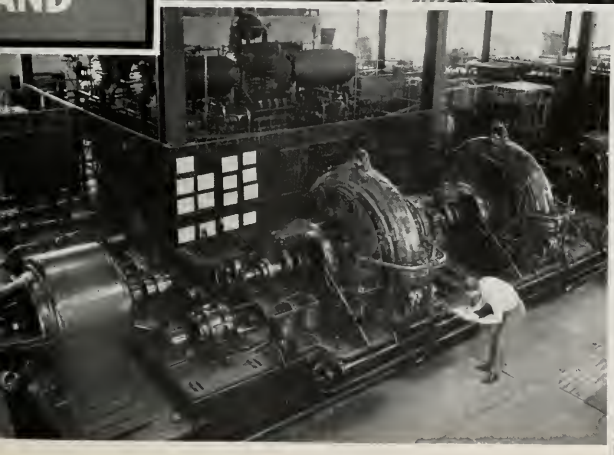


SHORT-WAVE BROADCAST TRANSMITTER USED FOR RELAYING RADIO PROGRAMS TO VARIOUS PARTS OF THE WORLD.

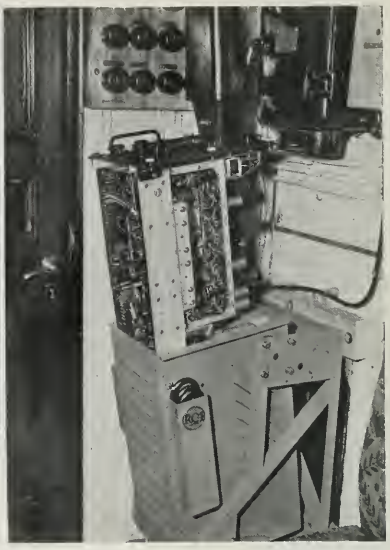


THROUGH THIS CONTROL BOARD MESSAGES FROM THE RCA CENTRAL OFFICE IN NEW YORK ARE ROUTED TO MORE THAN 58 COUNTRIES.

POWERFUL TRANSMITTERS ARE CONNECTED WITH THE ANTENNAS THROUGH LINES THAT ARE SHIELDED TO PREVENT SIGNAL LOSS.



LONG-WAVE "ALEXANDERSON ALTERNATORS" OF WORLD WAR I FAME ESTABLISHED NEW RECORDS IN COMMUNICATION DURING



CAPT. JOHN NORDLANDER OF THE DROTTNINGHOLM AND EDWARD OSCHMANN OF RADIOMARINE EXAMINE A LORAN CHART AS FIRST OFFICER JONSSON LOOKS ON. AT RIGHT: LORAN RECEIVER INSTALLED IN CHART ROOM OF THE DROTTNINGHOLM.

Navigating by Loran

WAR-BORN NAVIGATIONAL AID, AS DEVELOPED BY RCA, DEMONSTRATES ITS EFFECTIVENESS ON THE ATLANTIC AND PACIFIC

By Charles J. Pannill

President,
Radiomarine Corp. of America

TWO of the latest models of loran receivers, designed and built by Radiomarine Corporation of America, are demonstrating their dependability as highly accurate navigational aids on ships plying both Atlantic and Pacific Oceans.

One of the units was installed on the Swedish American liner Drottningholm and has been in operation throughout several round trips between New York and Gothenburg. G. H. Lundbeck, Jr., United States Managing Director of the Swedish American line, arranged for this installation through the RCA International Division which handles foreign sales for Radiomarine.

Officials of the steamship line emphasized the importance of loran on the voyage and said that all vessels of the line will employ this type of navigational equipment as peacetime services are resumed.

The second unit is aboard the Waterman liner J. B. Waterman now enroute to China from a gulf port.

The loran system is a modern electronic method by which navigators may determine their position accurately and quickly by the use of radio signals transmitted from fixed stations. Loran is a contraction of the words LOng RAnge Navigation since its principal characteristic is its ability to furnish positions to navigators at much greater distances from land than can be obtained by other methods of radio navigation.

When the Drottningholm put to sea on its first loran-guided voyage, Edward F. Oschmann, loran test engineer of Radiomarine went along to demonstrate the apparatus to Captain John Nordlander and First Officer C. W. Jonsson. Oschmann is believed to be the first man in merchant ship history to sign ship's articles as a loran operator.

Use of loran on the first eastward voyage of the Drottningholm commenced as soon as the ship passed out of New York harbor. Bearings taken near Ambrose lightship showed an actual accuracy of one tenth mile. From that time on, frequent checks were made night and day with equal or better accuracy. In the daytime, the signals supplied by loran coastal stations had a dependable range of 700 miles. At night this range increased to 1400 miles because of the greater coverage made possible by the reflection of signals from the Heaviside layer.

Oschmann reported that ship's officers, after only short periods of instruction, attained competent accuracy in handling Radiomarine's loran equipment. Although navi-

gators have been trained for centuries to place full confidence in celestial reckoning, those aboard the Drottningholm were soon convinced that loran not only was more accurate than the sextant but in addition could provide position readings at any time of the day or night, and especially in fogs and heavy weather when the usual optical observations are useless.

After versing himself in the operation of the loran unit, Capt. Nordlander proceeded to put the unit through its paces. He adjusted the loran unit and checked results against readings already taken by the navigator and recorded on the ship's chart. When the two points coincided precisely, the Captain turned to Oschmann and said laconically: "The sun's in the right place!"

It is expected that safety of life at sea will be tremendously increased by the use of loran since, if the positions of the disabled or survival crafts are accurately known, the searching vessel or plane can proceed directly with a minimum loss of time and in any kind of weather. Special navigational aids such as the Ice Patrol will also utilize loran to report positions of icebergs and will not have to depend upon "dead reckoning" or celestial navigation. This will permit 24-hour service unlimited by periods of low visibility.

RCA engineers, who were largely responsible for development of the original loran receivers used so effectively by the Army and Navy during the war, refined the wartime models and developed the present merchant marine loran system.

Trial installations of shorter-range radar equipment developed by Radiomarine for merchant vessels operating in lakes, rivers, harbors or coastal waters will be made shortly as a further application of wartime electronic safety and navigational devices to commercial maritime operations.

Radiomarine is cooperating with the Lake Carriers' Association, of Cleveland, in plans for tests of radar instruments on the Great Lakes. The Association, which represents leading shipping interests in that region, proposes an experimental program to integrate the uses of radar into a complete system of electronic navigation.

A New Form of Radar Device

The new RCA radar will be a high resolution device. It will include a 12-inch indicator tube, a transmitter of ample power, a highly selective and sensitive receiver, and many other features essential to a modern navigational instrument.

Radiomarine's aim is to make the installations reasonable in cost, easy to operate and maintain, rugged, and for use on the bridge for good navigation. In fairness to shipowners it must be emphasized that certain factors require governmental action before full-scale production of merchant marine radar can be undertaken.

The present frequency bands are limited to experimental service and it may be some time before final commercial allocations are made.

THE SWEDISH-AMERICAN LINER DROTTNINGHOLM WHICH HAS MADE SEVERAL LORAN-GUIDED CROSSINGS OF THE ATLANTIC.

NEW FILM PROJECTOR WAS BATTLE TESTED

Embodies Many Features Developed for Use of U. S. Signal Corps During War.

A NEW and improved 16mm. sound film projector, incorporating many wartime technical advances, has been developed by RCA, and limited deliveries to dealers already have been made. The new projector, known as Model PG-201, was designed primarily to provide schools and colleges, churches, industry, commercial establishments, civic groups, and other organizations with the highest quality of projection and sound reproduction. Engineers associated with the development consider it an achievement in combining professional performance with rugged construction and simple, fool-proof operation.

In its design and construction, RCA scientists have incorporated many features developed during the war for its military predecessor, which was designed to U. S. Army Signal Corps specifications and widely used by the armed forces on the fighting fronts and in training camps.

