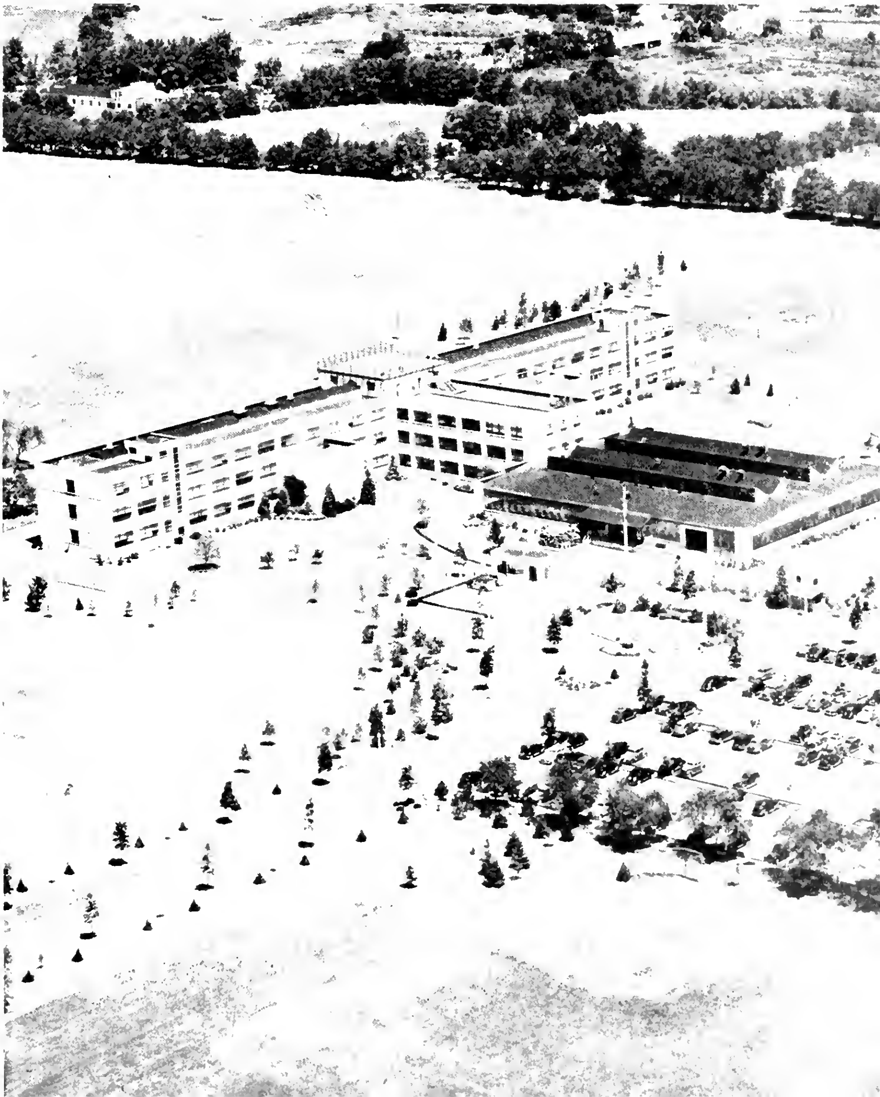
RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING



CTOBER

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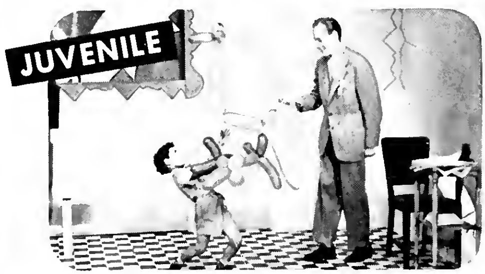
On the air FIVE TIMES WEEKLY with a regular schedule of fine television entertainment.

Timely, authentic, exciting, the WNBT Telenewsreel —news headlines and high-spots in review—is a regular weekly feature on NBC television.

From the live-talent studio in Radio City, especially adapted for NBC television—Broadway hit shows, grand opera, variety. A regular weekly feature on WNBT.

BASEBALL direct from Yankee Stadium and Polo Grounds. BOXING twice a week from Madison Square Garden. WRESTLING from St. Nicholas Arena. FOOTBALL (in season). Regular weekly features on WNBT.



NBC's special children's programs—for youngsters 6 to 60———include Quiz shows, feature-length films, shorts, novelties and a special Classroom program in connection with the New York Board of Education.

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NBC TELEVISION **WNBT** NEW YORK

NATIONAL BROADCASTING COMPANY

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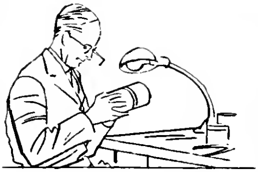
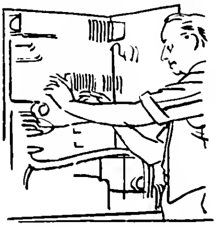
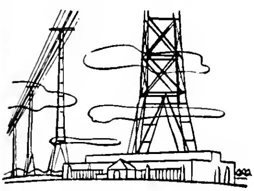
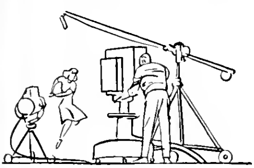
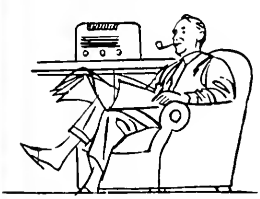










RADIO AGE

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

VOLUME 5 NUMBER 1
OCTOBER 1945

CONTENTS

COVER—RCA Laboratories, Princeton, N. J., one of the world's foremost centers of research in radio, television and electronics.
—*Fairchild Photo*

Radio Age, published quarterly by the Department of Information of the Radio Corporation of America, RCA Building, New York, N. Y., for the RCA services: RCA Laboratories, RCA Victor Division, RCA Communications, Inc., Radiomarine Corporation of America, National Broadcasting Company, Inc., RCA Institutes, Inc., RCA Service Company, Inc.

FLEET ADMIRAL CHESTER W. NIMITZ, SPEAKING FROM THE NBC TELEVISION STUDIO IN RADIO CITY, WAS SEEN AND HEARD BY VETERANS IN FIVE NAVAL HOSPITALS NEAR NEW YORK.

Science in Democracy

BRIGADIER GENERAL DAVID SARNOFF URGES SCIENTIFIC PREPAREDNESS FOR NATIONAL SECURITY—REVOLUTIONARY CHANGES IN WARFARE AND COMMUNICATIONS FORESEEN.

By Brig. General David Sarnoff
President,
Radio Corporation of America

An address before the American Academy of Political and Social Science in Philadelphia on October 5, 1945.

AMERICA, to be first in Peace and first in War, must be first in Science.

To achieve this, we must have democracy in science as well as science in democracy.

The essence of science is freedom to question and to experiment, with an opportunity to draw conclusions, unrestricted by any forces that would hamper liberty in thinking. The realm of study, investigation and development, must be free. Whether in politics or in science, it is the keynote of democracy that people must be free to think, free to discuss, and free to try their ideas in practice. To impose the opposite is tyranny.

That is one of the great lessons of World War II. We should not embrace victory merely as a triumph and let it rest as such in history books. We should study its lessons to cultivate progress and to safeguard the future. With peace comes the vivid truth that to be strong in this modern world a nation must have science ever ready to march with its Army, to sail with its Navy, and to fly with its Air Force. Indeed, some products of science, such as an atomically-powered missile, must be ready to fly through the air instantly, unattended by sailor, soldier, or pilot; guided to its target by push-buttons in a control room far away.

Such an alliance of science and military power can be achieved most effectively under the democratic form of government. The fate of Germany and Japan is evidence enough. Despite an earlier start by Germany in the creation and development of scientific weapons of war, the democracies were able to outdistance the enemy in this domain. If there be any doubt, let the doubter look to radar and atomic power. Developed and harnessed by democracy, they searched out the enemy and wiped out despotism. Our scientists gave their best voluntarily, while those of the Axis powers worked under duress. Democracy, unhampered by prejudices and obsessions about race and creed, was able to utilize the knowledge and brain power not only of its own scientists but of many who had been ruthlessly banished from their homelands by the dictators.

Freedom to Pioneer

For many years past, scientists from foreign lands have come to our shores and settled here so that they could study and experiment free from oppression, free from commands, and free from regimentation. Prominent among them we find Tesla, Steinmetz, Pupin, Einstein, Michelson, Zworykin, Fermi, and many others. Here they found the environment conducive to study and research, to free exchange of ideas, to experiment and discovery. Our nation has profited by their endeavors, and science has advanced.

America, the cradle of liberty, is also the cradle of invention. The list of our native scientists and inventors is a shining roll of honor. As a result, thousands of wartime scientific accomplishments helped to turn the tide of victory for the United Nations and thus rescue democracy from those who would destroy it. Scientists in democracy must continue to pioneer on an ever-expanding scale. We must be as daring in peace as in war. We must follow our vision with the same confidence if we are to cross new frontiers of progress. Through new products, processes and services that science can create, we should gain a fuller life, increased employment, improved health and national security. We must cultivate our natural talents and resources to meet the promise of science if we are to develop its endless opportunities for securing a higher standard of living for the masses of people everywhere.

Vigorous Policy Needed

It is imperative, therefore, that the United States maintain a vigorous national policy for the promotion of science. Statesmen, philosophers and religious leaders have led in the past—now scientists must join them in the vanguard of civilization. In the future, freedom and science must walk together, hand-in-hand as the spearheads of peace.

For this purpose, every phase of

"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."

sity, peace should have the right to recall, for the great national service of science, the trained men and the young recruits it gave up to the war.

But no mere return of our potential scientists from the armed forces can meet the pressing needs of the hour. You cannot recruit scientists through draft boards. They must be recruited through years of training in colleges and universities. If we are to meet the needs of tomorrow, we must enroll now, in our scientific schools and laboratories, an army of students for the four to six years of college and postgraduate work that is necessary to produce trained scientists. Nothing less will give our nation the scientific preparedness we must have for the march of science in peace as well as in war.

Value of Scientific Research

At the end of the First World War, it was vividly apparent that scientific research also was a vital factor in our industrial progress. As a result, it grew ten-fold between 1920 and 1940. Within the past two decades, in television alone the radio industry spent more than twenty million dollars on research. That investment has called for faith, for initiative, and for young men with new ideas. Now we are on the threshold of a new postwar industry. Television is destined to become a utility in the American home and a revolutionary force in worldwide communications. It will bring visual entertainment to the homes of rich and poor alike; it will flash letters, documents and pictures around the world while the television eye in factories will enhance safety and speed industrial processes.

In radio, each forward step leads to something new. From radio principles and television techniques sprang another new wonder, so miraculous that it is called a sixth sense—Radar! But this, too, required research on a wide basis.

Unified research on a national scale that cost two billion dollars produced the atomic bomb. Scientists themselves were amazed at the speed of the development. They thought it possible but believed it would require 20 years or more to achieve results. Their calculations, however, did not take into account the impact of war which produces speed, direct action and concentrated effort.

Peace also can benefit from concentration on certain pressing problems. For example, what would result from even one hundred million dollars wisely spent on cancer research? If research produced a cure for cancer, it would save more lives than were lost in the war.

Science Reveals Invisible World

Research into the unknown is a great adventure. It should be encouraged if American scientists are to blaze new trails in life, as the electron microscope has done in revealing the microscopic world which surrounds us. From a study of the infinitesimal organisms and elements, from the unseen rays and waves which permeate our bodies, we may find the answer to our future in the Atomic Age. The tiny, invisible things of life are only beginning to reveal their importance. The electron is the key to the world of the infinitesimal.

We have long associated power with great size but we are now beginning to realize that tiny invisible things, such as the electron and the atom, are the nuclei around which our very existence whirls. We are beginning to see that the atomic structure is a universe in itself, like the one in which our earth revolves around the sun. We see before us a new universe of power—the power of protons, electrons, deuterons and neutrons. When the atom is smashed terrific energy is released. Scientists tell us that when a lone neutron, with only a thirtieth of a volt of energy behind it, strikes the core of a uranium atom, 200 million electron volts of energy shoot out!

Harnessing Universal Power

The release and control of atomic energy represents a new and successful attempt by man to tap nature's great source of universal power. Let us envisage nature as a huge safe on which there is a combination lock. Inside this giant structure there are many chambers, one of which contains atomic power! Man, thus far, has learned only the combination to the safe and found the key to a single chamber. He has yet to find the keys to many other chambers which will unlock the secrets of nature that may astonish and change the world.

"AMERICA MUST CULTIVATE ITS RESERVOIR OF YOUTHFUL SCIENTIFIC TALENT."

"FROM RADIO PRINCIPLES AND TELEVISION TECHNIQUES SPRANG ANOTHER NEW WONDER, A SIXTH SENSE —RADAR!"

"RESEARCH INTO THE UNKNOWN IS A GREAT ADVENTURE. IT SHOULD BE ENCOURAGED IF AMERICAN SCIENTISTS ARE TO BLAZE NEW TRAILS."

Now the scientist has stepped out from the darkness of military secrecy into a spotlight that focuses the eyes of all the world upon him. The people in whose name he achieved victory look upon him as a giant endowed with magic powers for good or evil. But it is he who creates and it is they who must decide how his handiworks are to be used—for construction or destruction?

With the perspectives now unveiled, humanity may look forward to a future of terror, or a future of security and abundance. If we desire the latter to be our destiny, then all nations must decide to live in harmony in "One World." Such decision would be helped if the social sciences moved forward at a faster pace. They should not lag so far behind the physical sciences, as they have in the past. The statesman, the politician, the scientist, the spiritual leader, the teacher, the industrialist, and the labor leader must carry their new responsibilities to society, in the light of these momentous developments. Each must do his part towards curing the causes of conflicts and preventing misuse of the new forces now at man's disposal. Only thus can we preserve the freedom and democracy for which our sons and daughters fought and gave their lives.

The Use of Science

On August 5, 1945, the earth was spinning in an orbit of destruction. Science threw a mighty switch and released the atomic bomb. The world gasped! Almost in the twinkling of an eye mankind moved out from the dark clouds of war into the promising sunshine of peace.

In the wake of war there are many new ideas and discoveries which can be applied to our everyday life. In some instances, however, science ran far ahead of man's readiness to provide practical safeguards that would confine their uses to peacetime purposes. Atomic energy is one disturbing illustration. Further development is bound to release the great potentialities of atomic energy for use in industry, heat, light, power and transportation. But the atomic units that one day may power hundreds of thousands of peaceful automobiles and airplanes, also could be used in war.

Nor can it be safely assumed that atomic bombs necessarily will come only from the skies. They might come from submarines or ships, or even from land artillery. In fact it is conceivable that "smaller and better" atomic bombs, as small as baseballs, might be planted by saboteurs at strategic places and there remain hidden until such time as an enemy decides to strike. A secret radio signal transmitted from a distance, might be used to detonate such bombs and spread havoc far and wide.

Science races Time, and man in his efforts to survive and to progress, is in the race with both. Now, as man surveys the maze of possibilities which technology created in the heat of warfare, he faces the great tasks of converting and confining them to peacetime utility.

As we sit at home and watch the Tigers play the Cubs on the screen, or watch dancers in the studio at Radio City, television—for example—looks like an emissary of peace. But like other wonders of science, television too, if man so chooses, may be applied to war. Television in peace has fascinating aspects; in war terrifying!

Television in War

Since the war ended, General H. H. Arnold, commanding the U. S. Army Air Forces, has revealed that flying rockets which can be directed to targets far beyond the horizon are a definite possibility; no longer a dream. Television gives them an eye. From a distance, radio controls them in flight. So deft, so all-seeing is this control, that from the launching site, the operator can guide the winged missile as if he were inside its shell. If he sees that it is not going to hit the target, he can turn it quickly; he can even make it loop-the-loop! The very thought of thousands of these television-eyed monsters of destruction coming up over the horizon of the sea as a storm cloud may well cause us to shudder. They might be loaded with warheads of atomic power, some to strike and wipe New York off the map while others guided westward, to turn Pittsburgh, Detroit, Chicago and other cities into death and dust. No longer is the suicide flier needed; television can do his task — and more.

We have the testimony of another great airman, Air Chief Marshal Sir Arthur Harris of Britain who recently said, "War in the future is in the hands of the scientists. . . . Just as you had the old knight in armor leveled by the first man who got hold of a gun, now you have gotten to a stage where a country could win a war despite its size. It could win, however small it was, provided it had the scientific resources and brains to obtain mastery of the new weapons. If you couple the atomic bomb with the projected missile you have something with possibilities that hardly bear contemplation. The whole world is now in the range of this weapon."

I tell you the bomber with a television eye is no myth; neither is the radio controlled rocket.

Television in Peace

It rests with man how television, atomic power, electronics, and all the other forces of science are to be used. In man's will lies the answer to the future influence of science on the world. If harnessed for useful purposes the world will go into an era of wonders never before believed possible. Man will be able to look around the world by television, with the same facility that he now listens around the world by radio. Historic events such as the Japanese surrender on board the battleship *Missouri* in Tokyo Bay will no longer encircle the earth only as sound. They will be seen and heard as sight and sound in tandem.

Nor should we think of television only as an optic nerve over which entertainment and information flow pictorially, for it has many other uses which may even dwarf its performance in the home and theatre. Wherever transport needs vision, television will help to provide it. The airplane will see by television and radar; so will ships on the Seven Seas. Similarly, wherever industry needs an eye, television will provide it. It will watch over industrial processes and machines; it will go into places the human eye cannot reach. Fireproof eyes will be put into furnaces to scan chemical reactions. Tunnels will have these radio eyes, as will conduits and mines.

Several days ago, a prominent communications official from Europe called at my office. We talked of communications and the future. I could see that the threat of competition between radio and plane bothered him. In reading the news that a plane had flown a film from Iwo Jima to Washington in thirty hours he saw an ominous cloud darken the future of electric communications. Most certainly planes would pick up speed and deliver mail even faster.

Then I told him I had no such fear for the future. Radio traveling 186,000 miles a second is faster than any aircraft or even a mail-carrying rocket. A radio signal circles the globe in one-seventh of a second. Before a mail-laden plane could get off a runway in Australia, radio could be delivering mail from Melbourne—in Washington or London. Furthermore, radio could televise an important scene or event, anywhere, so that all the world might see it instantly and simultaneously. Radio travels with the speed of light. Television is light and radio combined.

I told my friend that in the future, a person will write a letter or a message that will be put on a belt moving in front of a television eye. In a split second that letter or message, exactly as written, will appear in England, South Africa or China. There, it will be automatically reproduced by a photographic process for delivery in minutes—not hours as required by even the fastest airplane.

My friend began to smile. His conception of the future of communications was changing. He was startled when I told him that eventually we may be able to take a sealed letter or document and flash it across the hemispheres without opening the envelope. That again is a television possibility—and it's not fantastic. If X-rays can look through the human body and through steel, why should it not be possible for the television eye to look through a paper envelope? This would make possible a radio mail system.

Science and Security

Atomic energy, radar, electronics, television, jet propulsion, plastics and airplanes are the craftsmanship of scientists. They are the architects of our future. It is not war alone but also science that transformed the world within the past six years. The chief effect of the two atomic bombs was not on the two Japanese cities which they destroyed, but on the human mind. As science reconverts to peace, the evidence of all this will become clear. War was a potent force in the crucible of Destiny.

In war, we used science to defend democracy, to defeat its enemies, and to destroy their false philosophies. In peace, democracy must advance the use of science for a better life and make its benefits available to all.

While we strive to obtain these benefits, we must not neglect the problem of preserving peace by adequate preparedness. For the dangers which face all of us from the new forces released by science, must not be ignored. We should adjust our military and industrial establishments to proper peacetime proportions as quickly as possible; but we must maintain them at a level that safeguards our national security.

"SCIENCE THREW A MIGHTY SWITCH AND RELEASED THE ATOMIC BOMB."

Our nation must not dissipate the moral and physical strength it now possesses in a world that is far from stabilized. Other nations, too, will benefit from our earnest efforts to substitute world peace for world war, if America is prepared with trained men and modern means to meet the perils of the terrifying forces science has discovered. If we fail in this, democracy will fail.

Let us, therefore, recognize the twin necessities of science in democracy and democracy in science.

Let us see to it that in our new-won freedom, the scientist retains his liberty to think, to speak and to work unfettered. Let us teach our youth the great responsibilities of science and encourage them to travel its highways of progress. Let them be bold in thought and daring in pursuit of the vision of their dreams.

At the same time, let us not ignore the fact that the dangers mankind faces, call for vision, courage, exploration and action not only in physical sciences but also in the political and social sciences. For all the world is now one neighborhood and the best guarantee for our own security and prosperity, is the security and prosperity of our neighbors as well.

Democracy in its hour of triumph demands that America be strong and help to make science a useful servant, not the master of mankind.

"TINY, INVISIBLE THINGS OF LIFE ARE ONLY BEGINNING TO REVEAL THEIR IMPORTANCE. THE ELECTRON IS THE KEY TO THE WORLD OF THE INFINITESIMAL."

"MAN WILL BE ABLE TO LOOK AROUND THE WORLD BY TELEVISION WITH THE SAME FACILITY THAT HE NOW LISTENS AROUND THE WORLD BY RADIO."

MISSILES WITH "RADIO BRAINS"

"V-T" Fuse, One of War's Best Kept Secrets was Called "Madame X" by RCA Workers Who Made Over Five Million of Them.

A MODERN miracle — conceived in the minds and machines of America—took place in the air over Britain in the summer of 1944.

For many months, the British Isles had undergone a terrifying ordeal of buzz bombs. Damage was mounting; casualties were great and increasing almost daily. Suddenly in June of that year, observers noted a sharp increase in the number of V-1s shot down by ground fire. In that month, only one out of every five bombs launched from France reached English cities and countryside. Germany's "secret weapon" had met its match. Unknown to more than a few high military officers and a handful of scientists it was the "proximity fuse," developed in American laboratories and built in American factories which had accomplished the feat. The fuse, next to the atomic bomb was the best kept secret of the war.

Thousands of RCA employees worked on the fuse in two of the Company's plants at Camden, New Jersey, and Bloomington, Indiana. Although they assembled more than 18,000 of these lethal weapons a day at the height of production, they knew only that the project was called "Madame X."

According to Navy officials, ten million of the fuses were produced nationally from October, 1942 to V-J Day. Of this amount, RCA Victor supplied the armed forces with five and a half million, or more than half the entire output, making the company the largest producer of the apparatus in the country.

Known officially to the Navy as the "VT Fuse," "Madame X" is a complete four-tube radio receiver and transmitter employing radar principles. No larger than a pint milk bottle, it is enclosed within the case of a five-inch shell. When such a projectile is fired, the fuse emits radio waves. As the radio waves bounce against the target, they are reflected back and are picked up by the receiver in the fuse. As the shell approaches closer to its objective, the returning signal grows stronger until it reaches sufficient strength to operate the detonating mechanism. Safety devices keep the shells from being discharged prematurely.

Miniature Tubes Used

Design of the miniature glass tubes was a feat in itself. Tiny as the tubes used in popular hearing aids, those designed for the proximity fuse had to be sturdy enough to withstand the terrific impact of the propelling discharge of the gun and the centrifugal force caused by the whirling of the shell at high speed as it left the gun muzzle. American tube designers attacked these formidable problems and solved them.

To supply the tubes and associated mechanisms with power, engineers developed a battery which was inert until the shell started its travel through the air. At that instant, the chemicals began to react and generate the required current.

Work Began Before Pearl Harbor

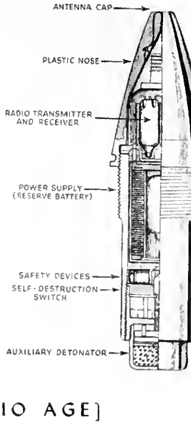
Work on "Madame X" started a month before Pearl Harbor when Radio Corporation of America scientists and RCA Victor engineers were called into conference. Ten months later, working in cooperation with representatives of the Navy's Bureau of Ordnance and the Office of Scientific Research and Development, they put the first fuse into production at Bloomington.

As an example of the ruggedness of the fuse, it had to withstand a sudden jump in velocity from zero to 2,000 miles an hour in a space of ten feet, as the projectile was fired from the gun. At the same time, it was spinning at the projectile's rate of 25,000 revolutions a minute.

The utmost care was necessary in the manufacture of the delicate device. In areas where the fuse was assembled the air was conditioned to keep out excessive moisture and foreign elements. When the fuse was fully assembled, molten wax was poured over the entire unit to keep it firm inside its housing.

"E" Flag for Achievement

So secret was the activity that the Navy Department delayed granting an "E" flag for accomplishment to the Bloomington factory. They did not want attention attracted to the plant. With the lifting of some restrictions on the proximity fuse, however, it was learned that the Navy Department was recognizing the Bloomington plant's tremendous contribution by awarding it the Navy Ordnance Flag with three stars. The Camden plant, which already has an Army-Navy E Flag with four stars for other outstanding accomplishments, is also to be awarded a Navy Ordnance Flag with one star for its fuse production record.



U. S. Navy Photo

THE "VT FUSE" (LEFT) IS SHOWN AT RIGHT AS IT APPEARS WHEN INSERTED IN NOSE OF 5-INCH SHELL.

WITH MOTORCYCLES TUNED UP, RCA MESSENGERS ARE READY TO PICK-UP OR DELIVER URGENT RADIOGRAMS. RIGHT: THIS SWISS OPERATOR, SHOWN IN AN RCA RADIOPHOTO, RELAYED THE JAP SURRENDER MESSAGE AS IT PASSED THROUGH BERNE ON ITS WAY FROM TOKYO TO WASHINGTON, D. C.

FAST, RELIABLE, COLORFUL

Mounted on Motorcycles, RCA Messengers in Washington, Are a Familiar Sight as They Weave Their Way Through Capital Streets.

FOR the pick-up and delivery of its international messages in Washington, D. C., RCA Communications, Inc., maintains a corp of efficient motorcycle messengers. Dressed in the familiar RCA uniform trimmed with red they may be seen dashing through the streets of the nation's capital at all hours of the day or night.

While these boys are well paid, particularly when the frequent overtime is considered, it does not seem to be the pay which attracts them so much as the excitement of tearing madly through traffic as though their messages concerned matters of life and death. In fact, they frequently do. Since RCA Communications, Inc., numbers among its customers practically every Embassy or Legation in Washington, as well as the Departments of the United States Government, it often happened during the war that the messages carried by these boys concerned the most vital phases of our war effort.

The messages exchanged between the Swiss Legations in Washington and Berne relating to the acceptance by the Japanese of the surrender terms were handled by RCA messengers. The final message from the Japanese, for which the world was so anxiously waiting, was held up for fully ten minutes by an encounter with an arm of the law.

Realizing the importance of this particular message, it was entrusted to two boys with instructions to get it up to the Swiss Legation as quickly as possible. One was driving while the other gave his exclusive attention to the precious message. In an effort to gain a few seconds time the driver made a U-turn where prohibited and was pounced upon by a waiting traffic officer who listened with considerable boredom to their explanation of the urgency of their errand. "A lot of horsefeathers!", he is said to have replied, writing out a traffic ticket and delivering a lecture on traffic safety which he considered appropriate. The boys completed their errand as quickly as possible and hoped it would be kept very quiet that ten precious minutes had been lost.

Unexpected Results

However, it was not to be so. All day long the gentlemen of the press had been on the look-out for this message and in some mysterious way known solely to newspaper reporters only a few minutes had elapsed before RCA phones began to ring. The story made the front pages of most of the nation's newspapers next day, with two unexpected results. First the traffic officer decided to tear up the ticket and then, the messenger, a former member of Chennault's Flying Tigers, was invited to New York to appear on the "We The People" broadcast the following Sunday night.

The rather independent spirit of these impetuous drivers does not make them too popular with the traffic officers. While the boys' instructions are to comply strictly with all traffic rules and regulations, nevertheless they have a real appreciation of the need for speed in picking up or delivering messages. A motorcycle needs little urging to cover the ground quickly and from time to time the boys are nabbed for speeding. But just as each messenger provides his own motorcycle and provides for its upkeep, he must stand on his own feet. He pays his own fine if he violates the law.

Their independent spirit also shows itself in their tendency—unless rather firmly held down—to adorn their uniforms with wide, fancy cowboy belts, to wear aviator's helmets instead of the standard caps, etc. And while a well-adjusted motorcycle can run very quietly indeed, some of them seem not exactly displeased when a defective muffler or some other maladjustment causes the machine to make a noise louder than a machinegun.

But all in all they are a fine cross section of American youth and they perform an important function in enabling RCA Communications to serve the public. The day may come when every customer will have a teletype or facsimile machine in his office or home to provide instantaneous pick-up or delivery, but until it does, the speedy motorcycle messenger provides the fastest known contact between the ultimate user and the radio company.

The Story of Radar

THIRTEEN YEARS AGO, SCIENTISTS OF RCA LABORATORIES CONDUCTED PIONEER EXPERIMENTS ON THE USE OF RADIO WAVES TO LOCATE SHIPS AND PLANES.

By Dr. Irving Wolff
RCA Laboratories
Princeton, N. J.

THE apparatus developed for the detection of objects by means of reflected radio waves has been called radar by the U. S. Navy, and this name has won wide acceptance. Yet, if the peacetime applications had been given first consideration, a name like radio-vision might have been more appropriate.

When a scene is photographed or seen by the eye, that scene is illuminated by artificial light or sunlight and the light reflected or scattered from each object is focused on the retina of the eye or on the photographic plate. The only difference between visible light and radio waves resides in the difference in wave length, as is well known. Conceivably, therefore, a scene could be illuminated by radio waves from some intense source, and the reflected waves focused on some mosaic structure which would give an indication of the elements on which the radio wave is focused. Such a procedure has actually been proposed but has not proven practical for two reasons. In the first place, the amount of radio power taken to illuminate a large area would be impractically large, and secondly, no known mosaic similar in sensitivity to the photographic plate or the retina of the eye exists for the detection and indication of the presence of the radio signal.

If we wish to see a large area on a dark night, we do not attempt to illuminate the whole area all the time. Instead, we concentrate the light into a strong searchlight beam and examine only a small section at a time. By sweeping the searchlight beam, we can examine the whole area. In the same way, in order to concentrate radio waves into a beam, we must either have very large radiators or small wave lengths.

It is well known, as a matter of fact, that to get a specified beam width, the antenna structure is proportional in linear dimension to the wave length. Obviously, an antenna which is too large is inconvenient, if not impossible, as a scanning device. For this reason, microwaves or at least ultra-short radio waves must be used to make a sharp scanning beam. By swinging the antenna, all parts of the area can be illuminated successively by the radio beam.

Object Reflects Signal

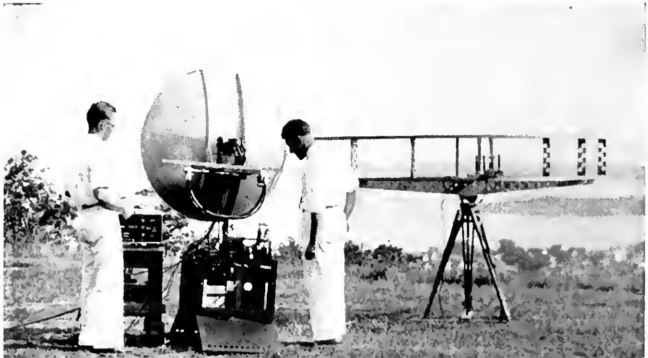
By attaching an antenna similar to the transmitting antenna to a sensitive radio receiver and swinging it so that it points in the same direction as the transmitting antenna, an indication is given in the receiver when some object in the path of the radio beam reflects signals back into the receiver. This method of scanning corresponds roughly to the old moving-spot television scanning system. In similar fashion, by synchronizing the motion of the beam in a cathode-ray tube with the motion of the antenna and modulating the grid with the intensity of the signal, a picture scanned by radio waves rather than light waves can be made visible to the eye. This is one form of radio vision.

How Picture Data is Obtained

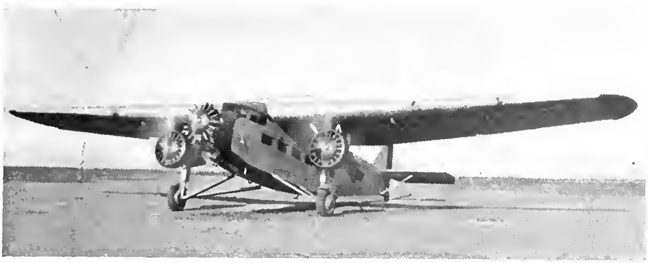
Data used to obtain this picture are obtained entirely by directional information and the intensity of the reflection of the radio signals. Similarly, it is only this information which is available to the photographic plate or the eye. The distance information is obtained indirectly by interpretation of the sharpness of definition of the images and by binocular vision.

If radar had consisted only of apparatus for furnishing a picture as described above, it still would have been useful since the picture could have been obtained through fog and clouds which light will not penetrate.

However, radar has made one very important additional contribution which the eye or photographic plate cannot supply, even under perfect visibility conditions. By means of radio waves and radio techniques, a direct, highly accurate measurement of the distance to each of the



RCA MICROWAVE EQUIPMENT USED IN 1934 FOR REFLECTION TESTS CONDUCTED IN COOPERATION WITH THE U. S. SIGNAL CORPS. THE TRIPOD AT THE RIGHT IS A LONGER-WAVE UNIT DESIGNED BY THE SIGNAL CORPS LABORATORY.



PLANE USED BY RCA FOR ITS OBSTACLE DETECTION TESTS IN 1937-39. THE V-ANTENNA APPEARS JUST ABOVE THE CENTER OF THE WING-SPAN.

objects which are illuminated by and reflect the radio waves has been made practical. Thus, whereas vision gives accurate angular information and by interpretation, approximate distance information, radar can supply accurate information in all three dimensions irrespective of the visibility condition.

Although several methods for measuring distance by radio have been proposed, only two of these have come into practical use in present day radar equipment. These have been known as the pulse and frequency modulation (FM) systems. In the pulse system, a short burst of radio-frequency energy, usually between 1 10 and 10 microseconds long, is radiated from the transmitter. The interval between pulses lies generally between 1/100 and 1/1000 second, although longer and shorter intervals are used in special equipments. Some time after the pulse is transmitted, it reaches the reflecting object and returns again to the radio receiver. Since the speed of travel of radio waves has been accurately measured and is well known, the time occupied between transmission and reception of the reflected pulse can be used to obtain an accurate measure of the distance of the reflecting object.

Spot Moves Across Tube Face

In order to measure the time, the spot on a cathode-ray tube is caused to move rapidly across the face, usually starting at the exact instant the pulse is transmitted. The rate of travel of the spot is adjusted to correspond to the scale length and definition desired. It may be as fast as an inch or more per microsecond when great accuracy is desired, or, in the long-range sets, slower than an inch per millisecond. When the signal is received, the trace is brightened or a kink is put in it. The distance of the indication from the start of the trace is proportional to the distance of the reflecting object. With adequate calibration of the equipment, this characteristic can be used to give a very accurate measure of the distance.

Uses Continuous Wave

In the FM system, a continuous transmitted wave is used but the radio frequency is swept back and forth rapidly. In the RCA altimeter, the frequency is swept either 4- or 40-megacycles, depending on the scale used, at approximately a 100-cycle-per-second rate. Since there is a time interval between the transmission and reception of the reflected signal, the frequency of the transmitter has changed during the interval and the received signal will have a different frequency than the transmitted signal. If the rate of change of frequency is linear, the difference will be proportional to the distance of the reflecting object. The frequency difference can be easily measured by feeding the received signal and a small part of the transmitted signal into a detector. The resultant output has a frequency which is equal to the "beat" between the two or the difference in frequency.

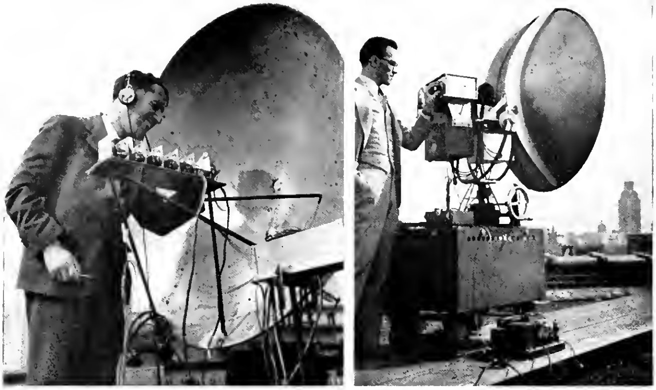
Most radar sets use the pulse method because of its ability to distinguish easily between reflection from several targets thus fixing the position of each one. The FM method is particularly applicable when accurate information is required as to the position of a single target. In the radio altimeter, where it has been used most successfully, this single target is the earth's surface.

Many methods of presenting the distance and directional information received by the radar set have been used. Although the information for forming a complete three-dimensional picture is at hand, three-dimensional indicators are not yet available. For most purposes, the information desired can be shown in two dimensions satisfactorily. In cases where horizontal, vertical, and distance information are all wanted at one time, as in night-fighter radar equipment, various tricks have been used to create the illusion on the two-dimensional indicator of the scene the three-dimensional eye would see if it were at the position of the radar transmitter.

In the most commonly used form of radar system, the scanning is limited to determining the angular position and the distance of targets without reference to their elevation. This type of limited display is useful, for instance, for ground and ship installation to get information about surface targets such as ships on the sea, and also in the search and instrument bombing airborne radar systems. It is also used in ground radars and ship radars which detect aircraft; auxiliary equipment in some cases being employed to determine altitude.

RCA Began Research in 1932

In 1932, the RCA organization started research on microwave tubes and components. This apparatus was demonstrated before IRE meetings in 1934. At that time, the possibility of reflecting sharp beams of microwaves from metal objects and ionized gas was shown.



DR. IRVING WOLFF (LEFT) AND DR. E. G. LINDER OPERATE EARLY PULSE MICROPHONE UNITS ON ROOF OF RCA LABORATORY IN CAMDEN. THESE VIEWS WERE TAKEN BETWEEN 1935-1937.

At the invitation of the Signal Corps, the equipment was brought to Sandy Hook for some tests of range as a communication set. It was also used to determine whether sufficient sensitivity was available to reflect from remote objects. Reflections were shown from gas tanks and small ships passing into New York Bay at about a half mile distance.

Ships Detected by Radar

For these tests, the microwave beam transmitter was modulated with an audible frequency such as 1,000 cycles. The directional receiver, which was placed perhaps 100 feet from the transmitter, was rotated at the same time the transmitter reflector was rotated so that both always pointed in the same direction. In the absence of a target, no signal would be noted in the receiver. When a target was in the beam, a tone was heard. These tests were described in an article in *Broadcast News* in December, 1935, but for military reasons, no mention has been possible until now of the fact that reflected signals were obtained from ships and other targets.

The equipment, in this early form, could be used to determine direction but had several defects as regards operation for location of targets in both distance and direction. These defects were: (1) in order to determine the exact position of the target, a triangulation process would be required with two transmitters and two receivers, and (2) very careful isolation between the transmitter and receiver was necessary in order to prevent interference which would blanket the weak received signal. However, these tests revealed such great possibilities in the field of reflected radio waves that our thinking on the subject was directed toward a more general application.

From then on, the goal to be reached was what has been described earlier in this article as "radio vision." This led to the adoption of the pulse technique since apparatus for determining distance as well as range was required.

Advantages of Pulse Method

The pulse method was chosen in preference to other methods of measuring distance because it was more adaptable to forming the area picture which was envisaged. In addition, it reduced greatly the interference effects which had been present in the earlier equipment, since the received signal would come in when the transmitter was inactive.

During the period from 1935 to 1937, a small group of men worked on the development of microwave tubes, receivers, pulse techinques and indicators. In 1937, they were able to demonstrate a microwave equipment which, from the roof of one of the laboratory buildings in Camden, could scan the Philadelphia skyline about 2 miles distant, and ships in the Delaware River. One coordinate on the cathode-ray screen indicator was plotted as "distance"; the "angle" was the second coordinate. This provided an area picture. The equipment operated at the same frequency employed in the 1934 tests at Sandy Hook, and used a magnetron transmitter which was pulsed, and, in the final form, a super-regenerative special magnetron detector. The pulse length was less than a microsecond, and high definition was obtained. Distances as short as five feet could be indicated. This corresponds to a time between transmission and reception of only one one-hundredth of a microsecond. However, the apparatus required considerable adjustment and attention from an operator in order to keep it running properly. Moreover, the range was short.

Altimeter Tests Began in 1937

During the winter of 1937, there were reports of a number of fatal airplane crashes in mountainous regions. Because of this, a program was initiated in the Spring of 1937 to develop airborne equipment which would give a warning of approach to obstacles such as mountains and other aircraft. Owing to the instability and research nature of microwave components at that time, it was doubted that a practical airborne system could be put in operation until microwave components had been more fully developed, hence the highest frequency which could be used with standard components, namely 500 megacycles, was chosen for the airborne equipment.

In the latter part of 1937, this equipment was installed in RCA's Ford airplane and numerous flight tests were made during the ensuing two years against the Catskill Mountains and the Alleghenies of Pennsylvania. Two antenna systems were used in the installation. In order to get a signal against objects in front, an inverted V-type antenna was installed the length of the Ford airplane. Dipole antennas were installed under the airplane in order to get an altitude signal. With the airplane in level flight at the height of the mountain tops, a signal was obtained at a distance of about 5 miles. If the airplane were 1,500 to 2,000 feet above the mountain, no signal was obtained. The pulse, which returned from the ground, representing the altitude signal, always gave good results. Other airplanes flying a half mile in front of the radar equipped plane could be detected.

Radar Placed on Secret Basis

It had been our intention to give public demonstrations of this equipment as well as a modification of it for shipboard use to guard against collisions with other ships and icebergs. However, the military representatives who saw it, thought that similarity to aircraft detection equipment and its other military possibilities made such a disclosure inadvisable, and the development was put on a secret basis.

From 1934 to 1939, the Army and Navy Service laboratories and RCA were probably the only laboratories actively pursuing radar research in the United States. Whereas the emphasis of the service laboratories was then on their chief problem, namely, aircraft detection, our emphasis had been on the possible peacetime applications of radar, in particular as applied to aircraft and marine navigation and collision prevention. But beginning in 1937, as the situation in Europe began to look more ominous, RCA engineers began to direct their work toward military ends. Contracts were undertaken in 1937 to supply some of the equipment for the first Army high-power search radar sets, and later for shipboard aircraft detection equipment for the Navy. In the early part of 1939, a 475-megacycle radar set was placed on the *U.S.S. Texas* at the same time that a lower frequency set, designed at the Naval Research Laboratory, was placed on the *U.S.S. New York*. These were the first two radar sets to be installed on Navy ships. The RCA Victor Division was given orders for the first shipboard radars, six in number, which were supplied commercially to the U. S. Navy.

From 1939 on, the development of radar equipment was devoted entirely to military requirements. The RCA Laboratories and the RCA Victor Division have participated in many of the developments of new equipment and have manufactured large quantities of sets. The altimeters that were developed as a result of the early experiments, and later the FM altimeter, have been the standard equipment for the Army and Navy and the British.

RCA Develops Tail-Warning Unit

Following the initial shipboard sets, numerous other pieces of equipment have been produced, particularly for installation on destroyers. The tail-warning set used on the Army and Navy fighter aircraft was an RCA development. Loran units for aiding in the navigation of both aircraft and surface ships have been made in an improved design and manufactured in quantity. The most accurate of the instrument bombing equipments, which was one employing radar, was initially developed and later manufactured by RCA. Details of many of these projects are still in the classified category and cannot be revealed.

As war became more imminent, first a small number and finally all industries in the electronic field were given information about radar by the services. From them came enormous quantities of equipment, and they have contributed greatly to research, development and manufacture. The Radiation Laboratory at the Massachusetts Institute of Technology, staffed with some of the best physicists in the country, has done an outstanding job.

Britain and U. S. Join Forces

The British development of radar paralleled that of the U. S. Service laboratories in the early 1930's. However, being closer to the scene of military action than the United States in the latter part of that era, they expanded their activities much more rapidly and consequently made faster progress. In 1940, when the first British radar mission visited this country, England had laboratories set up with more than a thousand engineers including many of their best scientists.

The outstanding contribution of the British was the development of the microwave tubes which made microwave pulse radar possible. They also awakened the U. S. to the enormous potentialities of radar. With this background, the Radiation Laboratory group, helped at the start by various industrial firms who had had microwave experience, were able to develop equipment in a practical form and expand its usefulness enormously.

Now that the war is over, it is to be expected that the RCA organization will again devote a major part of its effort on radar to the development of peacetime applications. The development has been so extensive during the war that most of the fundamental research is completed.

U. S. Signal Corps.

EARLY MODEL OF RADAR IN OPERATION ON AN ITALIAN HILLSIDE. THE THREE GRID-LIKE ANTENNAS GIVE AZIMUTH, ELEVATION AND RANGE OF OBJECT DETECTED.

Western Union To Use RCA Relay

AUTOMATIC MICROWAVE RADIO SYSTEM DEVELOPED BY RCA ENGINEERS WILL REPLACE HUNDREDS OF THOUSANDS OF MILES OF WIRE LINES, TELEGRAPH COMPANY ANNOUNCES.

A NEW super-high-frequency radio relay system developed by engineers of the Radio Corporation of America will be used by the Western Union Telegraph Company to improve and speed its service between the major cities of the United States.

In announcing Western Union's plans for the new relay system on October 22, A. N. Williams, President, predicted that radio relay systems ultimately will replace many of the familiar pole lines and hundreds of thousands of miles of wire in the company's 2,300,000-mile telegraph network.

Development by RCA of the new system is one of the most significant advances in the communications field in modern times, according to Dr. C. B. Jolliffe, Vice President in Charge of RCA Laboratories. It climaxes more than twenty years of radio relay research and engineering by RCA.