The "battle-tested" features of the de luxe, heavy-duty projector provide a new measure of projection, sound quality and dependability for industrial training, sales meetings, sales promotion, road shows, small community theatres, and other group services.

Equipped with a 20-watt audio amplifier, the new model features RCA's Sound Stabilizer, an oil-driven flywheel which gently smooths out film-speed variations for sound scanning; a new friction-drive even-tension take-up, which greatly reduces film damage and pulled splices, and a completely removable film gate which permits easy cleaning of the aperture.

All parts of the projector are accessible for cleaning or replacements. It can be taken apart with only a screw driver and an open-end wrench, and only a few moments are required to reassemble it.

PRESIDENT TRUMAN ACCEPTS A SPECIAL ALBUM OF ROOSEVELT RECORDINGS FROM NILES TRAMMELL, NBC PRESIDENT.

"Rendezvous With Destiny"

EXCERPTS FROM PRESIDENT ROOSEVELT'S SPEECHES HAVE BEEN ASSEMBLED IN AN ALBUM OF RECORDINGS

ON the weekend of the first anniversary of President Roosevelt's death, millions of people in America and throughout the world sat by their radios and listened again to a voice they had known so well during the war years. The occasion was the premier broadcasts of "Rendezvous With Destiny," an album of excerpts from the late President's speeches, the first of a series of NBC documentary recordings produced under the editorial advisorship of Dr. James Rowland Angell, public service counselor of the network and president emeritus of Yale University. The album's title was taken from Mr. Roosevelt's acceptance of the second presidential nomination—"This generation of Americans has a rendezvous with destiny."

From Mr. Roosevelt's first inaugural address of March 4, 1933 (". . . the only thing we have to fear is fear itself") to his March 1, 1945, report to Congress on the Crimea Conference ("I hope you will pardon me for this unusual posture of sitting down. . . ."), listeners heard portions of his outstanding speeches, delivered in his clear, unmistakable diction.

At various times from April 12 to 14, eighty-two of the network's stations carried the complete album as a two-hour feature. On April 13, selections from the album were broadcast over ninety-two NBC network stations as part of the "Our Foreign Policy" program. Listeners in England heard the recordings on the first anniversary of the President's death through a special short-wave program arranged by the NBC International Division. Later, the performance was repeated for Sweden and Denmark, with interpolations in the respective languages. In addition, the U. S. State Department used selections from the album in one 45-minute broadcast in English and in another with commentary in Italian.

Acclaimed for Historical Value

"Rendezvous With Destiny" has already been acclaimed throughout the nation as a notable contribution to the archives of history. Schools, radio stations, and libraries, as well as individuals and organizations of every description, are requesting copies of the album. The U. S. State Department has ordered 50 copies for distribution to its representatives abroad. A radio station in Sweden has asked for and received a set of the recordings.

Result of Combined Efforts

"Rendezvous With Destiny" is the result of the combined efforts of Dr. Angell; Cesar Saerchinger, NBC commentator; Tom Bennett, production director of NBC, and Herbert H. Wood, program manager of the network's Radio Recording Division.

Saerchinger selected the speeches from more than 300 original off-the-air recordings and compiled the index, which identifies the speeches by date as well as by quotations.

In the preface, which Saerchinger also prepared, he said, "The purpose of this album is to provide a permanent word-picture of the years preceding and during the Second World War, highlighted by significant excerpts from the speeches of President Franklin D. Roosevelt. I have aimed to recapture the spirit of those decisive years of our history in the actual words and the familiar voice of America's Chief Executive, as broadcast by the National Broadcasting Company and recorded at the time."

The Bennett musical score is based on a symphony which he composed and dedicated to President Roosevelt. The orchestra was directed by Norman Cloutier, and the album was produced by Wood.

THE TWO NBC VOLUMES CONTAIN FIFTEEN RECORDINGS OF SELECTIONS FROM MORE THAN THREE HUNDRED SPEECHES BY THE LATE PRESIDENT.

RCA STOCKHOLDERS' MEETING

General Sarnoff Reviews Activities of Corporation for Past Year and Reports on Operations in First Quarter of 1946.

ACTIVITIES of the Radio Corporation of America in all phases of radio — research, engineering, manufacturing, broadcasting and world-wide communications — now are being directed toward meeting the demand for new radio instruments and for radio services, Brigadier General David Sarnoff, president of RCA, reported at the 27th Annual Meeting of stockholders held May 7, in an NBC studio in Radio City.

"Everything we can possibly do," he said, "is being done to increase production of RCA Victor civilian radios, Victrolas, television receivers, electron tubes and other electronic devices. However, the reconversion of American industry has been and continues to be seriously retarded by many factors which affect the nation as a whole. As a result, the radio industry, in common with other industries, has been unable to reach a volume of production necessary to meet the public demand for goods."

In reviewing operations in the first quarter of 1946, General Sarnoff revealed that net profit, after taxes, of the Radio Corporation of America was $3,160,224, representing an increase of $172,738 or 5.8 per cent over the same period in 1945. Earnings per common share for the same period amounted to 17.1 cents, as compared with 15.8 cents per common share for the first quarter in 1945.

Consolidated gross income of RCA during the first quarter of 1946 amounted to $48,972,924, compared with $85,385,084 for this same period last year, when the company's manufacturing facilities were devoted to war production. This represents a decrease of $36,412,160 or 42.6 per cent.

General Sarnoff said that profits for this quarter reflect the benefits derived from the elimination, this year, of the excess profits tax. They reflect also an appropriate charge for reconversion expenses to the postwar reserve which was set up for this purpose during the war.

New Plants Are Acquired

His report to stockholders stated that, as part of its reconversion plan in providing for modern and economical manufacturing operation, the RCA Victor Division during the past year increased capacity by the acquisition of several new plants at a cost of $6,800,000. These include plants for expanded manufacture of electron tubes, theater projection equipment, automobile radios and radio cabinets.

Review of the activities of other RCA Divisions and services showed continued intensification of operations in the RCA Laboratories Division, National Broadcasting Company, RCA Communications, Inc., Radiomarine Corporation of America and the RCA International Division.

"The search for knowledge at RCA Laboratories is unending," General Sarnoff declared. "Our scientists and research men are now applying their valuable wartime experience in peacetime pursuits. Among other activities they are developing a comprehensive air navigation system known as teleran. Combining radar and television, it is designed to simplify operations and increase safety in aviation. Work is being continued on this project under an Army Air Forces contract."

Other Devices in Development

Other new and dramatic devices mentioned as being under development for peacetime use included shoran, created by RCA as the most precise blind-bombing system of the war and now heralded as one of the greatest geographic inventions since the compass. It is an electronic "yardstick" for world mapping, or can be applied in the position-locating of undersea oil deposits or jungle deposits of oil and minerals.

The part of RCA Laboratories in developing sonar, the underwater sound system which resulted in the sinking of nearly 1,000 enemy submarines, was described.

General Sarnoff announced that NBC will put television stations on the air in Washington, D. C., and Chicago, for which the Federal Communications Commission recently granted commercial licenses. Working in conjunction with NBC's

PRESIDENT DAVID SARNOFF ADDRESSES THE 27TH ANNUAL MEETING OF STOCKHOLDERS IN A RADIO CITY STUDIO.

pioneer television station WNBT, the new station at Washington will make available to viewers in the metropolitan area and other cities programs originating in the Nation's Capital. In addition, NBC has applied for television station licenses in Cleveland and Hollywood.

Radar Advanced Television

Discussing the general outlook for television, General Sarnoff said that the research and engineering which made radar and airborne television possible for wartime purposes, now provide a greatly improved television system including radio relay stations, more sensitive cameras and clearer pictures for the home. It is expected, he added, that RCA television receivers will begin to reach the market in the Autumn.