An experimental radio relay circuit was established between New York and Philadelphia last spring by RCA and Western Union, with the sanction of the Federal Communications Commission. It has been successful in meeting all of the tests imposed on it, according to Western Union, and has provided the experience required for the proposed nationwide radio relay system.

Employing radio microwaves transmitted by towers spaced approximately 30 miles apart, the relay system will provide a larger number of channels than are now available for the handling of telegraph traffic, it was said, and also will provide circuits for new uses and for special leased networks required by large users of the telegraph.

With this type of radio relay, Dr. Jolliffe pointed out, it is possible not only to send telegraph messages in multiple numbers over one circuit simultaneously and with the speed of light, but to transmit telephone calls, commercial high-speed facsimile, radio-photos, and FM (frequency modulation) broadcast programs. In addition, it can be used to operate automatic typewriters and business machines at widely separated terminal points.

"Tests conducted with RCA Victor apparatus in cooperation with Western Union over an experimental circuit between New York and Philadelphia," Dr. Jolliffe said, "have demonstrated that the radio relay system functions more efficiently than one using pole lines, without having the limitations or costly maintenance of wires. It is reasonable to believe that besides the wide use such systems will eventually have in communications services in this country, including those for transport vehicles and aircraft, they will be especially well adapted to rehabilitate and expand communication services in foreign lands."

Credits Three Engineers

Dr. Jolliffe credited three engineers of the RCA Victor Division, Camden, N. J., with development of the microwave system to be used by Western Union. They are Donald S. Bond, head of the project; L. E. Thompson, contributor of original ideas for the circuit, and Gerald G. Gerlach, supervisor of field installations and tests.

The system, which was manufactured by the RCA Victor Division, has these marked advantages over conventional systems: virtual elimination of distortion due to interference; simpler, more reliable and easier maintained; less equipment required at relay towers and lower cost of operation.

Radio relay stations in the system are automatic, unattended towers so perfectly designed that, despite the fact that they participate in the transmission and reception of every signal set in motion, their presence in the circuit causes no delay or interference.

In its first major move to use radio relays, the telegraph company revealed that it has applied to the Federal Communications Commission for permission to establish experimental radio relay systems between New York and Washington, New York and Pittsburgh and Washington and Pittsburgh, and a secondary system between New York and Philadelphia.

This first step, a part of Western Union's extensive post-war improvement program, is known as "The New York-Washington-Pittsburgh Triangle." Its establishment in time will permit the removal of approximately 2,500 miles of pole lines, some 54,000 miles of wires and 180 miles of aerial and underground cable.

The system planned for the "Triangle" would provide radio beams in each direction. Each beam could be equipped to provide 270 multiplex circuits, so that 1,080 operators could transmit telegrams simultaneously over a beam in one direction, but there is no present likelihood that traffic between any two cities would require such a large capacity. The radio relay facilities, however, may be used for various kinds of circuits, including multiplex, facsimile and teleprinter.

AUTOMATIC, UNATTENDED RADIO RELAY TOWERS, LIKE THE ONE ABOVE, MAY ULTIMATELY REPLACE THOUSANDS OF MILES OF TELEGRAPH AND TELEPHONE LINES IN THE UNITED STATES.

New RCA Image Orthicon Demonstrated

SUPER-SENSITIVE ELECTRONIC "EYE," SHOWN FOR FIRST TIME, PICKS UP SCENES IN CANDLELIGHT AND DARKNESS—SOLVES MANY PROBLEMS OF TELEVISION ILLUMINATION.

A NEW television camera tube of revolutionary design and sensitivity, called the RCA Image Orthicon, which has been withheld from public view for many months because of wartime secrecy, was exhibited recently in studio and remote pickups. It not only transmitted scenes illuminated by candle and match light but performed the amazing feat of picking up scenes with infra-red rays in a blacked-out room.

In the exhibition, arranged for newspaper and magazine writers in a studio of the National Broadcasting Company, Radio City, with the cooperation of NBC's engineering and production staff, members of the audience saw themselves televised under lighting conditions that convincingly proved the super-sensitivity of the new electronic "eye." The new tube solves many of the major difficulties of illumination in television programming and makes possible 'round the clock television coverage of news and special events.

Scenes from a special rodeo show arranged at Madison Square Garden for the visiting United States Navy Fleet gave the invited guests further evidence of the tube's superiority. Exciting cowboy acts were picked up by the Image Orthicon and transmitted to the studio in a comparative demonstration showing its advantage over conventional television pickup tubes in providing greater depth of perception and clearer views under shifting light conditions.

RCA-NBC engineers capped the demonstration by blacking out the studio where the writers were assembled, and providing the unprecedented spectacle of picking up television scenes in apparent darkness. Unseen infra-red (black) lights were turned on, but it was so dark that a member of the audience could not see the person next to him. Then on the screens of television receivers in the studio appeared bright images of persons in the room. The Image Orthicon tube, it was explained, achieved the feat through its sensitivity to infra-red rays.

Aladdin's Lamp of Television

"This is the Aladdin's Lamp of television," declared John F. Royal, NBC Vice-President in charge of television. "Its revolutionary effect on lighting problems means that many of our major difficulties of illumination will be eliminated.

"This new instrument which is easily portable and suitable for use in every field of television opens new vistas that challenge the imagination."

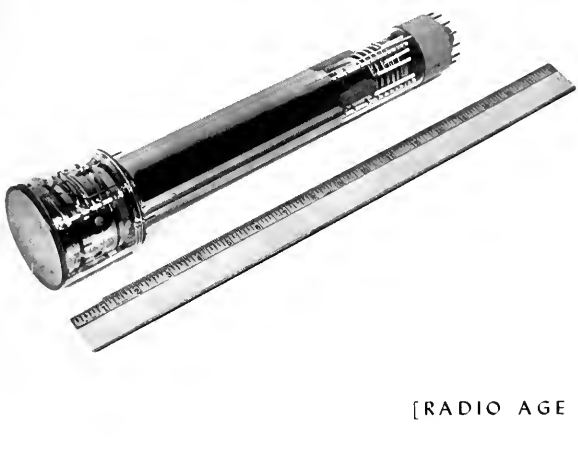
Declaring the Image Orthicon to be 100 times more sensitive than conventional pick-up tubes, E. W. Engstrom, Research Director of RCA Laboratories, Princeton, N. J., said the tube emerged in its present form much sooner than would normally have been the case, because of wartime research.

Credit for the tube's development goes to three members of the RCA research staff: Dr. Albert Rose, of Middletown, N. Y., Dr. Paul K. Weimer, of Wabash, Ind., and Dr. Harold B. Law, of Kent, Ohio. The project is a continuation of RCA Laboratories' work on the pick-up tube over the past 20 years under the direction of Dr. V. K. Zworykin, Associate Director of RCA Laboratories. During part of that period, the work was headed by B. J. Thompson, Associate Director of the Laboratories, who was killed in action overseas in July, 1944, while on a special mission for the Secretary of War.

Engineers of the tube division plants in Lancaster, Penn. and Harrison, N. J. have been engaged in development of the Image Orthicon for military applications and will be responsible for the final commercial design of the tube for television uses.

Announcing incorporation of the Image Orthicon in a new super-sensitive television camera to be manufactured by RCA Victor, Meade Brunet, General Manager of the Company's Engineering Products Division, said that deliveries

REVOLUTIONARY IN DESIGN AND SENSITIVITY, THE RCA IMAGE ORTHICON IS THE MOST COMPACT TUBE IN THE FAMILY OF TELEVISION "EYES." THE ELECTRON IMAGE UNIT, SCANNING MECHANISM AND POWERFUL ELECTRON MULTIPLIER SECTION ARE INCLUDED IN A CASE ONLY 15 INCHES LONG AND 3 INCHES IN DIAMETER.



on the camera are expected to be made to television broadcasters in about six months.

RCA engineers listed these specific advantages in performance of the Image Orthicon:

1. Ability to extend the range of operations to practically all scenes of visual interest, particularly those under low-lighting conditions.
2. Improved sensitivity, permitting greater depth of field and inclusion of background that might otherwise be blurred.
3. Improved stability which protects images from interference due to exploding photo flash bulbs and other sudden bursts of brilliant light.
4. Smaller size of tube, facilitating use of telephoto lens.
5. Type of design that lends itself to use in lightweight, portable television camera equipment.
6. Improved gain control system that provides unvarying transmission, despite wide fluctuations of light and shadow.

How the Tube Works

Resembling a large tubular flashlight in size and appearance, the advanced development model of the Image Orthicon has an overall length of about 15 inches, with the shank about two inches in diameter and the head about 3 inches in diameter and 3 inches long. It has three main parts: An electron image section, which amplifies the photoelectric current; an improved Orthicon-type scanning section, smaller and simpler than those built before the war; and an electron multiplier section, the function of which is to magnify the relatively weak video signals before transmission.

The principle which makes the new tube super-sensitive to low light levels is similar to that which enables RCA's famous multiplier phototube to measure starlight. This principle, known as secondary electronic emission, involves the use of electrons emitted from a primary source as missiles to bombard a target or a series of targets, known as stages or dynodes, from each of which two or more electrons are emitted for each electron striking it.

Light from the scene being televised is picked up by an optical lens system and focused on the photo-sensitive face of the tube, which emits electrons from each illuminated area in proportion to the intensity of light striking the area.

Streams of electrons, accelerated by a positive voltage applied to a grid placed directly behind the photo-sensitive face and held on parallel courses by an electromagnetic field, flow from the back of the photo-sensitive face to a target. Secondary emission of electrons from the target, caused by this bombardment, leaves on the target a pattern of varying positive charges which corresponds to the pattern of light from the scene being televised.

Electrons Stop Short of Target

The back of the target is scanned by a beam of electrons generated by an electron gun in the base of the tube, but the electrons making up this beam are slowed down so that they will stop just short of the target and return to the base of the tube except when they approach a section of the target which carries a positive charge. When this occurs, the beam will deposit on the back of the target enough electrons to neutralize the charge, after which it will again fall short of the target and turn back until it again approaches a positively charged section.

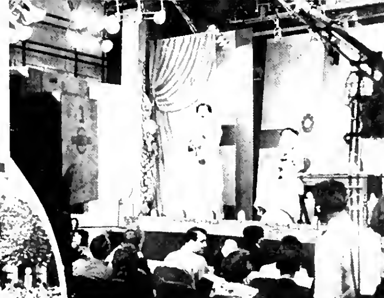
The returning beam, with picture information imposed upon it by the varying losses of electrons left behind on the target, is directed at the first of a series of dynodes near the base of the tube; secondary electrons "knocked out" of this electrode by the bombardment strike a second dynode, and this process continues, with the strength of the signal multiplying at each stage until it reaches the signal plate and is carried out of the tube through an external connection.

NBC ANNOUNCER BEN GRAUER AND USHERETTE BETTY BEUHLER DEMONSTRATE HIGH SENSITIVITY OF IMAGE ORTHICON USING ILLUMINATION OF ONE CANDLE. BELOW: GREATLY SUPERIOR SENSITIVITY OF CAMERA USING THE IMAGE ORTHICON (FOREGROUND) IS COMPARED WITH PERFORMANCE OF CONVENTIONAL CAMERA IN PICKING UP SCENES FROM THE RODEO AT MADISON SQUARE GARDEN.

UTH CONDUCTS AN "INFORMATION PLEASE" FOR TELEVISION.

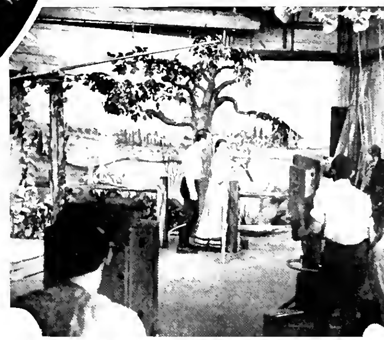
LLOWING HIS RELEASE FROM A JAP ISON, A JOURNALIST TELLS HIS STORY BEFORE THE CAMERA.

FILMS OF GEN. EISENHOWER'S WASHINGTON RECEPTION WERE TELECAST THE SAME DAY FROM NEW YORK.



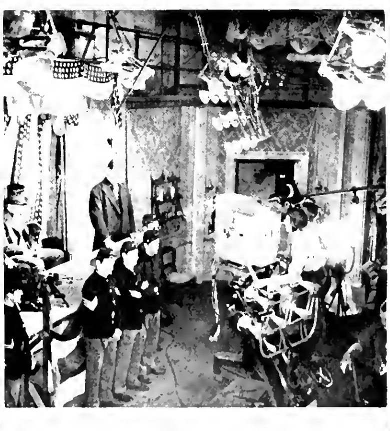
AN ACTUAL NBC STUDIO AUDIENCE BECOMES PART OF THE SCENE OF AN OPERATIC EPISODE.

A STRIKING BACKDROP AND STAGE SETTING CREATE THE ATMOSPHERE FOR A RURAL PLAYLET.



SNOW MACHINE IS FILLED WITH CORN AKES AND SCRAPS OF PAPER TO CREATE A WINTRY SCENE.

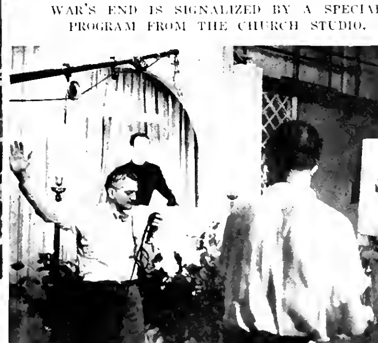
LEVISION CAMERAS FOCUS ON A TEAM OF INTERPRETIVE DANCERS.



ABRAHAM LINCOLN LIVES AGAIN IN A DRAMA ADAPTED FOR TELEVISION.

A COMMENTATOR ADDS THE "SOUND TRACK" TO A NEWSREEL AS HE WATCHES IT ON THE TELEVISOR SCREEN.

WAR'S END IS SIGNALIZED BY A SPECIAL PROGRAM FROM THE CHURCH STUDIO.



RCA VICTOR OFFICIALS EXPRESS SATISFACTION AS THE FIRST 1946 MODEL RADIO RECEIVER COMES OFF THE PRODUCTION LINE AT THE BLOOMINGTON PLANT. LEFT TO RIGHT: FRANK M. FOLSOM, EXECUTIVE VICE PRESIDENT IN CHARGE OF RCA VICTOR DIVISION; J. B. ELLIOTT, GENERAL MANAGER, HOME INSTRUMENTS DIVISION, AND J. B. MILLING, MANUFACTURING DIRECTOR.

RADIO SETS IN PRODUCTION

Blueprints for Reconversion, Held in Preparation for V-J Day, Speed Up Assembly of First RCA Receivers for 1946.

By Frank M. Folsom

Executive Vice President in Charge of RCA Victor Division

THE day following the end of the war, a number of my associates and I sat in Camden reading the hundreds of telegrams and letters cancelling the production of military, radar, and electronic equipment. These cancellations wrote the final chapter to the story of RCA Victor's contribution to victory.

In six years of wartime engineering and production, RCA Victor never failed in its obligations. Our war efforts have been commended again and again by the Government and by men in the armed forces who depended upon RCA Victor equipment. When peace came, it did not find us unprepared, for practical long-range plans had been carefully made for this event.

One of the first steps taken toward reconversion was a streamlining of organization so that we are better equipped and more efficient to meet the stiff competition which is anticipated. Basically, the RCA Victor Division has been divided into four separate businesses, each virtually a complete organization in itself. These four commercial divisions are Engineering Products, Home Instruments, Records and Tubes.

Within their separate spheres, each of these businesses has the responsibility for all functions of the business, including engineering, purchasing, manufacturing, accounting and selling. All these functions are the responsibility of a General Manager, who in turn reports to the Operating Vice President of the RCA Victor Division. This modern streamlining within the organization will help to insure fast action and efficiency.

Markets were studied and their potentialities mapped. While it is estimated that goods manufactured for the armed forces will comprise about 30 per cent of our total output in 1946, overall sales are expected to be considerably above the prewar figure in all divisions—Home Instruments, Records, Tubes, and Engineering Products. Some indication of the market potentialities for records and Victrolas alone is pointed up by the estimate that only about 15 to 18 per cent of all radio-owners who have phonograph turntables.

Distribution methods, too, came in for their share of analytical study during the period of planning for peacetime production. The result is that RCA Victor is geared to a streamlined, more efficient distribution system. The new program calls for fewer distributors, many of whom cover a wider area.

Sales training courses have also been inaugurated for men who are now in the field selling peacetime products.

Peacetime manufacturing will be devoted to the radio, electronic and sound reproduction fields, in which RCA has long been a leader, and which offer unlimited possibilities for expansion. Major products assigned to each of the seven RCA Victor plants are:

CAMDEN: Broadcast transmitters, communications equipment, electron microscopes, industrial electronic equipment, motion picture recording and reproducing equipment, aviation radio equipment, sound systems, home television receivers, industrial television equipment, records, export radio and many other products.

INDIANAPOLIS: Radio console sets, Victrolas, record changers, records, auto radios, receiving tubes.

BLOOMINGTON: Small radios and Victrolas of all types.

HARRISON: Receiving and allied type tubes.

LANCASTER: Power, cathode-ray, photo and special type tubes.

SAUGERTIES: Tube mount assemblies.

HOLLYWOOD: Film and disc recording, manufacture of records.

To Enlarge Floor Space

Anticipating a substantial upswing in production and sales, RCA Victor plans to add 400,000 square feet of manufacturing floor space in the next few years, including an additional plant at Indianapolis for the production of radios and the expansion and modernization of record-making facilities at Camden, Indianapolis and Hollywood. Plans are also being made for the continued use of the 825,000 square feet of space added during the war, which will be largely used for the manufacture of radios and engineering products, such as special electronic apparatus for industrial use, testing devices, and motion picture equipment.

Speaking generally, we expect to be back on a normal peacetime schedule in about six months. Fortunately, no important reconversion problems are involved in the manufacture of electron tubes, and at Harrison, Lancaster, Indianapolis and Saugerties, work is going forward on receiving, power, cathode-ray, and special type tubes for civilian applications.

Similarly, the manufacture of RCA Victor records has no reconversion problems. Immediate expansion is being undertaken in the Record Division, which during the war has been able to supply only about half of the public demand.

Small Sets First Off Line

In the Home Instruments Division, speed of production has been considered a prime factor in reconversion. The changeover pace was stepped up to the point where deliveries on a Kick-Off Line comprised of nine outstanding models were expected to start during October. A number of table model sets were produced in our Bloomington plant under government contract for shipment to Army and Navy bases overseas for morale purposes. Other commercial sets for export were in partial assembly in Camden. Final production has been delayed and our delivery schedule set back because of our inability to get parts and components. However, we expect that small sets should be in full production by the end of the year and consoles by early 1946.

Included in the Kick-Off Line are two new models — a personal radio and a table model automatic Victrola — two console Victrolas, and five table model radios. Taken as a whole they represent an exceptional line of RCA Victor radios and phonographs engineered to give maximum performance and housed in beautiful cabinets styled to conform with anticipated postwar trends in designs.

The Kick-Off Line will be supplemented, rather than supplanted, by additional new models as they become ready for production, until the RCA Victor home instrument line covers all classes of product.

In the television field, it is not expected that receivers will be ready for delivery to distributors before from six to nine months. It is impossible to predict the time when full production will be under way until it is known what the approximate demand will be. However, it is hoped that our first television sight-and-sound receivers will reach the market during the second quarter of 1946.

Some engineering products should be ready for delivery in approximately 30 days and in full swing in about six months.

The problems of reconversion are numerous, but they are being tackled with a determination to keep work interruption at a minimum. Our factories, warehouses, and storage space have been crowded with Government material —raw materials, work which was in process for war purposes, and completed equipment ready for shipment. These must be removed to provide room for new materials.

We estimate that the expansion program as now viewed should result in an average employment of about 23,000 persons, as compared with the prewar normal of around 18,000 and the wartime peak of approximately 32,000.

AMONG THE NEW RCA VICTOR RADIO RECEIVERS ARE THE PERSONAL RADIO (LEFT), SMALL ENOUGH TO FIT INTO A TOPCOAT POCKET, AND THE DELUXE RADIO-PHONOGRAPH CONSOLE WITH ROLL-OUT RECORD CHANGER AND A "PERMANENT POINT" PICKUP.

MUSIC LIBRARY SERVICE ADDS NBC THESAURUS

Recorded music from the National Broadcasting Company's extensive Thesaurus Library, listing more than 4,000 titles, has been added to the RCA Music Library Service to augment its current catalogue of records available for industrial sound system broadcasting, according to Philip J. Jacoby, manager of RCA Victor's industrial music service.

Thesaurus offers the orchestras of Xavier Cugat, Vincent Lopez, Horace Heidt, Dick Jurgens, Lawrence Welk, Tony Pastor, and others, in the popular hit class; favorite waltzes and musical comedy successes by the orchestras of Harry Horlick and Norman Cloutier, and favorite marching airs by Dr. Edwin Franko Goldman's band of 60 pieces.

RCA Music Library Service is available to plants using industrial music systems and to music companies operating over leased phone wires and serving several plants from a central studio.

RCA Buys Brenkert Co.

Purchase of the Brenkert Light Projection Company of Detroit, and plans for expansion of its production facilities to meet increasing demands for Brenkert motion picture projectors and Brenkert arc lamps and accessories was announced recently by Frank M. Folsom, Executive Vice-President of Radio Corporation of America in charge of the RCA Victor Division.

The Brenkert Company, according to Mr. Folsom, will continue to operate as a separate company under its existing name, and Karl and Wayne Brenkert will remain active in its management.

The Brenkert firm has been engaged in the manufacture of high quality arc lamps for more than a quarter of a century, and in 1939 introduced to the trade a projector of its own design in which are incorporated many unique and advantageous features. This projector and Brenkert arc lamps and booth accessories have been marketed since 1941 through RCA theatre supply dealers.

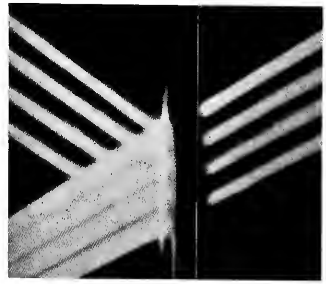
Splitting Light Beams

A PRE-WAR DEVELOPMENT IN SOUND-FILM RECORDING, IS PUT TO WORK TO INCREASE ACCURACY OF GUNFIRE.

By R. H. Heacock
Engineering Products Division
RCA Victor Division

THE optical phenomenon that causes bright blobs of color to appear when a thin film of oil floats on a puddle was put to work by RCA scientists to help our 40mm. anti-aircraft gunners draw a deadly accurate bead on Jap planes. The principle is used by RCA in processing a vital element of the new U. S. Army M-10 range finder, development of which was recently announced by the Eastman Kodak Company and the Rochester (N. Y.) Ordnance District of the Army. This element is a rectangular glass plate about the size of a calling card, but ¼-inch thick, with a submicroscopically thin chemical coating. Its function is to "split" the light striking it, transmitting a band of light with one color predominating, at the same time reflecting a band with the complementary color, both functions being carried out without absorbing any light within the reflector.