"Over the past few months, vastly improved black-and-white pictures, color pictures, and even color in three dimensions, have been demonstrated at RCA Laboratories," he continued. "The black-and-white pictures produced by the RCA all-electronic system provide greater detail, brilliance and contrast than ever before achieved in television. The demonstrations have proved that the RCA television system is ready for greater service to the public.

"We firmly believe that color ultimately will provide an added interest in certain television programs for the home as it does in certain motion pictures for the theater. However, the majority of television programs will, we believe, continue to be in black-and-white, as they are in the movies, even when color is available."

While color processes have been available to the movies for many years, General Sarnoff pointed out, only 6 percent of the feature motion pictures shown in the theater today are in color.

"Adding color to television involves new techniques and new devices which still are in the laboratory stage. That part of the radio spectrum in which a color television system is likely to be operated must be thoroughly explored. Moreover, standards for apparatus that can function in this portion of the spectrum, first must be agreed upon by the radio industry and next approved by the Federal Communications Commission. The equipment must be field tested, made commercially practical and manufactured at prices within reach of the consumer. All this already has been achieved by the present system of black-and-white television. It still remains to be done by any system of color television before it can be said to be ready for use in the home.

"Although color pictures can be produced by a mechanical system, we do not believe it is the most desirable system for home use. We believe that an all-electronic system of color television is the better method, and that when it is perfected it will make obsolete quickly any method of mechanical color that may be adopted in the interim. Our scientists, therefore, are hard at work in developing an electronic system of color that will have many advantages over any conceivable mechanical system. When a modern and practical color television system for the home is here, RCA will have it."

International Division Expands

General Sarnoff reported that the RCA International Division was enabled by the end of the war to go ahead with its plans to market RCA products abroad and had lost no time in enlarging facilities to meet the new opportunities. As a result of the plans, "RCA will be able to play an important part in advancing American export trade and to help in the program of world rehabilitation."

New peacetime records, it was disclosed, have been established in international radiotelegraph communication through the facilities of RCA Communications, Inc. Having re-established pre-war circuits, the company now operates 57 direct services between the United States and foreign countries. Installation of new equipment is underway, and when completed, communication over RCA circuits to all parts of the world will be handled by automatic printers which replace the slower dot-and-dash method. On May 1, RCA initiated the most significant reductions in international telegraph rates in 50 years, placing a ceiling rate of 30 cents a word on traffic from any part of the United States to any part of the world. This results in a saving of from three to 85 cents a word, and will benefit the American public to the extent of several million dollars annually.

RCA Reduces Press Rates

Press rates also have been materially reduced and a ceiling rate of 6½ cents, or less, per word has been established from the United States to the rest of the world.

Radiomarine Corporation of America was revealed to have applied its latest developments in radio communication and electronic navigation apparatus to shipping on the high seas, as well as on the Great Lakes, rivers and harbors. Loran — long-range navigation equipment—is being given trials on passenger vessels in both the Atlantic and the Pacific. Radar equipment—modified for marine use—soon will be in service on inland waterways.

General Sarnoff reported that more than 1,100 students are enrolled at RCA Institutes, the oldest radio technical training school of its kind in America. Among these are many veterans who are taking courses to prepare them for work in many phases of radio, television and communications.

Concluding his statement to stockholders, General Sarnoff declared:

"Radio, like science itself, is an endless frontier. It reaches far beyond its early bounds of telegraph communication and broadcasting, extending through the entire field of electronics. Radio is a rapidly advancing art and a highly competitive business that is subject to quick change and obsolescence. Therefore, expenditures for research and development are always necessary. RCA has met the conditions by providing from profits of its business, the amounts required for its growth and leadership.

"The steady progress of the Radio Corporation of America, and its recognized achievements over the past twenty-six years in peace and in war, have provided a well trained organization and a solid foundation of experience upon which we can build our future in a changing world."

AIR VIEW OF RCA VICTOR DIVISION'S MODERN TUBE PLANT AT LANCASTER, PA.

RCA BUYS LANCASTER TUBE PLANT

THE most modern electron and television tube manufacturing plant in the world, located at Lancaster, Penn., has been purchased from the U. S. Navy Department by the RCA Victor Division, which built and operated the plant for the Navy during the war. The purchase price was $4,362,500.

The availability of television for the public will be advanced considerably by the company's acquisition of the plant, according to Frank M. Folsom, Executive Vice President in charge of RCA Victor. The plant is the largest in existence for the manufacture of cathode-ray picture tubes used in television receivers and television camera pick-up tubes, he pointed out. These tubes, he declared, will be made available to other television home instrument and broadcast equipment manufacturers.

An additional investment of $2,000,000 is to be made by RCA Victor, Mr. Folsom said, to expand and further modernize the plant's high-speed production equipment for the manufacture of cathode-ray tubes.

On a 99-Acre Tract

The plant contains 396,000 square feet of floor space and stands on a tract of 99 acres. The present personnel is about 1000, of which 90 per cent are permanent residents of Lancaster and vicinity. As peacetime production expands, according to Mr. Folsom, employment is expected to rise until it equals or exceeds the plant's peak wartime level.

From its completion at the end of 1942 until the end of the war, the Lancaster plant produced unprecedented quantities of the power, cathode-ray, and special purpose tubes used to control modern weapons and military vehicles and communications. Peak production, reached in June, 1944, it was revealed, was equal to a rate of $30,000,000 a year.

In disclosing future plans, L. W. Teegarden, Vice President in charge of the Tube Department, stated that the plant will be devoted to the manufacture of the same general types of tubes for use in radio broadcasting and other forms of communications, in electronic power and control applications in commerce and industry, as well as in television.

Anticipates Larger Tube Demand

"We expect the market for kinescope picture tubes will eventually exceed our wartime production of all types of cathode-ray tubes," Mr. Teegarden said. "We anticipate a demand for large power tubes, both for high-frequency heating in in-

AT RIGHT: RACKS OF CATHODE RAY TUBES MOVE DOWN ONE OF THE PRODUCTION LINES AT THE LANCASTER PLANT.

BELOW: OPERATING OFFICIALS OF LANCASTER PLANT. LEFT TO RIGHT: E. M. WOOD, MANAGER OF MANUFACTURING; J. A. KING, PLANT MANAGER; DR. D. ULREY, MANAGER OF ENGINEERING DEPARTMENT.

dustry and for use in the communications field, including television, which will likewise exceed the wartime peak. A growing variety of applications for phototubes in the field of industrial control indicates a future market at least five times as great as the pre-war level."

The main building of the plant accommodates nearly all of the tube production operations in addition to offices, a complete engineering laboratory, a cafeteria, a dispensary, and warehousing space.

Other buildings include a luminescent materials plant where RCA manufactures all its own cathode-ray and kinescope screen coating materials, a gas plant for the manufacture of hydrogen, oxygen and liquid air used in tube manufacturing processes, a fireproof solvent storage building, a modern powerhouse and a separate building for engineering development of large power tubes. On the grounds are all-weather tennis courts, a baseball diamond, and a large parking lot.

Wartime Needs Were Met

Foreseeing the need for expansion to meet wartime needs, RCA drafted a plan for plant expansion during the summer of 1941. The plan was transmitted to the Bureau of Ships one month prior to Pearl Harbor. In January, 1942, the Navy asked RCA to build and operate additional facilities in this field.

Building operations at Lancaster were begun in March, 1942, and the plant was ready to begin production the following December. Just nine months later, in September, 1943, the Lancaster plant had attained the production rate to which it was committed. From October, 1941, to the peak month of June, 1944, RCA expanded its production of cathode-ray tubes 29.6 times; pick-up tubes 27.1 times; power tubes, 4.4 times; and special purpose tubes, 3.7 times.

During the war, the Lancaster plant was the largest single supplier of cathode-ray and power tubes for war critical radar, shoran, loran, radio altimeter, and airborne television ("block" and "ring") equipments used by the various armed services. Other vital wartime products included high-sensitivity multiplier phototubes used for jamming enemy radar and high-frequency magnetrons used in fine-detail radar mapping.

New Officers Elected

John T. Cahill, senior member of the New York law firm of Cahill, Gordon, Zachry & Reindel, was elected a Director of the Radio Corporation of America at the annual meeting of RCA stockholders, May 7, and Arthur B. Tuttle was elected Treasurer of the Corporation by the Board of Directors on May 10. Cahill's election fills the vacancy caused by the death of DeWitt Millhauser. Tuttle succeeds George S. DeSousa who will continue as Vice President of RCA.

JOHN T. CAHILL
Director of RCA

ARTHUR B. TUTTLE
Treasurer of RCA

Mr. Cahill was born in New York City on November 17, 1903. Graduated from Columbia University in 1924 and from Harvard Law School in 1927, he became associated with the firm of Cotton and Franklin. He served as Assistant Attorney General of New York from 1931 until 1933, when he joined the firm of Wright, Gordon, Zachry & Parlin.

In 1936 Mr. Cahill was named Special Assistant to the District Attorney of New York County. He served as United States Attorney for the Southern District of New York from 1939 to 1941, then returned to private law practice.

Associated with RCA for twenty-five years, Mr. Tuttle has served since December 6, 1940 as Vice President and Treasurer of RCA Communications, Inc. He joined RCA in January, 1921, later was advanced to Credit Manager, and in 1927 was elected Assistant Treasurer. During the early part of 1931, he was Treasurer of the Radiomarine Corporation of America and also held the position of Treasurer in RCA Communications.

A native of Bay Shore, L. I., Mr Tuttle studied at Commercial High School in Brooklyn and completed special courses at Cornell University. He served with the New York National Guard on the Mexican Border in 1916, and was a second lieutenant in the infantry during the First World War. He saw service in Belgium and Germany. Before joining RCA, he worked as an engineer with the DuPont Construction Company, Flint, Mich.

THE ATOM'S CHALLENGE

(Continued from page 5)

who have preceded you from Bethany and from other colleges throughout the country, have opened pathways that led to new livelihood and new comforts for the people. That is why America, as a land of freedom and opportunity, has made such steady progress.

By way of illustration, vivid in memory is my own experience, when, as a boy of nine, I came to these shores from a foreign land, unable to speak the English tongue. That was at the turn of the century. There were few automobiles and electric lamps, no radio broadcasting, no airplanes or movies. But I could sell papers, deliver telegrams and learn the Morse code! That was opportunity. As we look back in the light of scientific progress, we appraise those years as undeveloped. But fifty years from now our descendants will appraise 1946 as a dark and backward period in history. What we marvel at today will be commonplace or obsolete tomorrow. It will always be that way. Therefore, no matter how bleak the world may appear at close range, never lose faith in America or in yourselves. There will always be new problems to solve and new trails to blaze. New treasures will be found between the earth and sky as well as beneath the ground.

Those of you who are young in science face a world in which radioactive elements, nuclear research and electronics offer endless opportunities in biology, medicine, chemistry and physics, as well as in radio and aviation. Within the mind of a youth today may be the important engineering information that will make it possible for atomic energy to serve mankind—to power automobiles, airplanes, ships, locomotives and factories.

Classics Will Be Guides

Those of you who have achieved your degree in the liberal arts may go out into the world to teach, to preach or become industrial leaders with an opportunity for influence as universal as that of the scientist. From your study of the classics may come the precepts that will guide the scientists for generations ahead.

All these represent magnificent opportunities for you and those who follow you. Work, study and be thorough in everything you do. Confidence in yourself and your purpose, clear thinking, competent work, tempered by healthful recreation and rest, should enable you to reach your goal successfully.

It is a fundamental concept of our Constitution that American principles are based on the dignity of man and freedom of the individual. These basic principles are footprints imbedded on the path of human progress for more than 150 years, and have never been lost in the shifting sands of synthetic ideologies. They have guided our Government and our people. They are basic to the growth of this Nation and its institutions. These concepts must be preserved, and they can be preserved only in a Nation that is free. Through peace and war democracy has proved its ability to cultivate and to defend this American way of life.

The roots of democracy spread deeply through the soil of this continent, but we must be ever vigilant lest some perversive force attempts to destroy the principles for which Americans have always lived and fought.

Today, the Bachelor of Science and the Bachelor of Arts stand together on the horizon of a new international era, envisaged as "One World". May your learning here at Bethany inspire you to help man everywhere to find a better life free from drudgery, scarcity, oppression and fear. In such service to mankind you will find your own greatest happiness and the surest way to preserve our freedom and prosperity.

Engineers Study Television

A four weeks course in television theory and operation, designed expressly for engineers of broadcasting stations was conducted during June by RCA Institutes, Inc., in cooperation with the National Broadcasting Company and the RCA Victor Division, George F. Maedel, Jr., Assistant Superintendent and Chief Instructor of the Institutes, announced today. The course, which opened June 3 was a repetition of similar courses instituted in 1944 and 1945.

In previous years, enrollment in the television courses was limited to engineers of stations affiliated with the NBC network, but representatives of any station in the United States and Canada were eligible to enroll in the 1946 course.

Following a curriculum prepared by George F. Maedel, Jr., Assistant Superintendent and Chief Instructor of the Institutes, classroom instruction was supplemented by laboratory periods at RCA Institutes, RCA Laboratories at Princeton, N. J., and the experimental laboratories of the RCA Victor plant, at Camden, N. J. In addition, students attended lectures by television specialists from the engineering staffs of NBC and RCA.

Although basic television theory received substantial treatment, the course as a whole was directed toward an understanding of circuits and operations involved in commercial transmitters and receivers.

NBC television engineers conducted students through the WNBT transmitter installation in the Empire State Building and to the main control room and film projection studios in Radio City.

At Camden, television development engineers demonstrated the most recent station equipment including operating models of the latest transmitters and film projection apparatus.

Lectures at Princeton covered research developments in pickup tubes, sideband filters, color television, studio acoustics and high frequency television transmission and reception.

TWO TELEVISION CAMERAS OPERATED FROM THIS LOFTY CAGE, PROVIDED CROWD-PICTURES OF SPECTATORS AT THE LOUIS-CONN MATCH.

Television at the Fight

LARGE AUDIENCE ALONG THE ATLANTIC SEABOARD VIEWED NBC TELECAST OF LOUIS-CONN CHAMPIONSHIP MATCH AS HISTORIC MILESTONE IN THE ADVANCE OF NEW MEDIUM.

"TELEVISION looked good for a 1,000-year run!"

So summarized the *Post*, of Washington, D. C., in its report of the National Broadcasting Company's television coverage of the Louis-Conn world's championship fight in the Yankee Stadium on the night of June 19.

The *Post's* comment was typical. Before the 50,000 spectators had left their seats in the Stadium, an equal number of fight fans who, by television, saw the champion stalk his challenger through seven rounds and then knock him out in the eighth, enthusiastically began expressing their reaction to television.

The telecast was so packed with realism that it was noted that the observers, as soon as the fight was over, discussed the action as if they had been right at the ringside. Then, as if suddenly realizing that they had seen the fight from a distance, the comments swung around to the marvel of television which had given them a ringside view.

Newspaper reporters, feature writers, and columnists were virtually unanimous in their praise of television which had made it possible for spectators to witness the fight many miles—in some cases, hundreds of miles—from the ringside.

Television spectators in New York, Connecticut, New Jersey and as far distant as Washington, D. C., and Schenectady, N. Y., were able to follow every move of the fighters from the moment they entered the ring until the sudden end of the bout.