This reflector is a direct outgrowth of a pre-war development made by G. L. Dimmick of RCA's Indianapolis Engineering Department for the solution of a Hollywood sound-film recording problem. At that time Mr. Dimmick developed a color selective reflector for separating out from the modulated light-beam a band which is not very useful for photographic exposure but which is highly efficient for operating the phototube of a monitoring system. Thus in the film recording application, the reflector enables direct monitoring of the modulated light-beam without detracting measurably from its photographic exposure values. This represents a decided improvement over the type of monitor which divides the light on a purely quantitative basis and, therefore, noticeably reduces the light available for activating the emulsion on the film. This development was described by Mr. Dimmick in the January 1942 issue of the Journal of the Society of Motion Picture Engineers.



WHEN WHITE RAYS (LOWER LEFT) STRIKE A COLOR SELECTIVE REFLECTOR AND ARE SPLIT, THE TRANSMITTED RAYS (RIGHT) HAVE A YELLOW COLOR AND THE REFLECTED RAYS (UPPER LEFT) ARE BLUE.

Before discussing the principal application for similar reflectors in military range finders, it may be well to review briefly the best known methods by which light may be divided on quantitative and qualitative bases.

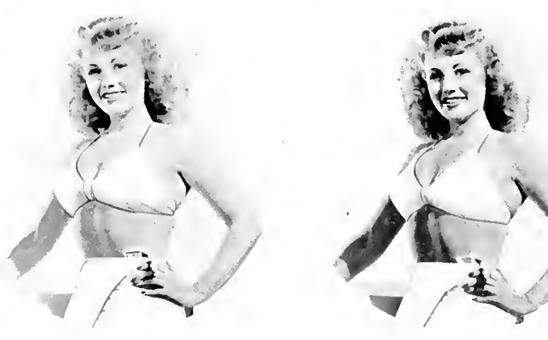
The common method for dividing light on a purely quantitative basis is to employ a partially silvered surface, that is, one with such a thin silver coating that part of the light passes through and part is reflected. These are far from 100% efficient because the silver film actually absorbs an important percent of the light it intercepts.

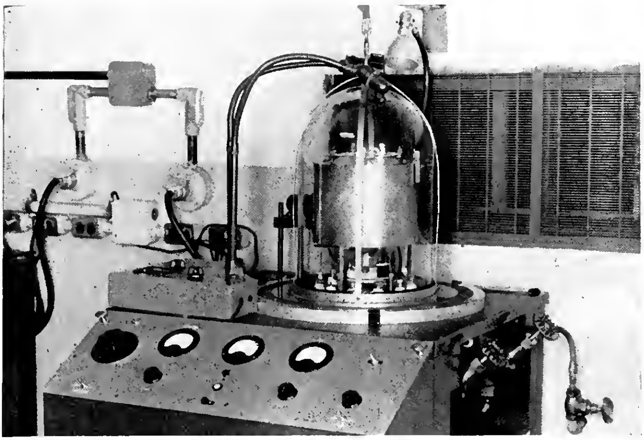
Standard Method Inefficient

A standard method for dividing light on a color selective basis is by means of colored glass or gelatine filters which are inefficient for many applications because they also absorb much of the light energy.

RCA has developed unique light dividers which employ the same optical interference phenomena which make low-reflection coatings possible. Reflectors which divide the light quantitatively and others which divide the light qualitatively (by color) are both made by the Company. They are phenomenally efficient because they have practically no absorption.

LOW REFLECTION COATINGS APPLIED TO BINOCULAR LENSES INCREASE LIGHT TRANSMISSION AND DECREASE SURFACE REFLECTIONS. LEFT, BELOW: IMAGE FROM UNCOATED LENS; RIGHT, IMAGE FROM TREATED LENS SURFACE.





LENS COATING EQUIPMENT DESIGNED AND DEVELOPED BY RCA. MATERIAL TO BE TREATED IS PLACED IN BELL-SHAPED VACUUM CHAMBER.

As used in the new range finder, the light divider serves to transmit to the eyepiece two separate images, one of one color, and the other of a complimentary color. To range the target, the gunner, by manipulating controls on the finder, superimposes the two images until a sharp natural-colored image appears. The finder is mounted on an automatic director which computes range and height factors and aims the battery of guns by applying firing data to them electrically.

The earlier counterpart of the reflector plate employed a partially metallized surface to make it semi-reflective and thus divide the light on a quantitive basis. Colored filters of the absorption type in the rest of the optical train subsequently created the dual images of different colors which the gunner superimposed by manipulation of the controls, as is done with the new sight.

Half of Light Lost

The inherent disadvantage of the metallized-surface reflector was its absorption of approximately 50% of the light striking it. This loss, coupled with absorption and reflection losses in the colored filters, made the device relatively inefficient. Furthermore, because the two images formed by the earlier device did not include all the colors of the spectrum, the "on target" coincident image could not be a natural-colored one as with the new instrument.

Because the light absorption of the new color-selective reflector is negligible, its use approximately doubles the amount of light put to useful purposes, resulting in a much brighter final image with appreciably more contrast. These properties provide easier ranging operation, as well as increased accuracy.

Coating Eliminates Reflection

In order to eliminate the possibility of reflection from the other side of the optical plate, it is customary to coat this surface with conventional, low reflection coating. Low reflection coatings very markedly decrease surface reflection and, at the same time, increase light transmission. One of the illustrations gives an artist's conception of the effect of low reflection coating applied to a pair of binoculars. Not only is more light transmitted, but a marked increase in contrast is obtained.

Any of the three types of coatings referred, namely, quantitative reflectors, color selective reflectors or low reflection coatings, may be produced on the same general type of equipment. Coatings are actually made by evaporating materials within a vacuum jar. Very careful control of thickness of the layer of each material is obtained.

All three types of coatings have played an active part in making our combat optical devices better and more useful instruments. It is believed that the same properties which made them useful in war devices will help establish them in our post-war devices of peace.

STORE TELEVISION TESTED BY GIMBEL

Television has rolled up its sleeves and gone to work to prove its power to make shopping easier and more economical for Philadelphia and, eventually, for the rest of the country's department store shoppers.

Using the practical theme, "Television Goes to Work", the most extensive demonstration of intra-store video ever held in a department store was previewed on October 23 at Gimbel Brothers-Philadelphia before an audience of department store executives, civic leaders, prominent professional and business men, educators, and radio executives. The demonstration was opened to the public October 24 for three weeks.

Under the supervision of RCA Victor engineers, a complete studio and control facilities were set up in the Gimbels store auditorium, where five hundred persons could witness the actual "shooting" of each of the television programs. In addition, 22 "telesites", or viewing centers, were located at strategic points throughout the store's seven floors.

Shanghai Circuit Open

RCA Communications, Inc., resumed radiotelegraph service to Shanghai with a substantial reduction in message rates on October 23. Under the revised tariff, the prewar rate of 74 cents a word between New York and Shanghai has been reduced to 24 cents, and the San Francisco-Shanghai rate to 20 cents.

The Shanghai circuit was opened by RCA in December, 1930, and continued in operation until December, 1941, when war interrupted commercial radiotelegraph communication with China.

AN RCA VICTOR EMPLOYEE DEMONSTRATES FLEXIBILITY OF NEW HIGH-FIDELITY RECORD.

UNBREAKABLE RECORDS

After Eleven Years of Research, RCA Victor Perfects Durable, High Fidelity Phonograph Disc of Flexible Plastic with Greatly Reduced Surface Noise.

PRODUCTION of the first non-breakable, high fidelity phonograph record for home use, announced recently by RCA Victor, adds another impressive achievement to the Division's list of "firsts." A pioneer in the record and phonograph field for 45 years, the Company has been identified with many outstanding improvements in recording and reproducing techniques, but development of the new type record has been acclaimed as the greatest advance in home phonograph records in that period.

The new non-breakable record, to be known as the Red Seal De Luxe Record, is the result of eleven years of research, covering many phases of technical exploration and development by our engineers. The final formula for the new record includes a compound composed almost entirely of vinyl resin plastic which produces a durable, long-life record.

The need for a non-breakable record has been long recognized by the industry. With a revival of the record business in the mid-thirties the need became more evident. Broken records have long been a big problem. When one considers there are approximately 10,000,000 children in this country between the ages of one and five years, many of whom have access to the family's record library, it is easy to understand the high incidence of record breakage, in addition to such breakage as might be caused by adults.

Record breakage has other annoying aspects. For example, a broken record in an album of recorded music is sometimes difficult to replace. The new De Luxe record eliminates this difficulty because, for all practical purposes, it is non-breakable.

Experiments Made in 1930

The first non-breakable record to appear on the market was made by the old Durium Company, back in 1930. It was not satisfactory and was soon withdrawn. However, this venture did serve one constructive purpose—it stimulated record engineers to examine the possibilities of a more durable disc than the standard shellac record.

Vinyl, the principal ingredient used in the new type record, is made from a series of thermoplastic resins and compounds. This material, termed by leaders in the plastic industry as one of the "most versatile plastics", scored one of its earliest successes when it was used for the making of expensive transcriptions for broadcast purposes. It was also used in the making of V-discs for the armed forces.

Weight is Reduced

Because this plastic compound does not require the mineral filler necessary in shellac records, the surface sound on the new record is substantially reduced. The new disc is the same size but its weight is somewhat less than the standard disc. Extensive tests conducted by engineers under the direction of H. I. Reiskind, Chief Engineer of the Recording Division, have determined that the new record can be played on practically all types of home phonographs, including those equipped with automatic changers.

The De Luxe record is exceptionally attractive. It has a glowing ruby-red color which lends itself to ready identification with the best in recorded music, along with the traditional Victor and RCA trade marks.

This record was first introduced at a special demonstration for music critics, record reviewers, feature writers, science editors, representatives of the metropolitan press and other selected guests in Radio City on August 30. Reaction was very favorable. Reports in the newspapers and magazines after the demonstration indicated that we had been justified in our belief that the public was ready for a non-breakable record.

The first Red Seal De Luxe album will be given general release this month. It is a brilliant performance of Richard Strauss' concert favorite, "Till Eulenspiegel's Merry Pranks," played by the Boston Symphony Orchestra under the baton of Serge Koussevitsky.

CALCULATES ANTENNA DESIGN

LONG, tedious mathematical computations which have been necessary in solving the intricate problems involving the location and arrangement of radio towers may now be replaced by a new electronic device called the Antennalyzer, Dr. George H. Brown of RCA Laboratories announced recently at a meeting of the Washington, D. C., section of the Institute of Radio Engineers.

Field tests and calculations, which formerly required weeks to perform, are now done in a matter of minutes by this electronic computing machine which adds and subtracts angles, multiplies, looks up trigonometric functions, adds numbers, squares them and finally takes the square root of the whole to produce the desired answer which the engineers must have to accurately locate a directional radio antenna.

The Antennalyzer, a new magic brain in the field of radio, consists of 52 electron tubes. The associate circuits can be adjusted to duplicate all characteristics of a projected antenna. In operation, the controls of the machine are regulated until a pattern of light on a cathode ray tube is identical with the desired pattern of transmission of the broadcast station. Final dial readings not only tell where to locate the towers, but give all electrical data needed to complete the most efficient antenna design.

PROBLEMS OF LOCATING AND ARRANGING ANTENNAS CAN BE SOLVED IN A FEW MINUTES BY THIS ELECTRONIC DEVICE.

Publishes New Magazine

First issue of a new Spanish language magazine, *Radio Mundial*, published by the RCA International Division is now being distributed throughout Latin America. The new periodical, a quarterly, is designed for Spanish speaking people interested in radio broadcasting, radio communications, television and allied activities.

NEW CIRCUIT LOWERS COST OF FM RADIOS

A NEW radio circuit for frequency modulation (FM) receivers which makes it possible for the first time to build a receiver that realizes the advantages of FM at a cost comparable to that of standard band receivers, was described by Stuart Wm. Seeley, manager of the Industry Service Division of RCA Laboratories, in a paper delivered to a recent meeting of the Institute of Radio Engineers in New York.

FM sets produced before the war, Mr. Seeley pointed out, required the use of one or more tubes whose functions were solely that of noise suppression. They contributed nothing to the volume of the receiver output. Furthermore, he said, to make these extra tubes fully effective, considerable amplification of the received signal was necessary. Although both of these requirements added noticeably to the cost of FM receivers, noise continued to be present when the strength of a received signal fell below a certain point called the threshold level.

According to Mr. Seeley, the new RCA circuit, called a ratio detector, is insensitive to electrical interference of all kinds, whether man-made by ignition systems, oil burners and domestic appliances, or natural, such as atmospheric static.

Mr. Seeley added that the new circuit is not only free of a critical threshold signal level, operating equally effectively on strong and weak stations, but its incorporation in a receiver eliminates the need for additional tubes and parts that formerly were considered necessary in frequency modulation receivers. It is this simplification, he said, that should reduce the manufacturing cost of FM receivers to a point comparable with that of receivers covering the standard broadcast bands.

The RCA Victor Division has announced that the development would be embodied in future models of RCA receivers.

STUART W. SEELEY CONDUCTS TEST ON A RECEIVER CHASSIS EMBODYING A NEW FM RADIO CIRCUIT WHICH REDUCES THE NUMBER OF TUBES REQUIRED.

AUDITIONS FOR SERVICEMEN

In First Year of "Welcome Home Auditions" Nearly Two Thousand Servicemen and Women of All Ranks Have Had Radio Try-outs.

ROYALTY has no option on a plush carpet welcome!

On October 9, 1944, the National Broadcasting Company unrolled its best "welcome mat," laid it on the mezzanine floor of its Radio City offices, and on it placed a desk, a file cabinet and a specially chosen reception committee, the latter in the person of Kathryn Cole.

That was the beginning of NBC's Welcome Home Auditions, the inauguration of a workable plan whereby the entire facilities of a radio network would be available to service men and women interested in radio as a career.

The plan, originated by Clarence L. Menser, NBC Vice President in Charge of Programs, provides that any person who wears, or has worn, a uniform in World War II is welcome to drop in to discuss his employment as a radio actor, musician, announcer or technical expert. Those who qualify are given an audition—either studio or committee—as soon as one can be arranged.

The procedure, organized by Mrs. Cole and carried out with the cooperation of George Maynard of the NBC production staff, has revealed interesting facts. In two months' functioning, 587 applicants were interviewed and 181 were auditioned. At the end of six months 2,102 service men and women came in for interviews with 796 auditioned. In one year's existence these figures have more than doubled: 4,602 interviewed, 1,848 auditioned.

Of those passing their auditions only 290 are dischargees and therefore available; of these, approximately 15 per cent have been employed in radio or allied positions. Of the total auditionees tested in either committee or studio hearing, approximately 22.8 per cent have passed and have been, or will be, recommended for employment when free to accept it.

Many of those seeking a radio career, the auditions revealed, have had no training and 50 per cent of the applicants have never been in a radio studio. Almost one third have had partial training or experience through regular educational channels or in military service. One fifth of those interviewed came in because of curiosity.

Nine Nations Represented

Nine countries — Great Britain, Canada, Australia, Holland, China, France, Argentina and Brazil—besides the forty-eight United States have been represented. Applicants have seen service in at least one of the war theaters, and some have seen action in all of them. Every branch of service, including the merchant marine, and every rank from private to colonel and seaman to lieutenant commander has visited Welcome Home Auditions.

The procedure has been made flexible so that proper routing may be maintained to aid Welcome Homers. Those in the script writing or technical field are routed through the NBC personnel department. Members of the former group submit samples of their work to the script department, the latter to the engineering department. These non-talent classifications alone have accounted for 233 recommendations.

Those in the talent group—actors, singers, instrumentalists, announcers—are recommended to NBC affiliated stations once they have passed their auditions. Competing radio stations and networks have written Mrs. Cole for data on the available applicants.

Jobs Found for Forty-four

Since the beginning of the project, photographs have been taken of each successful auditionee and these pictures are attached to each recommendation sent to a radio station. As of September 25, Mrs. Cole has mailed 63,670 prints. Her recommendations have produced the following results: 15 announcers placed in commercial radio; 8 used as singers; 16 as actors; and 5 in script writing, guest relations or clerical jobs.

Welcome Home Auditions have come to the attention of men and women on foreign fronts through letters from their families or friends, or through the sound movie made by the U. S. Army Signal Corps. In consequence, inquiries by mail have reached the high figure of 3,924. These letters have come from every country on the Asiatic and European continents, as well as from countries in Africa and South America. Newly returned service

MRS. KATHRYN COLE, IN CHARGE OF THE SPECIAL AUDITIONS, GIVES A GENIAL "WELL DONE!" SIGNAL TO AN APPLICANT, WHO MAY BE FROM THE NAVY, THE WAVES, THE ARMY OR ANY OTHER BRANCH OF THE SERVICE.

RICHARD MC DONAGH, SCRIPT DEPARTMENT MANAGER, STUDIES A SHEAF OF REPORTS ON THE DAY'S AUDITIONS.

men and women have made 923 telephone calls to get WHA facts.

The seriousness of the entire project has not obliterated its human interest aspects. Victims of "mike-fright," strapping young sailors, beribboned and cited for bravery in battle zones, have slumped in limp faints at the feet of petite Mrs. Cole. A warrant officer with a dog which had been with him in army camps throughout the country came in for an audition—for the dog. The animal talked and played the piano. A young officer who might have been a double for Herbert Marshall came in one day. Plans were made for an audition, but, at the last minute, it was cancelled because he was recalled to the Pacific theater to broadcast to the Chinese people in their own language.

A former prisoner of war, whose earthly days are numbered because of the brutal treatment he had received, has had his audition, and the hopelessness in his heart has been alleviated by the knowledge that whatever the length of his life, he can do a job equally as well as someone with a greater life-span.

A blind boy has arranged for an interview through his sister, and when his health permits will come into the studio to sit at one of NBC's shiniest grand pianos.

Each passing day necessitates different handling of as many varied situations. The American Red Cross and Army and Navy hospitals have sent veterans to the Welcome Home Auditions as part of their mental therapy.

Mrs. Cole's philosophy has been based on one premise: to restore the faith of auditionees in themselves. She has consistently stressed the need of education and preparation. She has recommended that those who fail in their first attempt keep in touch with her, discuss what they are doing, and, at the end of six months or a year, make a second try.

No applicant is given the so-called "brush-off". All receive equal opportunity before impartial judges and go through their auditions without spectators. Never at any time is a Welcome Homer made to feel that he is a guinea pig for experimentation.

Welcome Home Auditions are just as they're stated—a cordial welcome, gracious hospitality and a friendly handshake to speed service personnel on the way to a successful radio career somewhere in the peaceful world they have fought to build.

MCGRADY RECEIVES MEDAL FROM PRESIDENT

Edward F. McGrady, Vice President in charge of Labor Relations and a Director of the Radio Corporation of America, has received the Medal for Merit, presented to him by President Truman in recognition of his services as consultant and advisor to the Secretary of War on labor problems for the duration of the war. Mr. McGrady was loaned by RCA for the special task at the request of the Secretary of War.

The Medal was accompanied by the following citation signed by President Truman:

"The President of the United States takes pride in presenting the Medal for Merit to Edward Francis McGrady for service as set forth in the following citation:

"For the performance of extreme services to the War Department as expert consultant to the Secretary of War and the Undersecretary of War from 2 January 1941 to 3 September 1945. To Mr. McGrady fell the task of advising the War Department on labor problems of the greatest magnitude, as well as carrying out plans to the end that a smooth over-all labor to the country's war industry would continue unabated. Mr. McGrady was throughout instrumental in strengthening the bond of cooperation between organized labor and the army; in settling and avoiding a large number of labor disputes that impeded, or threatened to impede the production of war materials; in promoting the maximum effort on the part of the labor leaders and the rank and file of American labor in support of the war effort. He performed particularly notable services in such fields as the troublesome but uniformly successful administration of Army-Navy "E" awards; and in securing labor's absolutely unqualified cooperation to the production of the atomic bomb. Through his intelligence, wise counsel, great tact and farsightedness, and through his clear-headed analyses of one of the most difficult situations facing the country, he distinguished himself by exceptionally meritorious conduct in the performance of outstanding services and materially contributed to the victory of the United Nations over their enemies."

EDWARD F. MC GRADY, RCA VICE PRESIDENT IN CHARGE OF LABOR RELATIONS.

ELECTRONS MAKE PATTERNS

New Instrument Extends Scope of Crystal Analysis—Device May Be Changed Instantly to Act as a Diffraction Camera or Electron Microscope.

By Dr. James Hillier
RCA Laboratories, Princeton, N. J.

ALMOST twenty years ago Dr. C. J. Davisson and Dr. L. H. Germer, working in the Bell Telephone Laboratories, were bouncing relatively slow electrons on the surface of a piece of nickel in a vacuum tube. The results were not particularly spectacular. In the course of the experiments, however, they subjected the nickel to a heat treatment, probably to clean the surface, which happened to be just right to cause the normally small crystals in the nickel to rearrange themselves and form very large ones.

Then the bouncing electrons started behaving in a very unusual fashion. Being good scientists, Davisson and Germer found the new phenomenon much more interesting than their intended experiment and followed it up. They then built a tube in which the piece of nickel was a single large crystal and found that electrons bouncing off the surface tended to leave in a special direction.

They deduced correctly that they were observing the effects of electron waves which a Frenchman by the name of de Broglie had predicted should exist. Davisson and Germer's observations proved the correctness of de Broglie's theory and gave terrific stimulus to the newly developing quantum mechanics and to the development of electronic tools of analysis ultimately resulting in the development of the electron microscope and the electron diffraction camera.

A short time later Dr. G. P. Thomson, working in England, greatly simplified the Davisson-Germer experiment by using much faster electrons and by shooting them through thin metallic films in which the crystals were very small. He found that if he shot a narrow beam of electrons through the foil and put a photographic plate some distance on the other side that, in addition to the exposed spot due to the original beam, he obtained the series of concentric rings which we now call an electron diffraction pattern.

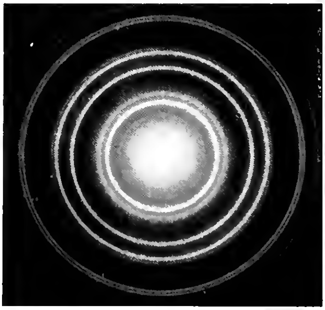
Thomson's experiments originated in a very clear-cut way the science of electron diffraction. Since it was already well known from similar work with X-rays that very few crystalline materials give the same diffraction pattern, it was obvious to Thomson and his contemporaries that the electron diffraction camera was an excellent method for analysis.

There are a number of everyday phenomena, which most of us have noticed, which make it quite easy for even the non-scientist to understand the formation of a diffraction pattern. Let us look at the factors involved. First there is a beam of electrons (or light or X-rays) which possesses a wavelength. That is just another way of saying that there is a regular vibration of some kind associated with the beam. Then there is the crystal in which the atoms are all lined up in regular rows and layers. If we have two beams in which the frequency of vibrations are the same or very nearly the same we have the possibility of interference between them.