3,000 View Theater-Sized Screen

In New York City, a group of 500 invited guests watched the action on twenty RCA Victor television sets installed in an NBC studio. At Princeton, N. J., staff members of RCA Laboratories with their families and friends, making an audience of 3,000, viewed the fight on a 16-by-21 foot screen suspended from the outside of the building. A projection type, metal-backed kinescope, newly designed by Dr. D. W. Epstein of the Laboratories, made it possible to project clear, brightly illuminated pictures on the theater-size screen.

At the Hotel Statler in Washington, Cabinet members, ranking Congressional leaders and heads of government agencies viewed the fight on receivers fed by coaxial cable from New York. By means of the same cable, WPTZ in Philadelphia was able to rebroadcast the fight pictures in that city.

Special equipment was installed in Schenectady to receive the television signals direct from WNBT in New York for retransmission to set owners in and around Schenectady and Albany. Reports from all locations praised the high quality of the pictures.

The National Broadcasting Company started its television plans for the fight broadcast several months in advance. On May 1, the network announced to the press that it had obtained rights to the television broadcast in association with the Gillette Safety Razor Company as the sponsor. The contract was signed with the Twentieth Century Sporting Club, Inc., which promoted the match. Bob Stanton, NBC Television sports announcer, was assigned to give the blow-by-blow account; Ben Grauer, NBC radio announcer, was selected to describe the "color" of the huge throng and to interview well-known personages at the ringside.

The press was quick to recognize that much of the success of the evening's program was due to the modern camera equipment and to the engineers who made the plans and directed technical details.

Of the five television cameras spotted at strategic points around the Stadium, three were the new

CARRYING A BEER-MUG TRANSMITTER, ANNOUNCER BEN GRAUER GETS AN EXPERT'S COMMENTS ON THE MATCH FROM JAMES J. BRADDOCK, EX-HEAVYWEIGHT CHAMPION.

super-sensitive RCA image orthicons which are capable of picking up scenes by even the light of a match. The other two were standard RCA orthicon cameras which heretofore have been used generally for out-door pickups. Three cameras were located on specially erected platforms more than 140 feet from the ringside. Two others occupied the NBC television box on the mezzanine. For the first time in the history of television as many as five cameras were used to scan an outside event.

Once the images had been recorded by the cameras, NBC engineers faced the task of getting the signals five miles downtown to the television master control board in the RCA Building. It was necessary first to lay cables from each camera to a control booth in the Stadium. From there, the technicians had a choice of two paths to Radio City. One was a coaxial cable, similar to the cable which carried signals from New York to Philadelphia and Washington. The alternate facilities consisted of a new microwave radio relay which was developed by RCA Victor Division as a result of wartime research in high frequency transmission.

Weight Less Than 75 Pounds

Weighing less than 75 pounds complete, the relay consists of three units—a parabolic reflector which acts as the antenna; a transmitter which is housed in a case 10 inches in diameter and 10 inches deep, that in diameter and 10 inches deep. Although its power output is only .05 watts, it is possible, through the use of a four-foot bowl-shaped antenna, which collects the energy into a pencil-like beam directed at a similar antenna at the receiving point, to gain the effect of 450 watts.

Press comment on the fight telecast was uniformly favorable.

Joseph Kaselow in New York Herald Tribune, wrote:

"The Louis-Conn fight served to reassure television proponents that virtually everything they have been saying about sight-and-sound broadcasts can stand up under a broad public test. As it worked out it was something of a set-back for television's debunkers as well as for those who, in the absence of widespread proof, have innocently or by design spread confusion among the general public."

T. R. Kennedy, Jr., N. Y. Times:

"Last Wednesday, radio science demonstrated how far it had moved ahead in a quarter of a century—many of the fans of 1946 not only heard a description of the Louis-Conn fight at Yankee Stadium but saw it clearly by television—more conveniently, and certainly as effectively, as many who witnessed the spectacle in the Bronx arena."

Hailed as Important Success

Roland C. Davies in Telecommunications:

"The first postwar major demonstration was hailed on all sides as a most important success, and the viewers almost unanimously were impressed with the clarity of reception. They apparently were convinced that television is 'the way to see a fight'. The 800 Washington notables who viewed the telecast at the Statler Hotel universally agreed that video, if not the fight, was a success."

James A. Burchard, N. Y. World-Telegram:

"Everything considered the NBC television program was a remarkable job. If you prefer your heavyweight championships in a setting of solid comfort, television is your dish."

Ben Gross, N. Y. Daily News:

"The camera work was excellent and the closeup telecast of the action in the ring was sharply defined—better than we have ever seen. . . . To television, last night's superballyhooed fisticuffs marked a historic milestone."

Charles Butterfield, Associated Press:

"Actually, watching by television was likened to a super-ringside seat without the usual complications."

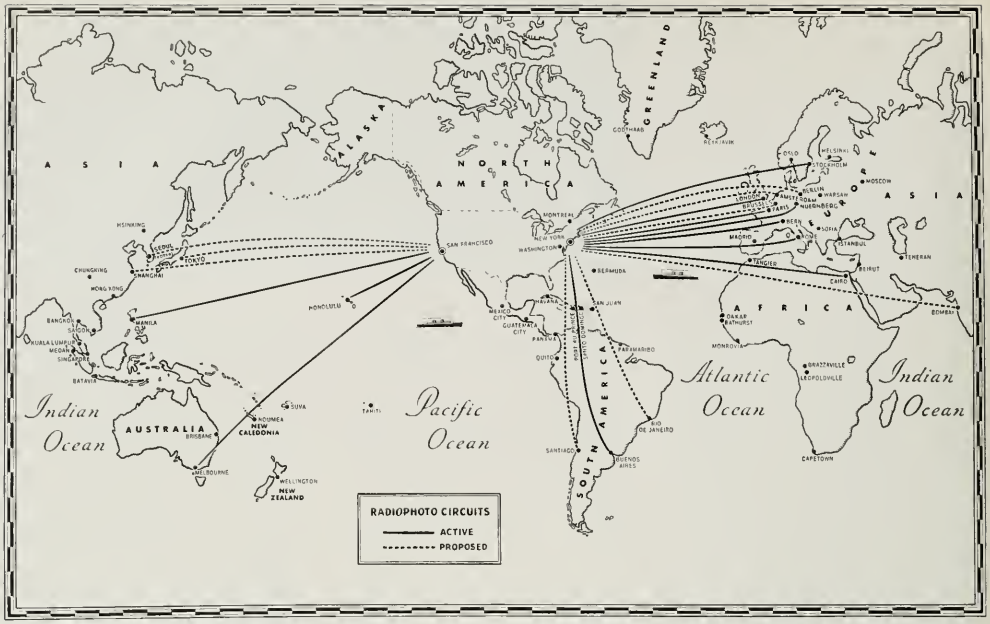
Ed Leamy, World-Telegram:

"The mountain came to Mohammed in a plush seat last night in a large NBC studio in Radio City when as fine a television display as was ever attempted in this country was flashed simultaneously on some 15 screens. As it was, everyone sat in enthralled amazement, so fine a show it was, so crystal clear. . . . Television has shed its swaddling clothes."

Robert K. Richards, Broadcasting Magazine:

Billy Conn wasn't the only fellow knocked out at Yankee Stadium last Wednesday night. There was a clean left to the jaw scored against many of those who doubted that television is ready for the public. NBC presented conclusive pictorial proof that television is ready.

THREE NBC CAMERAS — THE TWO AT THE LEFT HAVE THE NEW LENS TURRET — COVERED EVERY MOVE OF THE CONTESTANTS AT YANKEE STADIUM.



WHEN CIRCUITS INDICATED BY DOTTED LINES ARE COMPLETE, RCA WILL BE EQUIPPED TO PROVIDE RADIOPHOTO SERVICE FROM NEW YORK AND SAN FRANCISCO TO THE MOST IMPORTANT CITIES IN FOREIGN COUNTRIES.

RADIOPHOTO USE EXPANDS

Twelve Existing Circuits to be Increased by Nine Others to Meet Demands from World's Leading Cities.

By S. H. Simpson, Jr.,
Manager,
International Program and Radiophoto Services,
RCA Communications, Inc.

THE International Radiophoto Service of RCA Communications, Inc., is being expanded to meet the ever-increasing demand for this service by business firms and the press. This expansion is part of the plan which RCA has instituted to provide a vastly improved communications system between the United States and most of the countries of the world.

RCA Radiophoto had its inception in 1923. At that time, Brig. General David Sarnoff predicted the successful transmission and reception of pictures by radio, a prophecy which was fulfilled in the opening of commercial service in 1926. In succeeding years, the process of Radiophoto was developed by RCA engineers from the early systems of hot wax, hot air, ink stream and dot recording into the far more accurate system of linear recording on film.

For many years, this service was looked upon as a plaything, a means of periodic publicity, and was not considered a revenue-contributing part of RCA Communications' network. Since specialized equipment was expensive and the amount of time required for Radiophoto transmission was somewhat greater than that of telegraph, Radiophoto rates, of necessity, were maintained at a high level during those years.

World events during the past five years have accelerated the demand for this service. Every day pictures of the latest developments abroad are found side by side with the reports of these happenings in the local newspapers. Today business men, casting about for the fastest means of exchanging material with their foreign associates which is not easily communicable by telegraph, are looking to Radiophoto as a solution to their problems.

Important patent drawings, building plans, magazine copy, legal documents of all kinds, advertising layouts, financial statements, photographs and sketches often increase in value according to the speed with which they are presented.

A striking example of the potential possibilities of RCA's Radiophoto service occurred some time ago when a cargo ship which had been built abroad suffered serious damage to its rudder and propulsion gear while in mid-Atlantic enroute to America. A tow ship was dispatched to bring the crippled freighter to an eastern seaport. The operators of the vessel obtained drawings from the builders of the ship and, using Radiophoto, sent them to New York. By the time the ship was towed into the harbor and placed in dry dock, the new parts had been fabricated and were ready for installation.

Fast Commercial Service

Contrast this expeditious handling of a major emergency with the complicated and slow procedures necessarily used in the past by the accounting and treasury departments of large international organizations in effecting monthly and annual balances. Radiophoto, on the other hand, has enabled at least one large corporation to present its board of directors with a detailed accounting of its foreign subsidiaries within 48 hours of the end of a month—a performance impossible by any other means of communication.

The expansion of this service is not, however, without obstacles, some of which are formidable. There is first the problem of being able to transmit Radiophotos to many countries and being able to transfer them automatically to the wireline networks of those countries. This problem is further complicated by the fact that there are some 18 different types of wirephoto and Radiophoto equipment now in use in various part of the world. Only three or four of these machines will work together. Negotiations are now in progress with foreign administrations to establish international wirephoto and Radiophoto standards which will enable Radiophoto equipment to cooperate with wirephoto equipment the world over.

Radiophoto rates also constitute a problem. The possibilities of volume traffic over these circuits heretofore have lacked proper promotion because of comparatively high rates. Rate reductions on Radiophoto circuits have entailed, in some cases, exhaustive negotiations with foreign administrations. Agreements have recently been effected which will permit RCA Communications, Inc., to establish a new and uniform rate to all terminals. This new rate is as low as one-third of the rate existing several months ago, and further reductions are anticipated for volume filings. The lowering of the Radiophoto rate structure will bring this service well within the reach of all business interests.

Despite these and many other difficulties, a natural demand for Radiophoto service has sustained its place in the field of telecommunications.

RCA Communications, Inc., now has Radiophoto circuits between New York and Stockholm, London, Nuernberg, Paris, Berne, Rome, Cairo and Buenos Aires; and between San Francisco and Melbourne, Manila and Honolulu.

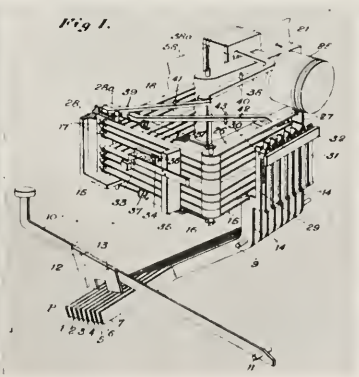
New Circuits Are Planned

Equipment is being readied to operate circuits to Santiago, Rio de Janeiro, Amsterdam, Brussels, Berlin, Bombay, Shanghai, Seoul and Tokyo.

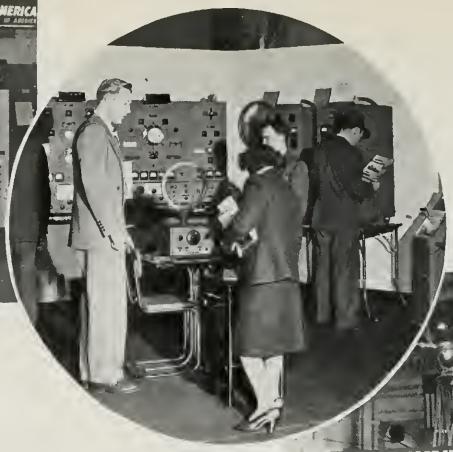
New designs for equipment, on an international standard, are now being developed by RCA engineers which will permit the more facile handling of Radiophoto traffic through New York and San Francisco to many other parts of the world.

Additional plans provide for facilities which will permit a press association in New York to forward "hot" news pictures over their own wirelines to terminals in New York or San Francisco from where they will be relayed to a foreign point. Similar equipment at the foreign point will permit the automatic relay of these pictures over wirelines to other cities in that country or by Radiophoto to any other part of the world where suitable equipment has been installed.

PHOTOGRAPHS, MECHANICAL DRAWINGS AND STATISTICAL COMPILATIONS ARE ONLY A FEW OF THE MANY SUBJECTS REGULARLY TRANSMITTED OVER RCA'S RADIOPHOTO CIRCUITS.



1010*	£333,880.11. 8		5010.1	£165,859. 6.10	
1011	14,252. 4. 6		6015.0	4,100. 1.10	
1012	£328,232.16. 2		5012.1	£169,959. 8. 8	
1013	2,438.12. 2		7017.0	2,231. 4. 7	
1014	2,628. 6. 8		5014.2	£14,728. 4. 1	
1010**	£323,165.17. 4		4033.0	103,076. 3.11	
2010*	£103,077. 2. 4		5015.3	£ 41,552. -. 2	
2011	12,944.12. 6		6010.6	£ 868. 5.11	
2012	£136,020.12.10		6011.2	86. 3. -	
2013	1,632.15. 4		6012.0	153. 3.10	
2010**	£134,387.18. 4		5013.1	2,723.17. 2	
3020	£97,170. 2. 9		6014.3	279.11.11	
3021a	£58,552.13. 9		6015.0	£ 4,100. 1.10	
3021b	7,814.19. 2		7010.0	£ 4.15. 2	
3021c	£66,370.12.11		7011.2	548. 7. 7	
3022	£209,799.13.10		7012.5	8. 4	
3022a	24,283. 4. 6		7013.2	3,323. 3. 1	
3023b	13,023.11. 6		7014.1	210. -. -	
3023a	6,633.13. -		7015.3	2. -. 6	
3023d	£ 43,940. 5. -		7016.2	1,242. 9.11	
4030*	£132,047.17. 7		7017.0	£ 5,331. 4. 7	
4031	105,290. 3. 6		8010	£ 12,429. 1. 3	
4032	£ 6,757.14. 1		9010	£ 10,989.13. 5	
4033	103,076. 3.11		9011	256.12. 9	
4030**	£109,833. -. -		9012	627. 2. 6	
A	£ 56,000. -. -		9013	670.10. 6	
B	3,781. -. -		9014	340. 8. 4	
C	£ 32,219. -. -		9015	60. 5. -	
D	11,976. -. -		9016	£ 12,924.12. 7	
E	13,992. -. -				
F	1,547. -. -				
G	£109,833. -. -				



VISITORS AT THE NATIONAL MARINE EXPOSITION INSPECT RADIOMARINE'S LATEST EQUIPMENT INCLUDING RADAR (ABOVE), DIRECTION FINDER (IN CIRCLE).