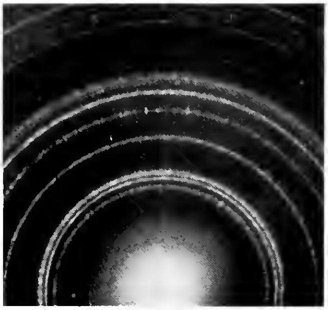
When Signals Fade

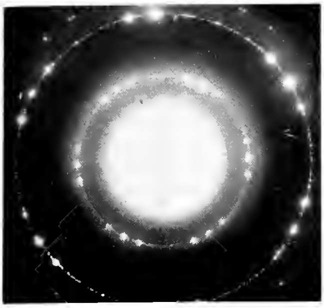
We have all heard a radio signal fade when the sky wave interferes with the ground wave. Then the two signals coming from the same station but by different paths are vibrating at the same rate but in opposite directions and cancel each other so the receiver detects no signal. (The engineer says they are out of phase) In the diffraction camera the phenomenon is almost the same. We have our signal (the beam) coming from a single station (the source of the beam) and striking the crystalline specimen before we detect it. At the crystal we find that the parts of the beam that strike the atoms of the first layer are reflected but the rest goes through to the second layer and the same thing happens and so on through the crystal. As far as our detector (the photographic plate) is concerned it is receiving a signal from one station but by a large number of paths. As you might expect, the signal is so confused that it almost invariably cancels itself

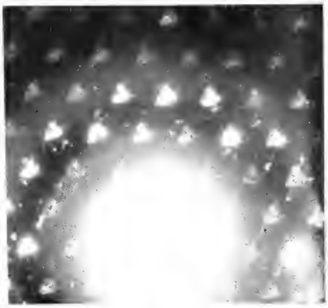
ELECTRON DIFFRACTION PATTERN OBTAINED FROM A THIN GOLD FILM.



PATTERN OF ZINC OXIDE SMOKE PARTICLES SHOWS RING CONSTRUCTION.







LEFT: CRYSTALS OF GRAPHITE AS THEY APPEAR UNDER THE DIFFRACTION CAMERA. THE SYMMETRY OF THE BEADS IS A RESULT OF THE HEXAGONAL STRUCTURE OF GRAPHITE. CENTER: COMBINATION ELECTRON MICROSCOPE AND ELECTRON DIFFRACTION PATTERN OF A SINGLE FLAKE OF GRAPHITE. THE CENTER IS A TRUE ELECTRON MICROGRAPH AT ABOUT 5,000 MAGNIFICATION. RIGHT: DIFFRACTION PATTERN OF BAUXITE CRYSTALS.

out and the detector receives nothing. However, if conditions are just right so that all the reflected signals are vibrating together when they leave the crystal then the detector receives a very strong signal. In the diffraction camera this means that no reflection is obtained from the crystal unless it is situated at just the right angle to the beam. Such a reflection leaves a spot on the photographic plate.

So far our explanation accounts for only one spot on the pattern yet the pattern shown here is a series of rings. The specimen was not a single crystal, however, but literally millions of very small ones arranged completely at random. If we examined one of the rings closely we should find that it is really made up of a large number of spots; each one due to a different crystal. Each of those crystals happened to be at just the right angle relative to the beam to reflect part of it by a definite amount. However, they do not necessarily do so in the same *direction*. In fact, since in every other regard the arrangement of the crystals is random, the result is the circle we observe.

Accounting for Rings

Accounting for the different rings in the pattern requires a little further understanding of the nature of a crystal. We have said that the crystal is made up of row upon row, and plane upon plane, of atoms regularly spaced in all directions. That means there are many different ways of picking the rows and planes which describe the crystal. It is like looking over a field of regularly planted corn. The corn was planted in regular rows both along and across the field so that the farmer could use a machine cultivator in both directions and thus cultivate all around each hill without doing hand work.

Crystals Have Many Planes

As we look over the field, however, we see that the corn is also arranged in rows other than those the farmer originally laid out but which came about as a result of the original regular arrangement. The same effect occurs in a crystal. There are many ways of finding regularly spaced planes in the crystal each of which can produce a reflection if the crystal is situated properly. In the corn field we would notice that the distance between extra rows is different than the distance between the intended ones. In the crystal this is also true and means that the angle of reflection from each one of these extra sets of possible planes is different.

The crystallographer with a good knowledge of geometry can work out what the diameter of each ring in the pattern, due to some special crystal, ought to be. Thus, the actual diffraction pattern he obtains quickly substantiates or reputes his guesses as to the nature of the specimen.

Diffraction as a method of analysis had been well worked out, using X-rays long before Thomson's experiments. When he obtained his results it was obvious that electrons could be used as an alternate means of accomplishing the same result. Quite a lot of work was done using early cameras. Unfortunately, the X-ray technique was better known and better developed so that little was done about designing good electron diffraction cameras in spite of a number of inherent advantages which they have for precise work in a general laboratory. Electrons can be focused, X-rays cannot; an electron diffraction pattern can be made in a matter of seconds while it takes hours in the X-ray camera.

Microscope Becomes a Camera

With these and a number of other points in mind the RCA Laboratories developed an adapter for enabling an electron microscope to be used as an electron diffraction camera whenever further analysis of the microscope specimen seemed to be desirable. This was the first application of precision electron optics to the problem of electron diffraction and the results were so encouraging that even further development was initiated. The result has been the construction of an experimental model of a new type of electron diffraction camera.

The new instrument has several new features which the designers feel will make it an important scientific tool in the not too distant future. For instance, the diffraction patterns which it gives are ten to

DR. JAMES S. HILLIER AND A LABORATORY ASSISTANT AT THE CONTROLS OF THE RCA DIFFRACTION CAMERA.

one hundred times sharper than was previously possible; the instrument can be changed instantly from an electron diffraction camera to an electron microscope, or vice versa, without touching the specimen. But most important of all is its ability to produce the diffraction pattern of a small microscopic crystal at the same time that the crystal is being observed in the electron microscope.

Action of the Electron Beam

This new instrument is much like an RCA electron microscope and even incorporates many of the same parts. However, there are also a number of differences. In the first place, the vacuum tube part of the instrument, or the actual instrument, is turned upside down. The electron beam starts from under the table and travels upwards. As usual a heated tungsten wire supplies the electrons and a steady voltage of 50,000 volts speeds them up until they are traveling in a nice beam up the instrument at about 90,000 miles a second.

Then the beam passes through two electron lenses just like the lenses used to magnify objects in the electron microscope but working backwards. Instead of magnifying several thousand times they reduce things by the same amount. Still another difference — the lenses do not reduce an image of the specimen but of the electron source. This gives us what we wanted in the first place, an artificial source of electrons which we can make extremely small—less than a millionth of an inch across.

Because we have formed this artificial source by means of lenses which we can control we find we can do all sorts of things with it to make it work for us. For instance if we move this artificial source up to the top of the camera so that it strikes the photographic plate, and also place the specimen down near the lens, we have the ideal condition for a very sharp diffraction pattern.

Going back to our radio station analogy, we see that the original source is the broadcasting station, but we have focused the signal so that only one receiver on the plate can receive the signal when there is no specimen. This is something you cannot normally do with ordinary broadcast wavelengths but which you can do with very short wavelengths. When we put in the specimen then the crystal planes reflect the signal but only in the very special directions we have discussed above. Since the focusing still affects the reflected signals only the receivers in exactly the right places on the plate receive any signal. Thus we say we have a focused diffraction pattern.

This is not all we can do with our artificial source. By changing the strength of one of our lenses we can move it down near the specimen. Then it behaves quite differently. We have all observed the sharp and large shadows we get on the wall if we put an object near a candle flame, as compared, for instance, with the shadow from a frosted electric light bulb. The same thing happens when we put our artificial source of electrons very close to our specimen. We get on our photographic plate or fluorescent screen an extremely sharp and highly magnified electron shadow of the object. In fact, the shadow is so sharp that it compares favorably with a regular electron microscope image.

But that is not all that our particular electronic slave will do for us. Except for extra precision and convenience everything so far has been more or less conventional. By setting our artificial source somewhere between the specimen and the plate we find that we can pick out a single microscopic crystal on our specimen and obtain a diffraction pattern from that crystal only, at the same time we are observing it. This, in all likelihood, will turn out to be the most important part of this work.

Only Minute Samples Needed

Probably the most important way of determining the arrangement of atoms in a molecule is by the interpretation of the X-ray diffraction pattern obtained from a large single crystal of the material. Implicit in the method, however, is the necessity of having sufficient material for the crystal and the method of forming it. Very often in the analysis of a new material, only microscopic quantities are available and there are no known methods of obtaining a single crystal. In the new diffraction camera, operated in the last manner described, both of these difficulties are eliminated. The amounts of material necessary are too small to be comprehended—a millionth of a millionth of an ounce —and the problem more often is to obtain that minute amount of material in crystals that are sufficiently small.

Thus, our story must be concluded as we arrive at this point. The next step, which is already under way, is to apply the new instrument to some actual problems and to see what happens. As the English say: the proof of the pudding is in the eating.

NEW TELEVISION ANTENNA

Thin Spire Crowning WNBT's Radiators atop the Empire State Building Will Be Used for Tests of 288-Megacycle Transmitter.

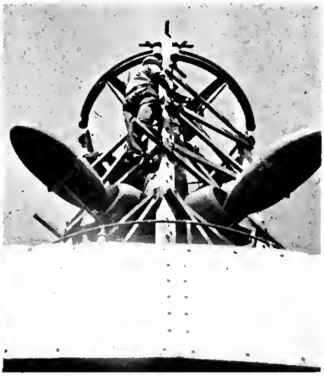
PEDESTRIAN New Yorkers gazing skyward in mid-summer saw a rising scaffolding gradually enclosing the spire-like television antenna of Station WNBT atop the Empire State Building tower. When the framework was removed a few weeks later, a new antenna came into view riding the old one in pick-a-back fashion. The newcomer, looking from the street more like a thin lightning rod than a complicated assembly of rods and spheres, was then revealed as a new antenna erected for the purpose of field tests centering around the 288-megacycle, 5-kilowatt television transmitter recently developed in RCA Laboratories.

The two antennas were arranged in this manner for a definite engineering reason. In order to make direct comparison between transmissions on 288 mc. and the present #1 channel (50-56 mc.), it was desirable that both radiating systems be at approximately the same height. By mounting one directly above the other, this condition was fully met.

The antenna for the 288-mc. channel is of the Turnstile type, thus insuring the broad frequency response necessary for successful television transmission. To further aid in obtaining the desired frequency response, the radiators themselves were constructed of copper tubing two inches in diameter. In addition, metallic spheres, six inches in diameter, were mounted on the radiators in such a fashion that the radiator element itself passed through the sphere.

The antenna structure, which was completely fabricated before erection, is made completely of metal with the radiators grounded to afford lightning protection. A lightning rod is also mounted on top of the support post. The transmission lines feeding each of the radiator elements are inside the mast. Heating elements are mounted in the radiators so that formation of ice may be prevented. Two sets or layers of radiating elements are used in order to concentrate the radiating energy toward the horizon. Many more layers are desirable but the mounting of a taller structure on the existing framework would present many difficult construction problems.

RODS AND CONES, FORMING THE 288 MEGACYCLE ANTENNA, CAN BE SEEN THROUGH THE SCAFFOLDING ON WHICH RIGGERS WORKED WHILE PUTTING THE NEW STRUCTURE IN PLACE.



ELEMENTS OF THE NEW ANTENNA ARE VISIBLE ATOP THE CIRCULAR PORTION OF WNBT'S TELEVISION ANTENNA.

A specially-constructed transmission line of the coaxial type with insulators spaced carefully to insure a "smooth" line was installed. The total length of this line is 350 feet with 250 feet of the line hanging vertically. An air compressor and a drying chamber, to absorb moisture from the air, feed dry air to this transmission line, thus, keeping the line under pressure and preventing the entrance of moisture. This special line, which has an outer conductor consisting of a stiff copper tubing approximately one and one-half inches in diameter, leads from the transmitter room on the 85th floor of the Empire State Building to a spot a few feet below the roof of the building. From this point to the antenna a semi-flexible transmission line was used since it would have been very difficult to pass the stiffer copper-tubing line through the maze of structural members in the interior of the low-frequency antenna support tower.

HISTORY OF RCA TRADE-MARK

Symbol Was Introduced 23 Years Ago With Pledge That It Would Stand for "The Highest Expression of The Advancing Art Of Radio"

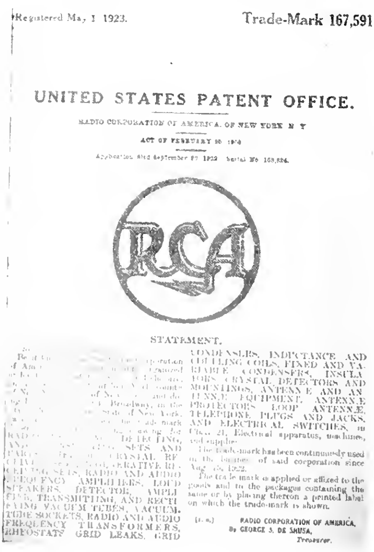
By Abraham S. Greenberg
Ass't Patent Attorney,
Radio Corporation of America

TWENTY-THREE years ago, in the earliest days of broadcasting, Radio Corporation of America pledged that the symbol "RCA" should stand thenceforth for "the highest expression of the advancing art of radio." In the years that have followed this statement, the symbol has been altered slightly in its abstract form, but its meaning and the pledge that accompanied its birth have grown in importance with the passage of time.

It would have been difficult in 1922 to foresee how much the Company would spend on Research and Advertising in the following two decades. It would have required an even keener vision to prophecy the growth of the Company from its humble birth to the outstanding position it occupies today, reaching, as it does, into almost every human activity, while reflecting the skill and determination of its personnel in producing products that touch the daily lives of millions of people.

The impact and meaning of the RCA symbol have kept pace with the Company's development. In the minds of those who see it in advertisements, on products and on counter displays all over the nation, it strikes a favorable response. Because of this wide public acceptance, there has grown up around the three letters an accumulated warmth and affection which we call "good will." It would be futile to attempt to calculate the intrinsic value of the trade-mark. By some justifiable standards of evaluation such a figure might easily scale into the millions of dollars.

As the RCA organization evolved, it absorbed other well-known companies. This expansion was accompanied by the acquisition of other famous trade-marks such as "Victor," "Victrola," "Red Seal," and Nipper, (dog listening to a phonograph), to name only a few. The accumulated goodwill presently enjoyed by the RCA organization is the commercial "reaction product" of these several trade-marks. Although inanimate, they are certainly as much a part of the selling and distributing agencies as are the salesmen themselves.


Registered May 1, 1923. Trade-Mark 167,591

UNITED STATES PATENT OFFICE.

STATEMENT.

...CONDENSERS, INDUCTANCE AND COUPLING COILS, FIXED AND VARIABLE CONDENSERS, INSULATORS, CRYSTAL DETECTORS AND MOUNTINGS, ANTENNÆ AND ANTENNÆ EQUIPMENT, ANTENNÆ PROTECTORS, LOOP ANTENNÆ, TELEPHONE PLUGS AND JACKS, AND ELECTRICAL SWITCHES, in Class 21, Electrical apparatus, machines, and supplies.

The trade-mark has been continuously used in the business of said corporation since Aug. 25, 1922.

The trade-mark is applied or affixed to the goods and to the packages containing the same or by placing thereon a printed label on which the trade-mark is shown.

RADIO CORPORATION OF AMERICA,
By GEORGE S. DE SHUSA,
Treasurer.

OFFICIAL "BIRTH CERTIFICATE" OF A FAMOUS TRADEMARK. THE SYMBOL HAS SINCE BEEN REGISTERED IN MANY FOREIGN COUNTRIES.

It is little wonder then, that our most famous trade-mark, "RCA", is zealously protected. Naturally, with a property so valuable it is to be expected that unscrupulous traders cast envious glances at the symbol.

The RCA trade-mark in its monogram style was registered in the U.S. Patent Office, May 1, 1923. Other registrations were granted for its use on different goods. In addition, numerous registrations of the mark exist in most foreign countries.

Old files reveal that the three letters (R.C.A.), separated by periods, were used in the earliest years of the company. The Annual Report for 1921 carried an example of this form. A short time later, the punctuation was omitted, and the resulting condensed form remained unaltered until the lightning flash, symbolizing electricity, was added to the base of the letter "A." This change is believed to have been suggested by Mr. E. J. Nally, first president of the corporation.

Two Letters in Early Symbol

Unknown, however, to most people, there was a time when the accepted monogram was a two-letter affair with the "R" and "C" superposed in a circle. Mr. R. C. Edwards, then a Company architect, is credited in the records with the design of that combination. It appeared in the company's first home radio catalog in September 1921. The next evolutionary step was taken in 1922 when the late William A. Winterbottom, for many years president of RCA Communications, Inc., wrote to David Sarnoff, at that time General Manager of the Radio Corporation of America, suggesting the addition of the third letter "A."

Obvious as this change seems today, it caused considerable discussion when proposed, objectors contending that the public could memorize two letters easier than three. However, the General Manager sided with the sponsor of the idea and the present monogram became the established mark.

The first use of the symbol, complete with three letters and the lightning flash, was in an advertisement of the Aeriola Grand—("with stand, $350."). What is even more interesting at this time is the fact


RADIO BROADCAST ADVERTISER

When Marconi heard the AERIOLA GRAND

"IT comes closest to the dream I had when I first caught the vision of radio's vast possibilities. It brings the world of music, news and education into the home, fresh from the human voice It solves the problem of loneliness and isolation.

"The Aeriola Grand is at present the supreme achievement in designing and constructing receiving sets for the home—a product of the research systematically conducted by scientists in the laboratories that constitute part of the R C A organization."

G. Marconi

© UNDERWOOD & UNDERWOOD

Look for this trademark at your dealer's

The Importance of the Symbol R C A

Crude Radio apparatus of a kind can be made even by embryonic organizations. But the vitally important inventions that have made radio the possession of every man, woman and child are those protected by patents owned by the Radio Corporation of America and developed as the result of costly research conducted in the engineering laboratories of the Radio Corporation of America.

The name-plate of a Radio Set is all-important in the purchase of radio apparatus. If it bears the letters "R C A" the public and the dealer are assured that at the time of its introduction it is the highest expression of the advancing art of radio

In tone quality, in simplicity of manipulation the Aeriola Grand is unrivalled. A child can snap the switch and move the single lever that tunes the Aeriola Grand and floods a room with song and speech from the broadcasting station.

Radio Corporation of America

Sept 1922

THIS SYMBOL OF QUALITY IS YOUR PROTECTION

LEFT: THE RCA SYMBOL IS LAUNCHED NATIONWIDE WITH A TRIBUTE BY MARCONI. ABOVE: SUCCESSIVE STEPS IN THE DEVELOPMENT OF THE COMPANY TRADEMARK.

that the launching of both the mark and the product carried the expressed blessings of Senatore Guglielmo Marconi, "father of Radio."

From that time on, much effort, expense and ingenuity were expended toward a single goal, viz., to impress upon the public memory that the alphabetical triad, RCA, referred to the Radio Corporation of America and to that firm alone. One of the unusual methods adopted to promote the trade-mark was a traveling road show which was booked to all parts of the country to spread the message of RCA.

Approved by General Sarnoff and directed by George Clark, RCA historian, the show started out on a run that outdid even the fabulous "Abie's Irish Rose." For eight years, Clark and his troupe and exhibits ranged the land, eventually covering all but eight states.

The show played to a total audience of over twenty-four millions and the total cost of the project, including cost of exhibits, transportation, labor and salaries, was over three quarters of a million dollars. The show was given in 146 different cities and towns, sometimes returning to the same cities in successive years. Almost 500 showings were made during the existence of the traveling display.

Since purpose number one of the show was to link the company's name with its initials, Director Clark or one of his assistants concluded each lecture in each city with the statement: "When you see the letters RCA, or the RCA monogram, that means Radio Corporation of America."

Magazine Pays Tribute

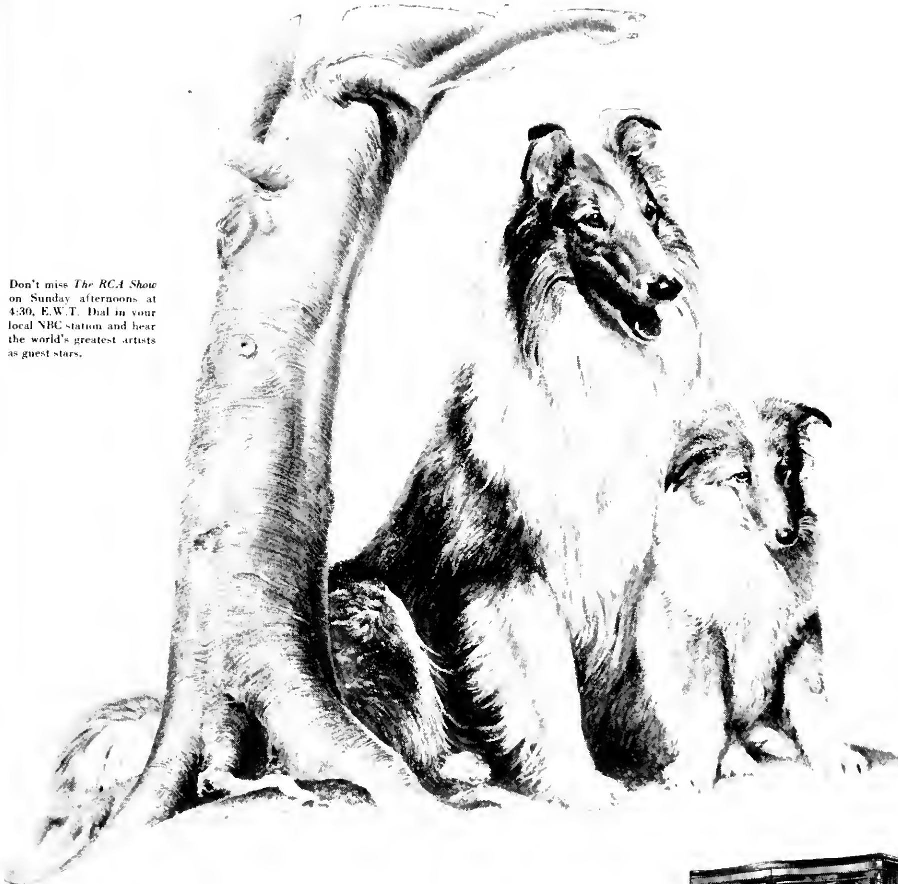
Persistent hammering of the symbol through these years accomplished one of the fastest "trademark selling jobs" in the history of merchandising. Two years after the adoption of the trade-mark, the Radio Corporation of America and its trade-mark "RCA", had become so well known that *Collier's Weekly*, in an editorial on October 18, 1924, credited "much of the sound and at the same time marvelous radio progress made in this country . . . to the splendid and untiring efforts of the Radio Corporation of America."

If clinching proof of the effect of this constant attention given to the importance of the company trademark is needed, it was supplied on January 24, 1944, when the Court of Customs and Patent Appeals, Washington, D. C., in handing down a decision in the case of Radio Corporation of America v. Rayon Corporation of America, ruled as follows:

"It is our opinion that the testimony abundantly establishes that the combination of the letters 'RCA' is generally understood by the public as meaning Radio Corporation of America."