NEW MARINE RADIO DEVICES

Radiomarine Exhibits Compact Electronic Navigation Aids and "Packaged" Radio Stations at National Marine Exposition

COMPACT and simplified radio and electronic devices developed by the Radiomarine Corporation of America for greater safety at sea and on the inland waterways of this country were given their first public showing on May 20, at the National Marine Exposition in Grand Central Palace, New York.

One of the main features of the exhibit was a shipboard radar set designed by Radiomarine for commercial maritime operations. Small and easy to operate, it can be used for anti-collision and navigation purposes on all types of merchant vessels. With this Radiomarine radar, the navigator is able to direct his ship into port with safety even though normal visibility is blotted out by fog or darkness.

This electronic "eye" instantly informs the navigator of the distance and bearing of such objects as channel markers, lighthouses, bridges, other ships or land formations. It has high resolution, a transmitter of ample power, and a highly sensitive receiver, as well as other improvements essential to a modern navigational instrument.

Other features of the Radiomarine exhibit that attracted attention included complete "packaged" merchant ship radio station, loran (long-range) navigational equipment, radiotelephone units for inland waterways, lifeboat radiotelephone and radiotelegraph units and a radio direction finder with a greatly simplified antenna.

The "all-in-one" ship radio station, it was explained, combines in one package all the marine radio communication requirements of the United States Maritime Commission, the rules and regulations of the Federal Communications Commission, the Cairo International Telecommunications Conference, and the Havana Inter-American Radio Conference. Nevertheless, this compact console requires less deck, bulkhead and overhead space, less wiring inside and outside the radio shack, and costs less to install and maintain than conventional models.

Radiomarine's radiotelephone for use on inland waterways is fully automatic and operates on six channels. It features a simplified remote control unit which makes it possible to have an extension some distance from the main cabinet.

The loran equipment exhibited by Radiomarine is of the type currently being demonstrated successfully aboard vessels in the Atlantic and the Pacific. Its use at sea is described elsewhere in this issue of RADIO AGE.

RADIOMARINE'S AUTOMATIC RADIOTELEPHONE INSTALLATION

WINDOW DISPLAYS IN PROMINENT NEW YORK STORES DRAW ATTENTION TO RADIOMARINE EXHIBIT AT MARINE SHOW.

Unfolding new horizons around the world . . . for all **RCA** *products*

THE RCA TRADE MARK is recognized around the world as the mark of quality, efficiency and dependability. It is the international symbol of radio and electronic progress.

Modern countries have been helped along the path toward more efficient, time-saving, and better living with modern equipment made by RCA. Wherever you go around the world, you will find the RCA International Division extending the horizon of business for all RCA products.

For example, the RCA International Division, working with its distributors, has furnished: a 150-kw transmitter to help provide modern broadcasting for modern Turkey . . . sound equipment for Mexico City's vast "Sports City" with its bull ring, baseball field, swimming pool and numerous other sports facilities . . . broadcast equipment for the streamlined Radiocentro of Station CMQ, Havana . . . communications for Volta Redonda, the great steel empire of Brazil . . . sound equipment for Argentina's huge Italar Textile Mills . . . theatre equipment for hundreds of theatres and recording equipment for motion picture studios of all countries . . . electron microscopes for England, Holland, New Zealand, Russia, and other modern nations.

• • •

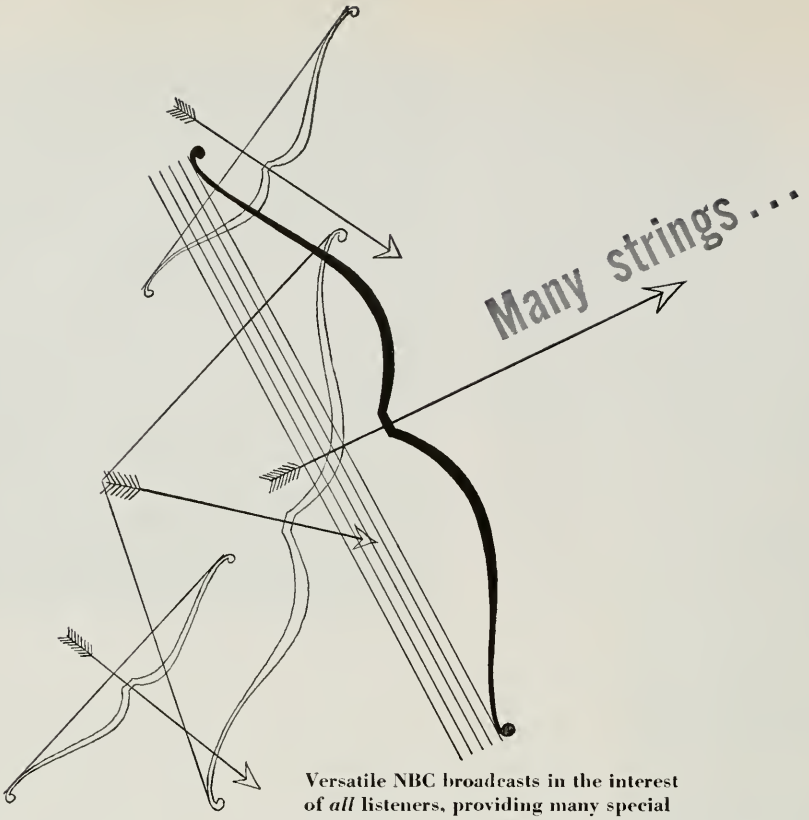
Leaders in government and industry of all nations look to RCA for technical consulting advice, for new and better products in radio and in electronics.

RCA's companies located in Argentina, Australia, Brazil, Canada, Chile, China, England, India and Mexico . . . RCA's distributor and dealer organizations covering all open countries of the globe—look forward confidently to new horizons of business for all RCA products.

RCA INTERNATIONAL DIVISION

RADIO CORPORATION of AMERICA

745 FIFTH AVE., NEW YORK, N.Y., U.S.A.



Versatile NBC broadcasts in the interest of *all* listeners, providing many special programs for numbers of special groups.

With many strings to its bow, NBC has for 20 years been fulfilling its pledge to broadcast in the interest of *all* listeners . . . providing not only programs which entertain the great majority of the listening public but also programs which have a limited appeal enjoyed by special groups with individual requirements.

This wide range of special service broadcasts includes such musical programs as *Symphony of the Air*, *The NBC Concert Orchestra* and *Concert of Nations*, which is a feature of the NBC University of the Air—as are *Our Foreign Policy*, *Home Around the World** and *Tales of the Foreign Service*. Joining these programs as part of NBC's United Nations projects is *The Pacific Story**, an established historical-geographical dramatic series. Religion of all the major creeds is served by *The Art of Living*, *Highlights of the Bible*, *The Catholic Hour** and *The Eternal Light** . . . while public affairs programs include such varied features as *Consumer Time**, *The Veterans' Advisor*, *The National Hour*, *America United*, *National Farm and Home Hour**, and *The Baxters**.

NBC devotes over half its hours-on-the-air to noncommercial programs of special interest to people with special tastes. Many more programs whose subject matter and presentation are in keeping with these are sponsored by forward-looking industries and individual firms.

**Cited by the Institute for Education by Radio of Ohio State University.*

America's No. 1 Network

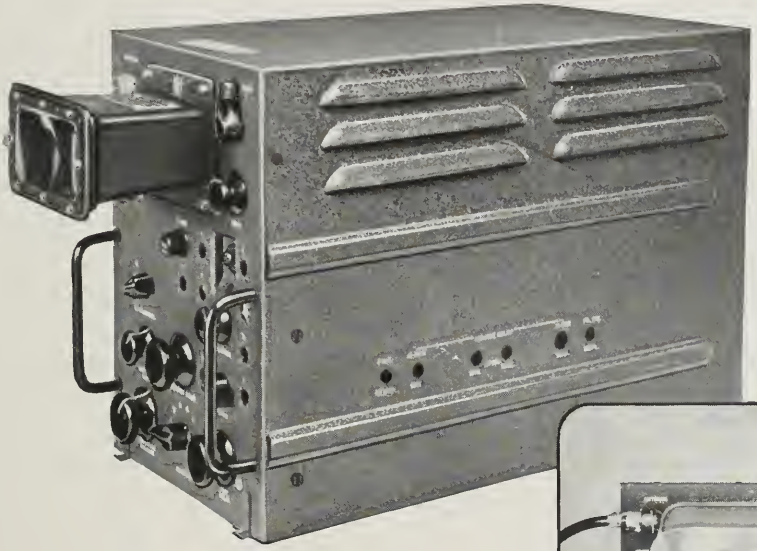
NBC

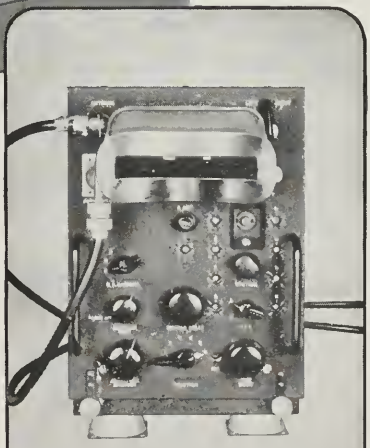
A Service of Radio Corporation of America

. . . the National Broadcasting Company

LORAN BY RCA

Available Now for Commercial Aircraft





Front view of RCA AVR-26 LORAN with light shield in place

RCA, basic designer of all air-borne LORAN equipment used in this country and largest producer of LORAN for military installation now makes this modern aid to navigation available for commercial aircraft.

Well proven under the severest conditions of wartime usage the RCA AVR-26 LORAN embodies even further refinements for peacetime application. Weighing only 35 pounds this compact unit provides the ultimate in accurate long-range navigation—precision fixes when clouds make celestial shots impossible and severe static prevents the taking of aural bearings.

LORAN is fast, too—bearings can be taken in less than a minute. Power consumption is low, and mounting space is comparatively small —the AVR-26 measures only 12¼″ high, 9⅛″ wide, and 23″ deep.

If you have a problem in long range navigation it's very likely you'll find the answer in LORAN. For further details write today to Aviation Section, Dept. 15-D Radio Corporation of America, Camden, New Jersey.

AVIATION SECTION

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

The Victrola, made exclusively by RCA Victor, gives higher fidelity and longer record life through its jewel-point pickup.*

Your Victrola's jewel-point pickup floats like a feather on water—

Instead of an ordinary, rigidly mounted needle, your Victrola radio-phonograph has a moving sapphire playing tip that fairly floats over the record.

It follows the groove with effortless ease, achieves new clarity of tone, adds longer life to records, and acts as a filter against surface noise.

Such a feather touch reduces "needle chatter," gives you all the rich warm flow of the pure music . . . the highest tones, the lowest tones, the overtones. Truly, your Victrola's jewel-point pickup brings you the ultimate in recorded music pleasure.

This pickup was perfected at RCA Laboratories—a world center of radio and electronic research—where RCA products are kept at the top of the field.

And when you buy an RCA Victor radio, television receiver, Victrola, or even an RCA radio tube replacement, RCA Laboratories is your assurance that you are getting one of the finest products of its kind that science has yet achieved.

• • •

Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 4:30 P. M., Eastern Daylight Time, over the NBC Network.

New Victrola radio-phonograph, with Chippendale-style cabinet, priced at approximately $275. "Rollout" record changer handling twelve 10-inch, or ten 12-inch records. Permanent jewel-point pickup—no needles. American and foreign radio reception. An outstanding radio-phonograph combination—thanks to research at RCA Laboratories.

RCA **RADIO CORPORATION of AMERICA**

*Victrola T. M. Reg. U. S. Pat. Off.

Printed in U.S.A.

"AMERICA, TO BE FIRST IN PEACE AND FIRST IN WAR, MUST BE FIRST IN SCIENCE."

technology should be explored and developed. Every scientist or embryo scientist must be encouraged, if America is to remain unsurpassed in peace and unconquerable in war.

The national security of the United States demands that military scientists and industrial scientists continue their cooperation, for peace and security rise and fall with science.

We have but to read the dramatic stories of the life and death race between the scientists of the United Nations and of Germany, to realize how narrow was the margin during the earlier periods of the conflict. It was frightening, even after the war had ended, to find how nip-and-tuck the race had been between German and American scientists in harnessing atomic power, rockets, radar, bombsights, tanks and other implements of war. It behooves America, therefore, to develop its scientific capital, to protect and to encourage science in times of peace, if the principles and traditions of this country are to survive.

Scientific Talent Must Be Cultivated

Today we survey a world that has emerged from the most terrible war in history; a war in which science, like a global flame-thrower, spread death and destruction around the earth. From now on, no nation is immune. No nation can be protected by oceans or mountains, forts, frontiers, or isolation. Victory in any future war may be determined by the skill of scientist against scientist. No physical barrier will limit the battlefields. The victor will be the one best fortified by science and development, by discovery and invention, and by use of scientific weapons in the hands of the ablest fighters.

Science that saved democratic civilization in World War II, must now be used for peace. This calls for training young Americans with an aptitude and an interest in science and invention. Therefore, Democracy must promote scientific education, not only for the development of weapons, but for the creation of employment, for the production of more abundant crops, for increasing national health, and for developing new wonders in atomic energy, electronics, chemistry and physics that will make for good living and eliminate poverty and disease throughout the world. America must cultivate its reservoir of youthful scientific talent along with development of its natural resources.

War Gave Impetus to Science

War gave tremendous impetus to scientific research. We must keep it moving in the right direction — toward progress in peace. In our land the power behind it will come from the training of future scientists—from the high schools, colleges, laboratories and workshops of America.

Just as we have succeeded in releasing atomic energy from uranium, we must release the energy from the minds of our youth. In the fertile brains of American boys and girls are the master keys to the future. We must stimulate and encourage youth, if this nation is to have health, prosperity and security. With its natural interest in science, youth is one of America's greatest national resources. The figment of an idea may be more revolutionary than the fission of an atom.

Great industrial laboratories will be built, splendidly equipped and on sites conducive to clear thinking; but they will be worthless, no matter how great the funds behind them, if trained men of research do not work within their walls. There is no substitute for brains. Men, not tools, are the lifeblood of research.

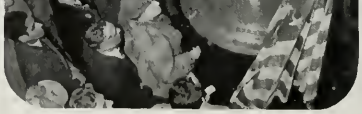
Enlisting Scientists for Peace

We stand on the threshold of revolutionary developments that call for thousands of trained scientists. We need them more and more to convert to the uses of peace, the scientific achievements of the war, which victory has made available to us.

When war came, the manpower requirements of peace were pushed aside. War drafted scientists, teachers and students with little question of future needs. Scientific and pre-scientific schools emptied their classes into the training camps of the armed forces. Industry and education responded alike to that draft of men.

Now the war is over. Peace is the order of the day. And peace, to meet our national needs, should have the priorities that were given yesterday to the demands of war. Subject only to urgent military neces-

"AMERICA, THE CRADLE OF LIBERTY, IS ALSO THE CRADLE OF INVENTION."



"NO NATION CAN BE PROTECTED BY OCEANS, MOUNTAINS, OR ISOLATION."