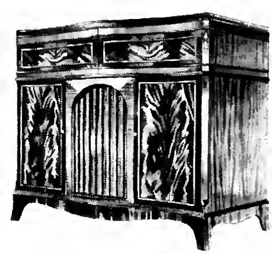
NBC ADDS WING TO HOLLYWOOD STUDIOS

Ground will be broken soon for a new wing to NBC's West Coast Radio City at Sunset Boulevard and Vine Street, Hollywood. In announcing the expansion, Niles Trammell, NBC President, said that the addition would not only provide space for two audience studios, but would make available much-needed room for the West Coast offices of NBC Radio Recording division.



Don't miss *The RCA Show* on Sunday afternoons at 4:30, E.W.T. Dial in your local NBC station and hear the world's greatest artists as guest stars.

There's something in heredity . . .



CUTE PUPPIES are "a dime a dozen." They may be born of any kind of dog parents . . . But *champion* Collies can be produced only by the most careful selection from pedigreed Collie stock. Heredity counts!

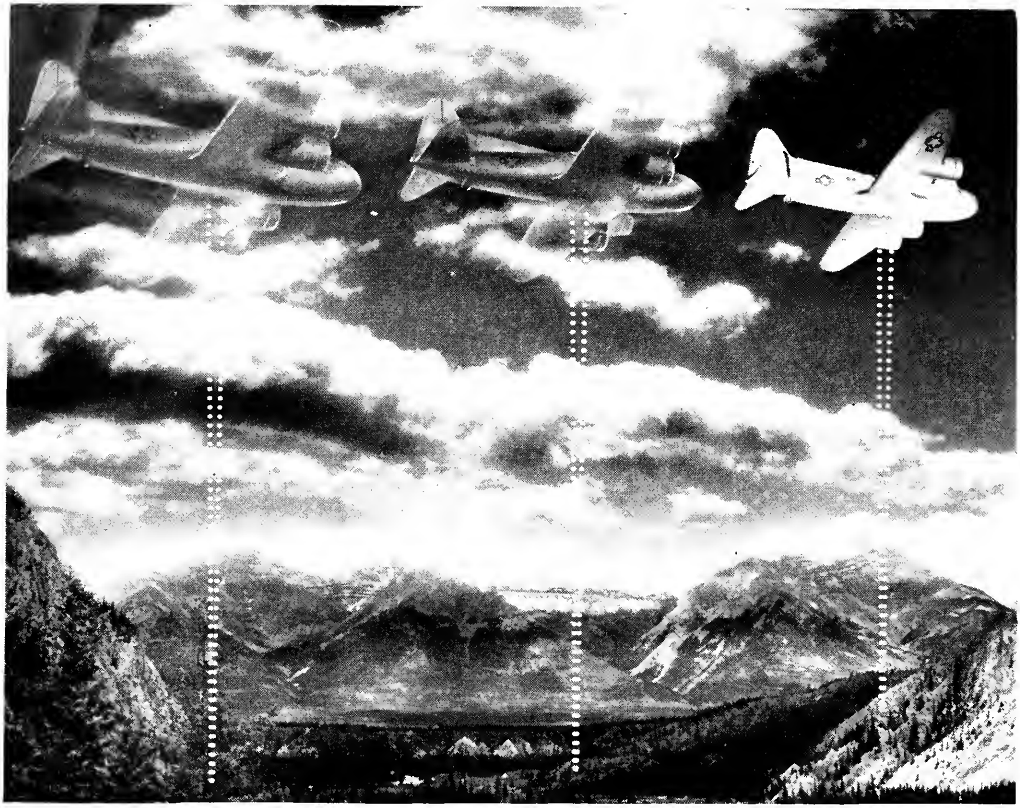
Your first postwar radio set—whatever its name—will also be the result of the background and experience of its makers. And in *engineering* where will you find a background of achievement equal to that of the Radio Corporation of America? . . . In the whole field of recorded *music* where will you find experience comparable to that of Victor?

As soon as radio sets are available, make your selection carefully . . . And at whatever price you decide to pay, you'll find added enjoyment and added pride in owning a set which bears the combined name of the acknowledged leaders in two fields—RCA Victor.

THE NEW RCA VICTOR SETS will include many great improvements—the result of extensive experience gained in building 350 different types of war equipment, *none of it ever manufactured by anyone before* . . . FM and television, of course. Radios and the famous Victrola (made only by RCA Victor) will range from excellent low-priced table models to fine automatic consoles. See your RCA Victor dealer before you buy.

RCA VICTOR

RADIO CORPORATION OF AMERICA



The RCA Radio Altimeter assures that the last mountains have been passed before letting down to the airport in the valley below.

A radio altimeter—that indicates the exact height above land or sea—is another RCA contribution to aviation.

Old-style altimeters gave only the approximate height above sea level—did not warn of unexpected "off-course" mountains.

To perfect a better altimeter was one of science's most baffling problems. So RCA developed an instrument so accurate it "measures every bump on the landscape" from the highest possible altitudes... so sensitive it can measure the height of a house at 500 feet!

This altimeter—actually a form of radar—directs radio waves from the airplane to earth and back again . . . tells the pilot exactly how far he is from the ground... warns of dangerously close clearance . . ."sees" through heaviest fog or snow.

All the radio altimeters used in Army, Navy and British aircraft were designed and first produced by RCA. This same pioneering research goes into *every* RCA product. So when you buy an RCA Victor radio, Victrola, television receiver, even a radio tube replacement, you enjoy a unique pride of ownership. For you know it is one of the finest instruments of its kind that science has yet achieved.

Radio Corporation of America, Radio City, New York 20. *Listen to The RCA Show, Sunday, 4:30 P. M., E. T., over NBC.*

The RCA radio altimeter will be a major contribution to the safety of post-war commercial flying. The section at the left sends the radio waves to earth and back again while the "box" at the right—timing these waves to the millionth of a second—tells the navigator the plane's exact height in feet.

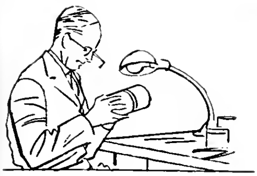
RADIO CORPORATION of AMERICA

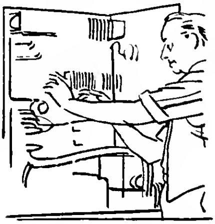
RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

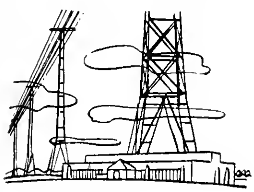
v 5 - no 2

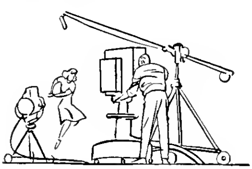
ANUARY

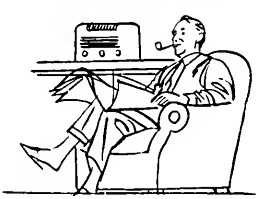

Restoration of
RADIO-TELEGRAPH
COMMUNICATION
with the Liberated Countries of the World
No.8... AUSTRIA
VIENNA
UNTIL FURTHER NOTICE SERVICE IS LIMITED
TO GOVERNMENT, MILITARY AND PRESS MESSAGES
NO 1 ITALY
NO 2 FRANCE
NO 3 BELGIUM
NO 4 HOLLAND
NO 5 NORWAY
NO 6 PHILIPPINES
NO 7 CZECHOSLOVAKIA
NO 8 AUSTRIA
Inauguration of
DIRECT
RADIO-TELEGRAPH
COMMUNICATION
with a liberated country of the world
SOFIA
BULGARIA
No. 9 BULGARIA
NO 1 ITALY
NO 2 FRANCE
NO 3 BELGIUM
NO 4 HOLLAND
NO 5 NORWAY
NO 6 PHILIPPINES
NO 7 CZECHOSLOVAKIA
NO 8 AUSTRIA
NO 9 BULGARIA
Restoration of
DIRECT
RADIO-TELEGRAPH
COMMUNICATION
with the Liberated Countries of the World
No.7... CZECHOSLOVAKIA
No 1 ITALY
No 2 FRANCE
No 3 BELGIUM
No 4 HOLLAND
No 5 NORWAY
No 6 PHILIPPINES
No 7 CZECHOSLOVAKIA
Restoration of
RADIO-TELEGRAPH COMMUNICATION
with the Liberated Countries
of the World
No. 10
(VIA MANILA)
SIAM
BANGKOK
NO 1 ITALY
NO 2 FRANCE
NO 3 BELGIUM
NO 4 HOLLAND
NO 5 NORWAY
NO 6 PHILIPPINES
NO 7 CZECHOSLOVAKIA
NO 8 AUSTRIA*
NO 9 BULGARIA
NO 10 SIAM
RCA
RCA COMMUNICATIONS, INC.
A SERVICE OF RADIO CORPORATION OF AMERICA











RADIO AGE

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

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CONTENTS

COVER — Studio scene at RCA Laboratories, Princeton, N. J., during press demonstration of latest developments in television.

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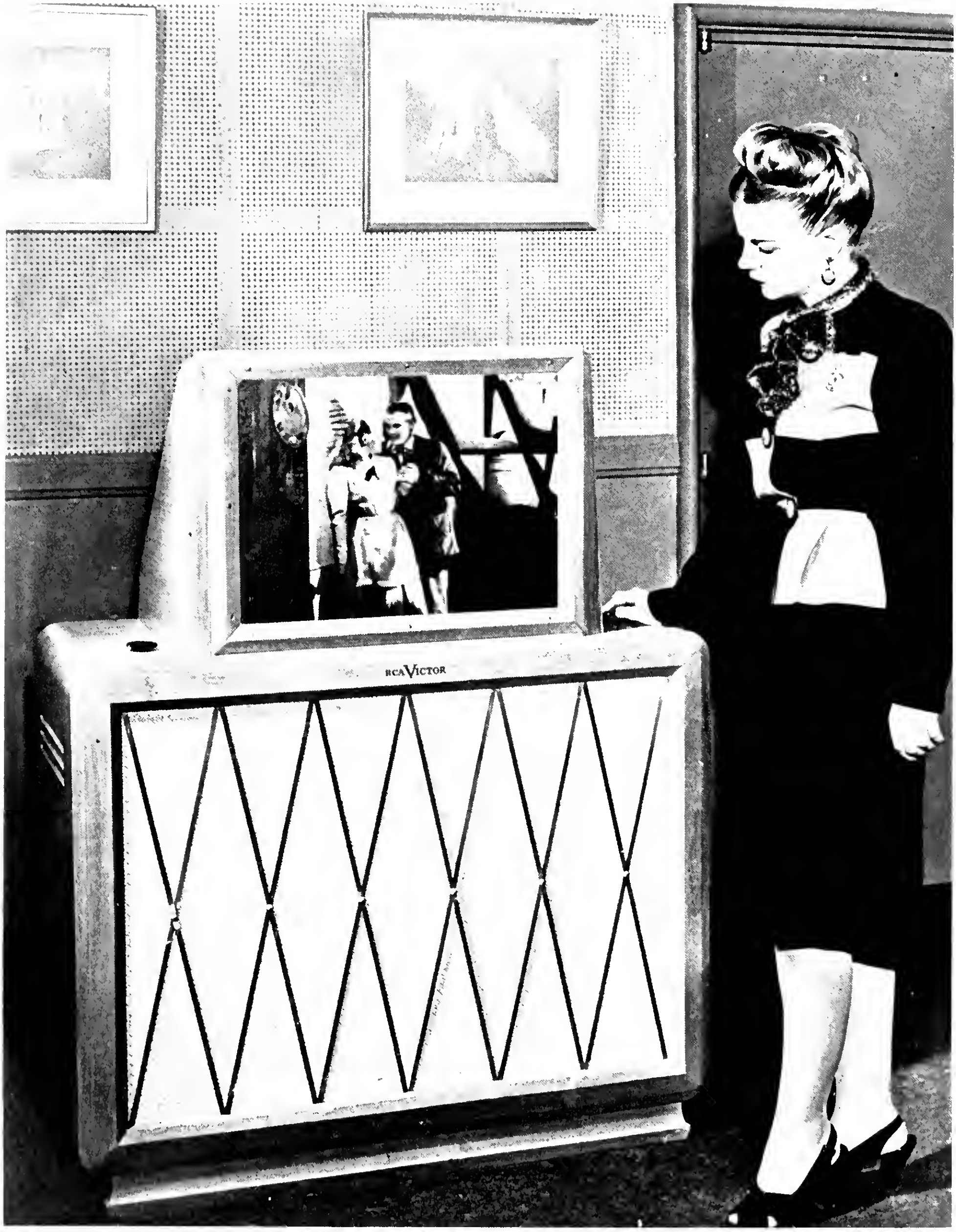


LARGE, BRILLIANTLY LIGHTED PICTURES WITH DETAIL AND CONTRAST COMPARABLE TO THE BEST HOME MOVIES ARE PROJECTED ONTO THE 18 x 24-INCH SCREEN OF RCA TELEVISION CONSOLE.

RCA Demonstrates Latest Developments in Black-and-White Television

GENERAL SARNOFF OUTLINES POLICIES AND PLANS AT MEETING OF FRESS AT PRINCETCN, N. J.

THE latest developments in television, including vastly improved black-and-white pictures and color pictures in three dimensions, were demonstrated to the press on December 13 at RCA Laboratories, Princeton, N. J. The black-and-white pictures were transmitted by radio from WNBT, the National Broadcasting Company station atop the Empire State Building in New York, a distance of 47 miles. The color pictures were transmitted by radio from RCA Laboratories to the Princeton Inn, two and a half miles away.

The black-and-white pictures, produced by the RCA all-electronic system, featured greater detail, brilliancy and contrast than ever before achieved in television — all of which have been made possible by receivers containing new and greatly improved Kinescopes, or picture tubes. These television pictures were bright enough to be seen in a fully lighted room.

Indoor studio scenes of live talent in action were picked up directly by the RCA color television camera, and transmitted through the air. The action was reproduced with all the hues and tints that would be viewed by the human eye. The television camera and receiver employed mechanically driven color filters.

Stereoscopic pictures in color, with depth of background, clearly portrayed young women wearing bright-hued dresses and scarves. The perspective of the pictures was emphasized when the models held out flowers as if offering them to the audience. Cigarette smoke drifted toward the audience as if to waft out of the picture. A cane, pointed toward the audience, protruded with amazing realism. Special polarized filters in the camera and receiver, and polaroid glasses worn by the spectators produced the three-dimensional effect.

Although the pictures reproduced by the mechanical color system show promise, RCA engineers pointed out that color television is still distinctly in the laboratory stage of development, with obvious shortcomings. Much technical development, they said, needs to be completed before a practical color television system will be ready for home service to the public. They estimated that this will require about five years.

On the other hand, the demonstration of the RCA black-and-white all-electronic television system clearly showed its readiness for the home. It presents sharp pictures on a screen as large as a newspaper page, with brilliancy, definition and contrast equal to motion pictures.

A Post-war Progress Report

Brig. General David Sarnoff, President of Radio Corporation of America, describing the demonstration as "the first of a series of progress reports on the advance of television," said that the accomplishments as revealed by the demonstration were the result of years of research and the expenditure of millions of dollars in pioneering and development.

"Our research men and engineers have built a practical all-electronic television system for the transmission and reception of excellent pictures in black-and-white," said General Sarnoff. "There is every reason why television should go ahead as a service to the public. Frequency allocations, rules and regulations for commercial television service have been approved by the Federal Communications Commission. Any further technical advances—and they will be continuous—will bring new benefits in television to the public. If we wait for all the new developments of the future, the American people will always be waiting for the enjoyment of television and will be denied its thrills in the present."

Stating the television policies of Radio Corporation of America and its subsidiaries, General Sarnoff said:

1. The RCA organization will continue research and devel-

ENTERTAINERS FACE THE CAMERA DURING THE RECENT TELEVISION DEMONSTRATION AT THE RCA LABORATORIES, PRINCETON, N. J.

GENERAL SARNOFF OUTLINES RCA TELEVISION PLANS AND POLICIES TO 100 NEWSPAPERMEN AND SCIENCE WRITERS AT PRINCETON DEMONSTRATION.

opment in all phases of television. Technically, this includes black-and-white, color, three dimensional views, transmission, reception and network distribution. Artistically and educationally, this means development of program technique through use of motion pictures, live talent, outdoor scenes, news events, sporting events and other features of local and national interest.

2. The RCA Victor Division—a pioneer in television engineering and design — will manufacture the finest possible television equipment for sale to broadcasters and the public.
3. The National Broadcasting Company — a pioneer in television broadcasting—will continue development of television broadcasting and program service to American homes and schools, and will develop plans for the establishment of a nationwide network of independent television stations.
4. The Radio Corporation of America will continue to make available to its licensees all of its inventions in this new field of television as it has done in broadcasting and other fields of electronics.

Television Introduces Problems

"Television as an art and a new service naturally introduces new economic and artistic problems," said General Sarnoff. "While they are by no means easy to solve, many of them are similar to those which confronted the pioneer broadcasters. American ingenuity solved the problems of sound broadcasting and can solve the problems of television.

"We are confident that this progress report is the forerunner of further achievements. We shall continue pioneering in all phases of television. We shall move television forward from a local to a regional basis, thence to a national service and eventually, we hope to see it function on an international scale."

Obsolescence Means Progress

Warning that obsolescence in television is a necessary part of its progress, General Sarnoff pointed out:

"In a science, art and industry so vast in scope and possessing possibilities for unlimited growth as television, obsolescence is a factor which the public and the broadcaster must always face as a guarantee of progress.

"There will be obsolescence in television systems, transmitters and receivers. The purchaser of a receiving set, or the licensee of a transmitter, buys his receiver or installs his transmitter with the knowledge that he is pioneering in the development of a new service. Obsolescence will and must take place. When and how soon obsolescence occurs will depend upon the ingenuity and creativeness of the scientists and engineers within and outside of the radio industry.

"Similarly, the network operator makes an investment in the new art as part of his obligation to the public. He must not hesitate to pioneer and improve his network's service if this country is to lead in television and the American people are to reap its benefits in entertainment and education, as soon as they are available. The time has come in television when the networks must assume the responsibility to introduce and to advance the new art of sight-sound broadcasting and to make their television programs available by whatever means may be found technically and economically feasible to the independent stations associated with their networks.

"We do not fear obsolescence; we welcome it," said General Sarnoff. "That is why American industry continues to research and to make progress. Every new development in radio, whether it be a gadget or a system, involves some obsolescence of former methods. A television receiver or a transmitter is no exception. Every new art or business based upon the technical sciences must deal continuously with the factor of obsolescence.

"Assuming that a television receiver bought for $250 becomes obsolete in five years, the price the owner pays for obsolescence is less than 2 cents an operating hour, if he has program service from 2 or more stations; for a $150 receiver, less than 1 cent an operating hour. In New York, for example, there will be seven channels from which to choose programs.

"Research and development in television must not be looked upon as a process of obsolescence. Rather it should be regarded as an evidence of progress through which a new service of sight and sound with constantly improved instruments and programs are made available to the American people."

RCA Victor Plans

Frank M. Folsom, Executive Vice President in Charge of the RCA Victor Division, announced that orders are now being accepted for new television transmitters which will be available in the autumn, 1946. RCA will manufacture television transmitters for large and small broadcasters.

"Aside from the program itself the most important element in the television system insofar as the public is concerned is, of course, the receiving set," Mr. Folsom said. "Improvements in receivers are comparable to those made in transmitters and cameras. Pre-war reproduction of television pictures in the home was limited to the face of the Kinescope tube; the size of the picture depended upon the size of the tube. To overcome this limitation, RCA developed and demonstrated prior to the war a new projection-type receiver for the home that reproduced a black-and-white picture 15 x 20 inches. Today, the brilliancy of these large-size pictures is such that they can be viewed under ordinary room lighting conditions."

Home Receivers Ready in 1946

Home television receivers, Mr. Folsom stated, will begin to come off the RCA Victor production line in the late spring or early summer of 1946, according to present plans. These instruments, he said, will be table models of the direct viewing type, that is, the observer will see the pictures directly as they appear on the face of the Kinescope, or picture tube. These sets retailing from less than $200 to $300, will have screens ranging in size from 4½ x 6 inches to 6 x 8 inches, and they will feature black - and - white pictures of improved contrast and brilliancy. Larger models in this line will also provide standard broadcast reception.

"Sometime later," said Mr. Folsom, "television receivers featuring pictures projected by lenses and mirrors on at least 15 x 20-inch screens will be available for about $500. These deluxe consoles will provide standard and FM broadcast programs as well as worldwide shortwave reception. The instruments will be all-electronic in operation with no moving parts. They will be as simple to operate as present-day sound broadcast receivers."

Trammell States NBC Plans

Niles Trammell, President of the National Broadcasting Company, announced the plans of NBC in regard to television as follows:

1. NBC will install early in 1946 a new and improved transmitter at its pioneer television station WNBT, atop the Empire State Tower in New York City. . . . NBC also will build a station in Washington, D. C., in 1946, followed by stations in Los Angeles, Cleveland and Chicago; subject to the FCC granting licenses for which applications have been filed.

2. NBC will operate a network between New York and Washington in 1946 . . . and a New York-Boston network in 1947. As soon as practicable other regional networks will be established, using Chicago, Cleveland and Los Angeles as key stations.

3. NBC will improve and enlarge its program service in New York, which currently includes on-the-spot views of news and special events alternated with major sports events and a wide variety of studio programs.

4. NBC will solicit the support and cooperation of sponsors and their advertising agencies in producing programs to serve the television audience.

5. When a color television system has reached the stage of practicability and availability that is now true of the black-and-white television system, NBC will bring color to the American home.

Dr. Jolliffe On Techniques

Dr. C. B. Jolliffe, Executive Vice President in charge of RCA Laboratories, said that color television always has been a goal of RCA scientists and engineers, and added:

"The possibilities of producing color television were first demonstrated by RCA to the Federal Communications Commission on February 6, 1940, at Camden, N. J. A year later, on February 20, 1941, NBC broadcast through the air the first color television pictures from its transmitter atop the Empire State Building. A color system, using a projection type receiver producing a picture 15 x 20 inches was shown to the FCC by RCA in December 1941.

"War then stopped television research for civilian purposes. Research efforts were concentrated on the war applications of television techniques. The many new electron tubes and techniques developed during the past five years for ultra-high-frequency military uses now are available for television and other phases of radio communication."

The mechanical color demonstrated at Princeton, Dr. Jolliffe continued, "has been accomplished through constant development and improvement of the devices employed in black-and-white television and not through any basic discoveries in color television which still uses a mechanical system of many limitations.

"For example, the new RCA

VISITORS TO RCA LABORATORIES EXAMINE DETAILS OF RCA VICTOR TELEVISION RECEIVERS. DIRECT VIEWING AND PROJECTION TYPE MODELS WERE SHOWN.

Image Orthicon tube, or 'eye,' used in the camera, is so accurate that it is unnecessary to introduce special controls to balance the three primary colors for proper blending. Its light sensitivity is such that studio productions can be picked up with much less light than now used in the studio for black-and-white television. When this camera 'eye' is used to pick up color, a disk comprising red, green and blue filters revolves between the camera lens and the face of the tube.

"Receiving equipment consisted of a special 12-inch RCA Kinescope installed within a revolving drum carrying three equally spaced color filters.

"Interesting as these tests have been, we are convinced through our achievements in all-electronic black-and-white television that any mechanical color system is outmoded.

Dr. Jolliffe called attention to the fact that the color demonstration employed a directional beam transmitter and parabolic antenna. The power was 1/20 of a watt, which is infinitesimal compared with the 50,000-watt transmitters used by standard broadcasting stations. A new electron tube developed during the war made this accomplishment possible on a carrier frequency of 10,000 megacycles — a frequency twenty times higher than any used heretofore in television. The wavelength at such a frequency is only three centimeters.

New Transmission Methods

A new method of transmission used in the demonstration permits sound-and-sight signals to be carried on the same wave. The sound is transmitted during the very brief periods when the scanning beam is inactive and insures high fidelity reproduction.

"On the lower frequencies, television black-and-white transmitters now can be built to operate with at least 5 kilowatts up to 300 megacycles. New antennas can be built to make the effective power of 5-kilowatt transmitters the equivalent of 20 to 50-kilowatts output. Thus it is now possible to deliver all the power necessary on all 13 channels assigned by the FCC to commercial television."

Dr. Jolliffe explained that at present there are two possible methods of producing color television—one using mechanical filters and the other all-electronic.

"We look forward to the day," he continued, "when we will have an all-electronic color system. As with black-and-white television, we believe that the electronic system will be far more satisfactory and practical as a service to the home than anything that can be done mechanically.

Rotating Disk Mixes Colors

"In our demonstration today of the mechanical system, we were shown no fundamental advances in color television as such," Dr. Jolliffe pointed out. "Actually the system of color television which has been demonstrated today is based almost entirely on the elements and apparatus of our all-electronic, black-and-white television system. We have merely added motor-driven color filters to the transmitter and receiver which enable us to transmit the red, green and blue components of the televised material in rapid sequence — so fast that the color components appear to be directly overlaid.

"With the development of the Iconoscope, Kinescope, Orthicon and other electron tubes in RCA Laboratories, an excellent black-and-white, all-electronic system of television has been produced," said Dr. Jolliffe. "It has no motors or whirling disks. It is practical and simple to operate in the home.

Great Strides in Tube Design

"The latest cathode-ray tubes used in all the new receivers demonstrated today were far more efficient than any publicly demonstrated previously. They revealed that great strides had been made in the development and use of fluorescent materials in cathode-ray tube manufacture during the war. In the new tubes the fluorescent screen on which the image appears in black-and-white is backed up with a very thin coating of aluminum which permits the use of higher voltages than formerly. The aluminum film acts as a mirror preventing loss of light inside the tube thereby greatly improving picture brilliance and contrast.

Dr. Jolliffe concluded: "There is no technical reason for further delay in giving television to millions of Americans, as a new medium of information, education and entertainment.

"Black-and-white television is ready for service to the public. We have all of the elements necessary for the immediate expansion of a satisfactory television service to the home on a national scale."

SELTZER WATER SQUIRTED AT STEREOSCOPIC TELEVISION CAMERA GIVES VIEWERS A THREE-DIMENSIONAL THRILL.

Radio in 1945-46

Revolutionized by Wartime Research and Development, Radio Moves into a New Era of Peace in which People Everywhere Will See the World by Television.

By Brig. General David Sarnoff

President,
Radio Corporation of America

ELECTRONIC EYES perfected by wartime research have given long-range radio vision to mankind. The electron tube, which extended man's range of hearing around the world, now enables him to see distant events and people far beyond the range of the human eye. Into his view also come infinitesimal organisms, tiny specks and particles heretofore hidden in the air, in drops of water, in darkness and in dust. Whether it be a germ in the bloodstream or a plane in the clouds, the invisible speck is identified by electron beams which bring it into focus and amplify it as a picture.

To meet the demands of war, RCA developed more than 150 new types of electron tubes. Since tubes are the keys to major advances in radio, these new tubes are now opening the future of a new world of radio in which the eye as well as the ear will play an all-important part. Already this electronic magic has given television a new super-sensitive eye, one thousand times more sensitive than the pre-war eye.

Similarly, new electron tubes made possible the miracle of radar. So sensitive is the radar eye that geese tracked for an hour and forty minutes by radar, were followed on the scope, or screen, for 57 miles. The speed of the flock was clocked at 35 miles per hour. Yet the radar man never actually saw the geese, any more than gunners saw the enemy ships which they sank in the dark beyond the horizon, when radar aimed the guns.

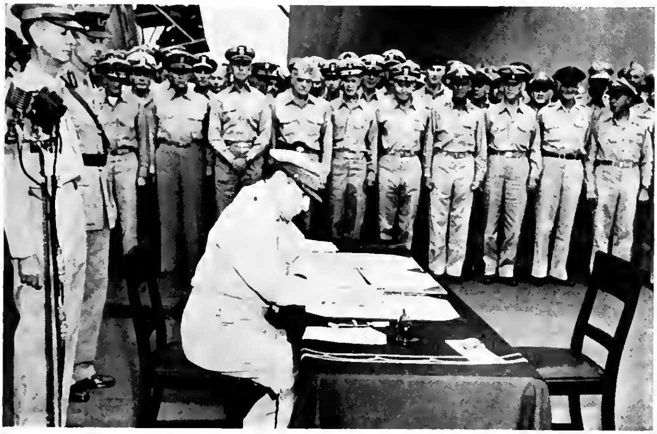
Out of the same war research have come electron timers and computers—timers that measure time at intervals of 10 one-millionths of a second, while computers count, multiply and divide in fractions, up into the millions, with split second precision and accuracy.

While television sees by the light of a match, and while radar spots a plane 20,000 feet up in the clouds and 20 miles or more away, the electron microscope sees in the opposite direction—into the sub-microscopic world—thus enabling man to study bacteria, viruses and infinitesimal particles of matter far beyond the range of the most powerful optical microscope.

Having thus established a distinguished record in the performance of indispensable tasks of war, radio-electronics has returned to peacetime pursuits. Under the cover of wartime secrecy, scientific progress has been rapid and productive.

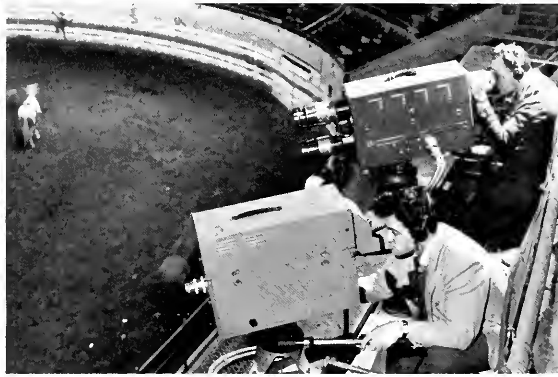
Since 1940, five years of intense research and development have revolutionized every phase of radio. In 1946, that scientific revolution will become continually more apparent to the public, as "secret weapons" are freed for application to everyday use. Instruments and services, which in the normal course of events might not have appeared until 1960, should therefore be in use before 1950.

Conclusion of the war in August made it possible for the broadcasters of the United States to celebrate in a peaceful November of 1945 the completion of their first quarter century of service to the public. Broadcasting climaxed these twenty-five years by performing services far beyond the most sanguine hopes of its founders in 1920. Today there are 940 standard broadcasting stations and 56,000,000 receivers in this country, while hundreds of new FM and television stations are planning to go on the air.



Acme

RADIO CARRIED TO THE WORLD A DESCRIPTION OF THE JAPANESE SURRENDER CEREMONIES ABOARD THE U.S.S. MISSOURI IN TOKYO BAY.



. Navy

ABOVE: SKILLED OPERATORS RECORD RADAR REPORTS IN PLOTTING ROOM AT A NAVAL COMMUNICATIONS HEADQUARTERS. RIGHT: NEW IMAGE ORTHICON CAMERA (FOREGROUND) DEMONSTRATES ITS HIGH SENSITIVITY IN A TELECAST FROM A SPORTS ARENA.

After that day of infamy at Pearl Harbor, radio flashed countless V's into space as the signal of the hope for victory—the symbol of a goal that looked so far away on December 7, 1941, when President Roosevelt, by microphone, summoned his countrymen to partnership "in the most tremendous undertaking in our national history." Through the dark days of war, the civilized world looked forward to the day when an "E" and a "J" would be added to the V to signal victory in Europe and in Japan.

World Hears of Germany's Fall

Finally, after long years of fighting and vigil, the ether on May 7, 1945, pulsed with the news that on the day before Germany had surrendered unconditionally to the Allies, at the headquarters of General Eisenhower in France. The V-E Day broadcasts were heard around the world.

But war in the Pacific was still on. The August air of 1945 became tense as it vibrated with indications that historic news of great import was in the offing. On August 6, a radio news flash from the White House announced the world's first atomic bomb had been dropped on Hiroshima; the next day radio encircled the earth with the news that Russia had declared war on Japan, and on August 14, the message came that the Japanese had surrendered. World War II was over.

Never in history had the population of the earth been kept so well informed and so up-to-the-minute on the progress of a war. Radio spread news and communiques with lightning speed. On September 1, when the documents of surrender were signed by the Japanese on board the U.S.S. Missouri in Tokyo Bay, the microphone was on the deck of that battleship to enable countless people to listen in on one of the greatest events in all recorded history. Electrical transcriptions were rushed by plane to broadcasting stations across the oceans, while films of the surrender were flown to New York, for broadcast by television through the National Broadcasting Company's pioneer station WNBT.

The war indeed had ended, but a gigantic task of reconversion faced the radio industry as it moved to play its part in the restoration and the rehabilitation of the world. Out of the conflict emerged incredible developments in radio science—among them, radar! Peace lifted the curtain of secrecy behind which thousands of men and women in the radio industry and in the armed services had enacted miracles in communication and radio production.

New Words of Achievement

Indicative of their achievements were many new words in the vocabulary of radio—words unknown in 1940. Now they would find their way into dictionaries and encyclopedias—such words as radar, unheard of in the press until 1943; sonar, shoran, loran, teleran, proximity fuses and numerous other terms, each the headline of a new episode of man's ingenuity in radio.

As the year ended, the lifting of wartime secrecy restrictions permitted the new word "shoran" to be printed and spoken. It was one of the best kept secrets of the war and a scientific triumph. Developed in RCA Laboratories, shoran was the most accurate system of bombing developed during the war. Pinpoint accuracy permitted fragmentation bombs to be dropped through heavy overcast from 20,000 feet to fall with demoralizing effect on invisible enemy troops entrenched only 400 yards from American lines. With shoran, a bomb could be aimed at a 30-foot bridge invisible to the bomber because of overcast, and yet hit the bridge with greater precision than by visual bombing.

Another Miracle of War

Another miracle that came out of warfare is the "proximity fuse"—a miniature radio sending and receiving station encased in the nose of projectiles. Radio waves projected from an automatic transmitter in the shell itself were reflected from targets—as in radar—and received by a tiny electron tube which detonated the charge at the moment of its most devastating proximity. RCA assembled more than five million of these fuses.

Through the story of wartime radio runs the theme of accomplishment by operators who participated in pushbutton warfare on an electronic keyboard performing magic undreamed of at the beginning of the war. Who at that time would have thought that an enemy battleship lurking in the dark, miles away, could be hit by shells and sunk as if it were within clear view, although the gunners could not see it? For the radarmen saw reflections from it on their scopes and told the gunners exactly where to point their guns. Radar and gunnery, radar and aviation, radar and ships, became inseparable. So peace will find them allied in new applications that will enhance safety and aid navigation on the sea and in the air.

The shift from wartime activity to peace, with its promise of new civilian radios, phonographs and television, is a tremendous task. The radio industry, having marshalled more than 550,000 workers in 1,600 factories to produce more than 7½ billion dollars worth of military radio, radar and other communications equipment from 1941 to the end of the war, has had to redesign and retool for the application of wartime developments to peace. Because it represents an abrupt and complete turnabout, months of effort have been required to get back on the track of peacetime production.

Pictures of a New Era

Since V-J Day, in August, "reconversion" has been the dominating factor in research as well as in production. Laboratories that devoted every effort to the war now are concentrating on peace, as are broadcasting and communication services. Some indication of the service they are rendering is seen in the fact that Admiral Chester W. Nimitz broadcast a message to service men in hospitals, over television station WNBT, New York, so that he might, at the same time, be seen by them.

President Makes Television Debut

President Truman made his television debut while speaking at the October Navy Day ceremonies in Central Park, New York. Secretary of State Byrnes, Secretary of War Patterson and Secretary of the Navy Forrestal also made their first television appearance over the same station at a Forum in New York. In the realm of sports, the Army was televiewed as it rolled up a score of 48 to 0 against Notre Dame while the players plunged, punted and passed under the telephoto lens of the television camera.

Since the war, the new supersensitive television camera tube called the Image Orthicon, developed in RCA Laboratories, was demonstrated at the NBC studios, in an exhibition that showed how television has acquired an electronic eye so sensitive that it sees in candlelight, moonlight, twilight or even in darkness with the scene "illuminated" by infra-red rays. This achievement solves major problems in television programming and in outdoor pick-ups, making possible 24-hour news coverage. Here was a camera that brought new life and detail into television at the Army-Navy football game, despite the darkening shadows of a December afternoon.

The demands of war led the scientists across new frontiers in the spectrum of space. In applying television techniques to radar and in mastering the radio "echo," as well as in the development of secret systems of communication, new and ever shorter wavelengths have been harnessed to perform new magic. A recent demonstration by the Western Union Telegraph Company of an ultra-short wave radio relay system, developed by RCA was a revolutionary step in electronic communications, destined eventually to replace thousands of telegraph and telephone poles and thousands of miles of wire from coast to coast.

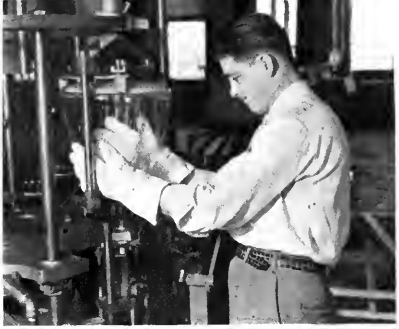
"Citizens Radio" a Prospect

As a result of wartime developments vehicular radio, or "citizens' radio," as it is popularly called, is about to be introduced. From microwave transmitters in automobiles, trucks and buses, travelers on the highways will be able to establish contact by radio with the nearest telephone exchange so that they can talk with any telephone subscriber in the country, just as a passenger on a modern ship can telephone via a radio link to home or office.

During 1945, extensive tests of radio on railroads were inaugurated to increase safety, assist in train dispatching and in communication along the rails as well as intertrain.

Many of these advances have evolved from the war which called for new specifications in the design

LEFT: AUTOMATIC RECORDING MACHINE SPEEDS UP MANUFACTURING PROCESS AT RCA VICTOR. BELOW: STUDENTS RECEIVING INSTRUCTION IN ELECTRONICS AT RCA INSTITUTES.



ABOVE: A 12-INCH KINESCOPE GOES THROUGH A FINAL STEP IN ASSEMBLY AT RCA VICTOR PLANT. RIGHT: A BATTERY OF NBC TELEVISION CAMERAS FOCUS ON THE ACTIVITIES AT AN OUTDOOR SPECIAL EVENT.

of radio equipment. It had to be compact and light, yet withstand the rigors of high aviation speeds and severe changes in atmospheric conditions. These demands led to many revolutionary devices, prominent among them new types of miniature tubes, some as small as acorns. RCA, which originated the miniature tube, had used them in the pre-war camera-size "personal" radios, and to meet the demands of radar and other wartime equipment, RCA manufactured 20,000,000 of these tiny tubes from 1942 to the end of the war As a result of wartime experience in the practical application of these Liliputian tubes, many new uses are foreseen for them. They should bring to a world at peace new pocket-size radios, handie-talkies and walkie-talkies, and receiving sets as small as a package of cigarettes, or a lady's compact.

Some Radio Highlights of 1945

These are some of the highlights of radio in 1945—the radio that enabled the U. S. Army Signal Corps to send a nine-word radio teletypewriter message completely around the earth in 9½ seconds, surpassing the previous record of 3½ minutes.

In 1945, RCA Communications carried more than 200,000,000 words of international radiograms, over circuits linking the United States with 56 foreign nations. With thirty-five of these countries, radio program service is maintained, bringing overseas broadcasts to American listeners. This service multiplied five-fold during the war, with a 50 percent reduction in rates.

Radiophoto service to twelve overseas nations doubled during the war, again with a 50 percent rate reduction.

One by one, the radio stations of Europe and Asia, which were cut off from the United States during the war, have been restored to service. Radiograms are again the speediest messengers in international service. By the use of new error-proof high-speed 7-unit multiplex apparatus, perfected during the war, eight channels of communication are now used on a single radio frequency, offering an almost unlimited expansion in instantaneous world-wide communication.

Mariners, as well as the aviators, who sail and fly across a world at peace will find radar a new service that increases safety and speeds transport. Adapting radar, loran, the electronic depth-meter and new radiotelephone devices to peacetime use on ships of all sizes, the Radiomarine Corporation of America—a service of RCA—is adding them to its postwar line of marine radio and navigation apparatus, which includes direction finders, lifeboat sets and various types of communication transmitters and receivers. Practically all coastal stations have returned to commercial service.

Progress in Radio Developments

At the same time, experimentation in other radio fields has produced achievements that promise revolutionary help for American industry. New progress has been made in the application of heat generated by radio, and in the application of electronic devices to industrial operations that call for the utmost precision. Electrons have been put to work to accelerate processes, increase safety and provide automatic controls as well as counting and sorting. New wonders are promised in the use of supersonic vibrations and infra-red rays. Research in fluorescent materials has produced a greater variety and finer phosphors, with increased capacity for receiving and retaining electronic images—the basic functions that make television and radar possible.

The Year Ahead

Now let us look forward to 1946. Civilian radio production is under way. Home and automobile receivers again are coming into the market, along with the new and improved Victrola phonograph. With "the music you want when you want it," the phonograph steadily climbs in popularity. A new nonbreakable record, the most revolutionary development in phonograph records in forty-five years, has been introduced by RCA Victor to mark a new milestone in the recording and reproduction of music by the world's greatest artists.

Science has made television practical for the home. All elements of a satisfactory television system are available. Television networks are in prospect as automatic radio relay stations are being built to relay television from city to city. At the same time the coaxial cable, another artery of television, is being extended; already New York is linked with Washington by means of this new cable, and it is moving into the South toward Dallas, Texas. Gradually, radio relays and coaxial cables will grow out across the country to link coast with coast—and to provide a nationwide service of sight and sound.

Before nationwide television is possible, however, there must be hundreds of transmitters to supplement the nine commercial stations now on the air. These transmitters will begin to be generally available late in 1946 and by the end of 1947 considerable activity in television broadcasting may be expected.

Television will be widely utilized throughout commerce and industry. Department stores will use it so that the public may shop by television; through inter-store television, merchandise will be displayed throughout the stores at "telesite" salons. Gimbels - Philadelphia, in cooperation with RCA Victor, have demonstrated this idea with great success and have received public acclaim for a new service and convenience.

Uses of Radio in Industry

Industry too will find considerable use of radio sight as "eyes" in factories—the means of coordinating and controlling complicated manufacturing processes, observing and directing operations from start to finish. Industrial television will furnish the means for looking into chemical reaction chambers and other areas of production, dangerous or inaccessible to the human eye.

In the field of air navigation, RCA has devised a complete system for preventing collisions, controlling traffic, performing instrument approaches and in the general navigation of aircraft. Unique in its combination of television and radar techniques, this new system is called Teleran.

The miracle of radar and the advent of postwar television, make 1945 a year to be remembered as beginning the third cycle in the evolution of radio: First, there was wireless telegraphy; second, broadcasting of the human voice and music, and now the world enters the third cycle—the era of radio sight.

New Adventures in Exploration

America's men of science and its great industrial research centers, such as RCA Laboratories, brought true glory to the Nation in a war that called upon science to defeat the enemies that had sought in vain to pervert science to destroy civilization. The greatest and most efficient fighting forces ever assembled had science at their side on every battlefront. Victory gave to the United States the place of leadership in science among the older nations of the world, all of whom had cultivated science throughout the centuries.

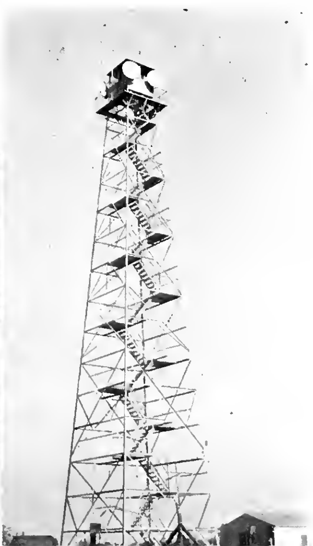
Opportunities for Youth

Today, American ingenuity is at the forefront. Here is the great opportunity for youth. Encouraged to pioneer in research and to follow science as a career, it will furnish the leadership to make this country unsurpassed in every realm of science — electricity or electronics, chemistry or physics, radio or atomic energy. America accepted the challenge of war. It now accepts the challenges of peace.

If a nation is to expand to gain new resources, comforts and freedom for its people, it must not neglect progress in science. Exploration today does not mean conquest of people, nor lust for territorial expansion. The rewards in science can be much richer and far more productive for mankind.

Science has given man a key to atomic energy, to radio-controlled rockets and to television-eyed pilotless planes. The fate of civilization depends upon the use to which man puts them. Our national security, our progress in peace and our future as a Nation depend upon science, which has lifted war and peace into a new dimension by the annihilation of Time and Space.

BELOW, LEFT TO RIGHT: ELEANOR STEBER, OPERATIC SOPRANO, DEMONSTRATES THE NEW RCA VICTOR UNBREAKABLE PLASTIC PHONOGRAPH RECORD; DR. ALBERT ROSE HOLDS THE IMAGE ORTHICON, THE NEW SUPERSENSITIVE TELEVISION CAMERA TUBE; ONE OF THE TOWERS IN THE RCA-WESTERN UNION MICROWAVE RELAY NETWORK WHICH HAS BEEN PLACED IN OPERATION BETWEEN NEW YORK AND PHILADELPHIA.



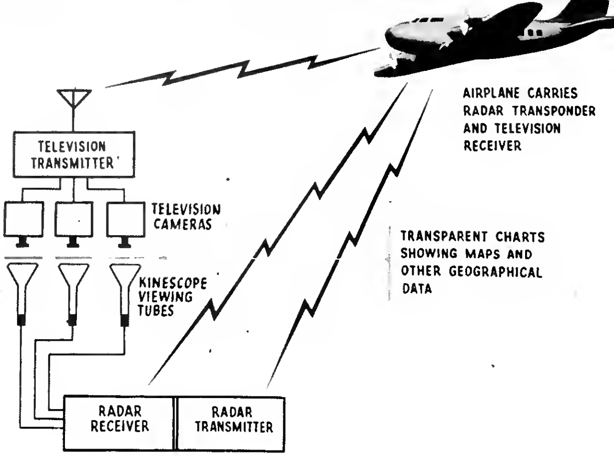


FIGURE 1—SIMPLIFIED DIAGRAM SHOWING HOW TELERAN TRANSMITS MAPS, DETAILS OF LANDING FIELDS AND OTHER VITAL INFORMATION TO PILOT OF PLANE.

THE STORY OF TELERAN

In this New Aid to Air Navigation, RCA Engineers See a Possible Solution to Many Traffic Problems Facing the Aviation Industry

By Loren F. Jones

Engineering Products Department
RCA Victor Division

A NEW system of air navigation known as Teleran (a contraction of TELEvision-Radar Air Navigation) is being developed by RCA engineers and scientists in Camden and Princeton. It is expected that Teleran will constitute a major advance in the field of aviation by meeting a critical need.

The constantly increasing density of air traffic requires development of improved methods for navigating aircraft. Improvements in present methods will suffice for the immediate future, but a more comprehensive solution will be required within the next several years, a situation that is generally recognized.

Various methods have been proposed for controlling traffic, preventing collisions, performing instrument approaches and in other ways navigating aircraft, particularly under conditions of poor visibility. The problem is the all-weather flying of large numbers of aircraft having different speeds, different maneuverabilities, different destinations and different degrees of pilot skill.

In the RCA Teleran method, devised in 1941 but not actively worked on until 1945 because of the war, radar and television technologies are combined along original lines. Teleran collects information by means of radar equipment on the ground, collates it with meteorological, geographical and control data, and transmits a television picture of the assembled information to a television receiver in the aeroplane. On the Kinescope of his television receiver, the pilot sees a picture showing the position of his aeroplane and of all other aircraft at his altitude, superimposed upon a terrain map complete with route markings, weather data and unmistakable visual instructions pertaining to his flight.

Teleran had its origin in a synthesis of the requirements for a technically ideal system of air navigation. An ideal system must present complete information to the pilot in the simplest possible form, must minimize weight and complexity of the airborne equipment, and must be operative under all weather conditions. It must operate in conjunction with other existing navigational aids, must be very flexible so that changes in traffic control methods can be accomplished without obsolescence, and must be able to handle greatly increased traffic densities.

In addition, the ideal system must be able to handle all types of aircraft and must make identification of individual aircraft unnecessary. It should allow pilots freedom of action where necessary, should provide explicit instructions for approach, holding and landing and should provide warnings of impending collisions. It must be able to provide supplementary information such as weather data, and must operate at a cost commensurate with the services rendered. It must not necessitate reference to innumerable meters, scales, charts and radio signals.

Radar Alone Has Limitations

Radar is a valuable new navigation device, but in the use of radar alone, there are limitations. For instance, airborne radar equipment is relatively bulky and requires skill in its operation. It provides no traffic control data for the use of the traffic control personnel on the ground. Also, due to space and weight limitations, there are limits to the attainable accuracy. Ground radar, on the other hand, furnishes adequate and accurate information, but this information is on the ground and is not available to the pilot. The full advantages of radar can be realized only if the information from a large and accurate ground search radar can be transmitted to the pilot. Television is the natural and unique means for accomplishing this. In addition to transmitting precise radar information to aircraft, television provides a means for transmitting other data, e.g., weather maps, ceiling, visibility and traffic instructions. In fact, by the combination of radar and television, the requirements for an ideal system can be essentially fulfilled.

Camera Combines Views

For convenience, a simplified Teleran installation is illustrated in Figure 1. This shows a ground search radar whose data are displayed as a "PPI" picture on a cathode ray tube. Placed in front of this tube is a transparent map or chart. Both the map and the face of the tube are photographed by a television camera, and the combined picture is sent aloft.

Since the presentation of all aircraft in the skies would confuse the pilot, any one pilot being interested only in other aircraft flying at approximately his altitude, the system includes a method for separating the signals received from aircraft at various altitudes and for transmitting a separate picture for each level. This is accomplished by using in each aircraft a transponder or beacon whose transmitting signal is coded in relation to altitude. By means of this code, altitude separation can be accomplished automatically by the ground radar. Thus there actually are several "PPI" radar indicators, each showing aircraft in a certain altitude layer, and several television cameras with individual television transmissions. Each pilot tunes in the transmission appropriate for his altitude.

Figure 2 is typical of the kind of picture which will be sent aloft. In this particular view, which is for aircraft flying at 10,000-13,000 feet, it will be noted that the picture indicates the airways, the television channel to be used when entering the next Teleran zone, terrain features of interest, wind velocity and direction, and the presence of other aircraft. The spot representing the plane in which the picture is being received is indicated by a radial line passing through the spot.

Requirements of Basic System

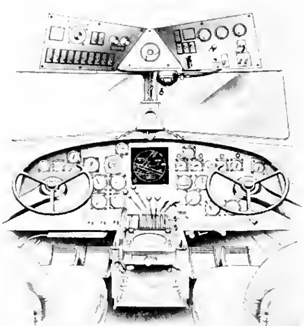
The basic system, therefore, requires a ground search radar, ground selection equipment to separate the signals received from various altitude levels, television cameras, maps and charts, television transmitters for sending the pictures aloft, and a radar transponder and television receiver in each aircraft.

In Figure 6 is depicted a more complete Teleran system in which a shorter range radar is employed for approaching the airport and for controlling traffic. Also, in conjunction with a television link, there is a special radar for bringing the plane down the glide path. This radar permits sending a special picture for instrument approach.

Spot Indicates Each Plane

The picture for instrument approach on the glide path is shown in Figure 3. In this case, each aircraft again appears as an elongated spot, and its distance from the airport and its deviation from the glide path are plainly shown. The horizontal lines indicate whether the aircraft is above or below the exact glide path. These lines appear in the picture automatically, without requiring the attention of the pilot or the ground operators.

Possibly the most important feature of Teleran is its adaptation to traffic control, a subject too lengthy for discussion here. Experienced pilots and airline operators state that the traffic control problem is certain to become critical. Many are outspoken in their belief that Teleran offers the ideal solution.



BELOW, LEFT TO RIGHT: FIGURE 2—TYPICAL PICTURE SENT ALOFT BY TELERAN; FIGURE 3—PICTORIAL INSTRUCTIONS WHICH GUIDE PILOT IN LANDING; FIGURE 4—TELERAN WEATHER MAP AND TERRAIN FEATURES. AT RIGHT: FIGURE 5—SUGGESTED METHOD OF MOUNTING TELERAN KINESCOPE IN COCKPIT OF PLANE.

Figure 4 is an example of other information which can be transmitted. The importance of weather data has been emphasized by many pilots. It may be worthwhile to transmit special weather maps periodically over the Teleran system. Then each pilot would receive regularly, without any effort on his part, complete meteorological information in visual form, the information being particularly suited for one flying at his altitude.

Figure 7 shows a network of Teleran stations along trans-continental airways, illustrating how long-range navigation can be accomplished by Teleran, providing sufficient stations are installed.

Figure 5 shows one way that the Teleran Kinescope could be mounted in an aircraft instrument panel.

The further development and demonstration in flight of Teleran will require several years of effort by RCA Victor Division engineers at Camden, with consultation and other assistance from RCA Laboratories engineers at Princeton. The chief engineer in charge of the Teleran project is Dr. Douglas Ewing of the Victor Division. RCA Laboratories personnel who have contributed most are Mr. P. J. Herbst and Drs. V. K. Zworykin and Irving Wolff.

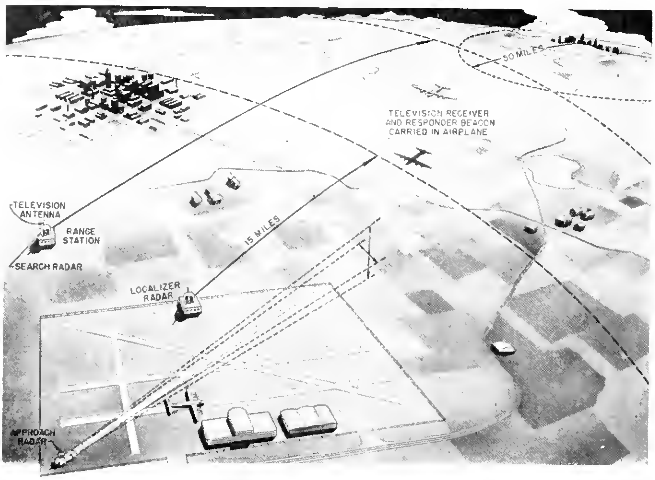
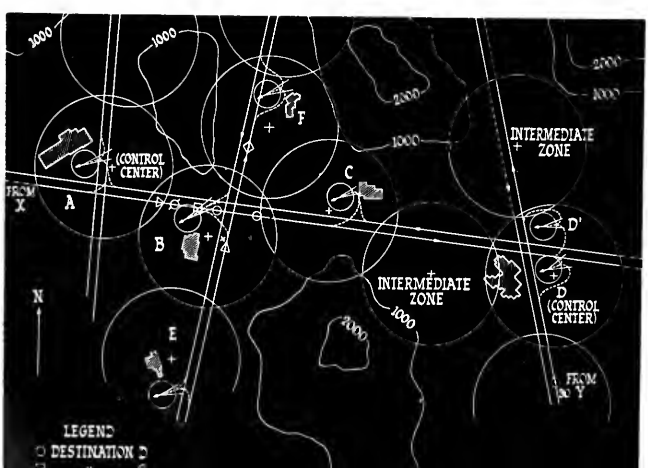


FIGURE 6—DRAWING OF COMPLETE TELERAN AIRPORT INSTALLATION COMBINED WITH SHORT-RANGE RADAR FOR CONTROLLING TRAFFIC. BELOW, FIGURE 7—PROPOSED NETWORK OF TELERAN STATIONS AS IT WOULD BE ARRANGED ALONG TRANSCONTINENTAL AIRWAYS, SHOWING OVERLAPPING RANGE OF EACH STATION.



SIGNAL CORPS USED RCA RELAY SYSTEMS

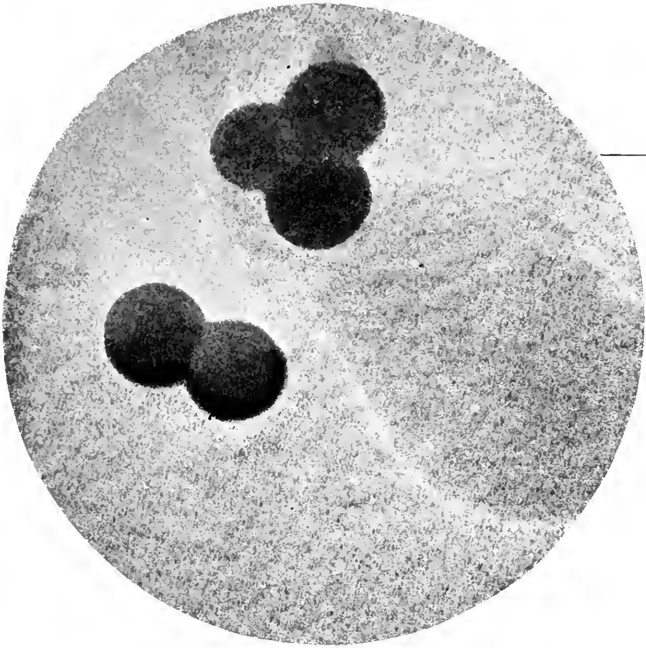
Two of the radio relay systems demonstrated recently between Catalina Island and San Francisco by the U. S. Army Signal Corps to show wartime developments in military communications which may revolutionize peacetime civilian telephone and teletype operations were developed by the Radio Corporation of America.

These two systems eliminate the necessity of long lines in certain types of long-distance telephone communication, according to Dr. H. H. Beverage, Associate Research Director of RCA Laboratories, which developed the system in collaboration with the Camp Cole Ground Signal Agency.

Operating at radio frequencies well above those used before the war, the systems provide multiple voice channels on a single carrier. One type has a capacity for four voice channels, which may in turn be used to provide four teletype channels. The other provides eight simultaneous voice channels on a single carrier. In each instance, operation requires no wires, since transmission is carried out efficiently by automatic radio relay stations which "bounce" the high frequency waves from one point to another completing the desired circuit.

A unique feature of the four-voice channel set is its flexibility. The carrier frequency is held constant by a device which can be adjusted to any carrier frequency in a 20-megacycle band in a matter of seconds. Transmitter and receiver function without radiation of spurious frequencies or harmonics. This is regarded as a marked improvement in the field where a number of units must be used at a single location.

While the four-channel system operates on FM (frequency modulation), the eight-channel unit operates fundamentally on a system of the time-division multiplex employing very short pulses. The radio frequency energy is radiated in a series of short bursts or pulses, each somewhat less than one-half of a millionth of a second in duration.



MOLECULES OF POLYSTYRENE LATEX MAGNIFIED 180,000 TIMES BY IMPROVED ELECTRON MICROSCOPE.

DEEPER INTO THE UNKNOWN

Improvement in Electron Microscope Permits Magnification of Atomic Structure to More Than 180,000 Times Original

SUCCESS in magnifying an infinitesimal particle of atomic structure to a size more than 180,000 times greater than the original specimen—an achievement opening to scientists and disease fighters heretofore unseen realms for research and exploration — was disclosed by the Radio Corporation of America to members of the Electron Microscope Society of America, meeting at Princeton University on November 30 and December 1.

Dr. James Hillier, one of the electron microscopy pioneers of RCA Laboratories, told of developments which have almost doubled the previous accepted bounds of magnification by electronic means. These include design of an electronic "gun" which increases the intensity of the image twenty-fold and improves illumination to such an extent it is possible to use a new telescopic viewing device. Also revealed was an improved lens designed to increase resolving power. Dr. Hillier described how these modifications not only have enabled an operator to examine the final image visually at unprecedented levels of magnification but have made possible photographic exposures as well.

He pointed out that were the magnification (180,000 times) of the modified RCA electron microscope applied to a man of average size, he would tower 200 miles above the earth; should he lie down, his head would be in Washington and his feet in Philadelphia.

This advance makes visible for the first time submicroscopic objects far smaller than the virus and brings molecules into sight. In fact, bacteria can be magnified to the size of a dachshund and were this atomic laboratory animal to have fleas they, too, would be clearly visible and have the approximate size of molecules.

Dr. Hillier said that in laboratory experiments he and his associates had achieved magnifications in which the final images were examined at as high as 300,000 times original size. He said recent improvements had made it possible consistently to obtain resolutions of the order of 20 angstrom units (one unit representing approximately $1\frac{1}{2}$ atoms). This is considered a major advance in view of the fact that during the previous five years only a few exposures of this resolving power had been obtained from more than 25,000 exposures made during the period.

Electrons "Illuminate" Specimen

The electron microscope—hailed by research experts as the greatest aid to science developed in the 20th Century—differs from the optical microscope chiefly in the fact that the specimen to be examined is "illuminated" by directing a concentrated beam of electrons through it. These electrons, in passing through the specimen, are affected in varying degrees according to the density and composition of various parts of the specimen. When the electron beam emerges from the far side of the specimen it bears the pattern or "image" of the specimen. This image is magnified to satisfactory size by magnetic lenses, which correspond roughly to the optical lenses in a light microscope.

Spanish Lessons on Records

A new Spanish language record set titled "New World Spanish," consisting of two albums of ten 10-inch records, together with a 337-page textbook, was announced in November by RCA Victor. Prepared and arranged by outstanding Spanish language authorities in this country, the set is designed to give a practical and authentic approach to the learning of the language by students in classrooms and individuals in homes or clubs.

RCA-NBC FIRS

1923

Dr. V. K. Zworykin, now Associate Research Director of RCA Laboratories, applied for patent on the Iconoscope, television's electronic "eye." *(December 29.)*

1929

Dr. V. K. Zworykin demonstrated an all-electronic television receiver using the Kinescope, or picture tube, which he developed. *(November 18.)*

1930

Television on 6 x 8-foot screen was shown by RCA at RKO-Proctor's 58th Street Theater, New York. *(January 16.)*

NBC began operating W2XBS, pioneer experimental television station in New York. *(July 30.)*

1931

Empire State Building, world's loftiest skyscraper, was selected as site for RCA-NBC television transmitter.

1932

RCA-initiated field tests with 120-line, all-electronic television. *(May 25.)*

1936

Television outdoor pickups demonstrated by RCA at Camden, N. J., on 6-meter wave across distance of a mile. *(April 24.)*

1937

RCA announced development of electron projection "gun" making possible television pictures on 8 x 10-foot screen. *(May 12.)*

Mobile television vans operated by RCA-NBC appeared on New York Streets for first time. *(December 12.)*

1938

Scenes from Broadway play, "Susan and God," starring Gertrude Lawrence, telecast from NBC studios in Radio City. *(June 7.)*

1939

RCA and NBC introduced television as a service to the public at opening ceremonies of New York World's Fair, featuring President Roosevelt as first Chief Executive to be seen by television. *(April 30.)*

Improved television "eye," the "Orthicon," was introduced by RCA. *(June 7.)*

Major league baseball was telecast for the first time by NBC, covering a game between the Brooklyn Dodgers and Cincinnati Reds at Ebbets Field. *(August 26.)*

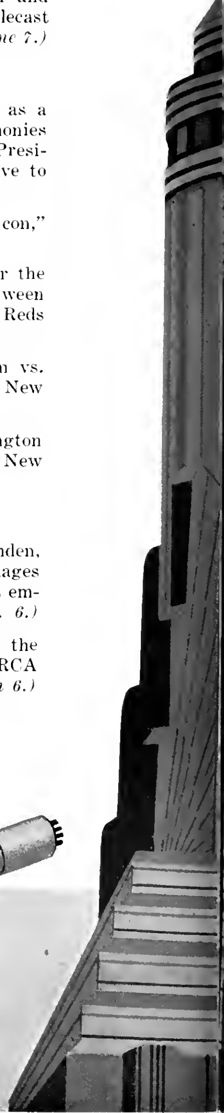
First college football game—Fordham vs. Waynesburg—televised by NBC in New York. *(September 30.)*

RCA receiver in plane over Washington picked up telecast from NBC station in New York, 200 miles away. *(October 17.)*

1940

RCA demonstrated to the FCC, at Camden, N. J., a television receiver producing images in color by electronic and optical means employing no moving mechanism. *(Feb. 6.)*

New York televised from the air for the first time by a plane equipped with RCA portable television transmitter. *(March 6.)*



IN TELEVISION

Television pictures on $4\frac{1}{2}$ x 6-foot screen demonstrated by RCA at annual stockholders meeting in Radio City. *(May 7.)*

Coaxial cable used for first time in television program service by NBC in televising Republican National Convention at Philadelphia and transmitting scenes over New York station. *(June 24.)*

1941

Demonstrating television progress to the FCC, RCA exhibited the projection-type home television receiver featuring a screen $13\frac{1}{2}$ x 18 inches. . . . Television pictures including a prize fight from Madison Square Garden and a baseball game at Ebbets Field, Brooklyn, were projected on a 15 x 20-foot screen in the New Yorker Theatre. . . . Scenes at Camp Upton, Long Island, were automatically relayed by radio to New York establishing a record as the first remote pick-ups handled by radio relay stations. *(January 24.)*

Color television pictures in motion were put on the air by NBC in the first telecast in color by mechanical means from a television studio. *(February 20.)*

RCA-NBC made successful tests with first projection-type color television receiver using mechanical methods. *(May 1.)*

NBC's television station WNBT became the first commercially licensed transmitter to go on the air. *(July 1.)*

1942

First mass education by television was initiated by RCA-NBC in training thousands of air-raid wardens in the New York area. *(January 23.)*

1943

NBC televised major sports and other events at Madison Square Garden for wounded servicemen in television-equipped hospitals in the New York area. *(October 25.)*

1944

NBC announced plans for nation-wide television network to be completed possibly by 1950. *(March 1.)*

1945

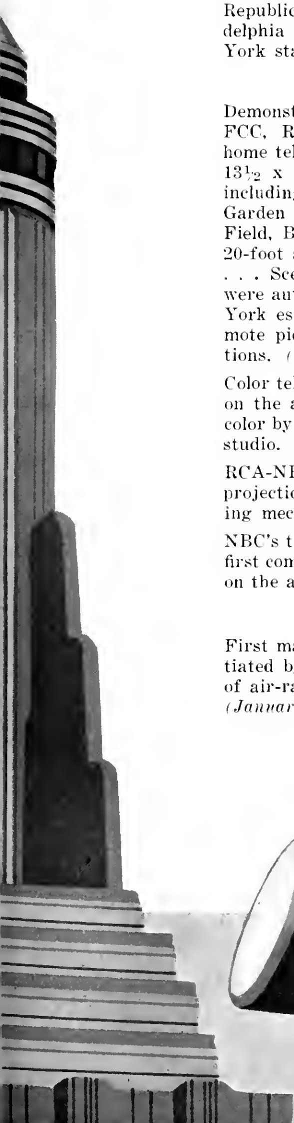
RCA demonstrated projection-type television home receiver featuring screen approximately 18 x 24 inches. *(March 15.)*

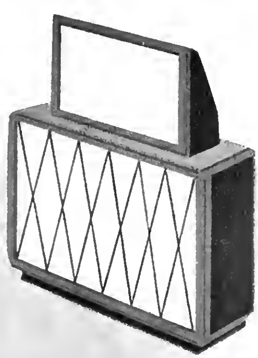
Films of Japanese signing surrender documents on board USS Missouri were telecast by NBC station WNBT, New York. *(September 9.)*

RCA Image Orthicon tube of supersensitivity was introduced as solution to major problems in illumination of television programs and outdoor pickups. *(October 25.)*

NBC's expanding television program service included these outstanding events: President Truman at Navy Day exercises in New York; coverage of the New York Herald Tribune Forum, and climaxing record coverage of the year's major sports events by televising the Army-Navy football game, professional football games and college contests.

Greatly improved black-and-white television pictures and color television in three dimensions featuring live talent were demonstrated by RCA at Princeton, N. J. The color system was mechanical; the black-and-white all-electronic. *(December 13.)*





Radar in Aviation

AIR TRAVEL FOR COMMERCIAL AND PRIVATE PILOTS WILL BE SAFER THROUGH USE OF ALTIMETERS AND LORAN EQUIPMENTS.

By H. M. Hucke

Manager, Aviation Radio Sales
RCA Victor Division

ON AUGUST 14, 1945, the Office of War Information issued a 20,000 word release on the subject of Radar. This statement was devoted almost exclusively to the military aspects of the subject and, as a result, the general public was left without an answer to the question, "What will Radar do for us in post-war years?"

Since the term "Radar" covers a wholly new family of radio devices and principles, it is not possible to produce a simple answer to the public's question. For example: Radar principles have been applied to gun directing, aircraft altimeters, precision bombing, precision navigation of both aircraft and marine vessels, warning against enemy bombing attacks, searching for submarines and at least a dozen other special purposes. In order to select those applications which will be useful to the public, it immediately becomes necessary to decide on one field of activity and cover that as a specialized subject.

For this reason, we will choose the field of private and commercial air navigation and limit our discussion to those Radar applications which will have useful application within the next two to five years. These are: Altimeters, Loran and the pictorial type of Radar as applied to collision prevention.

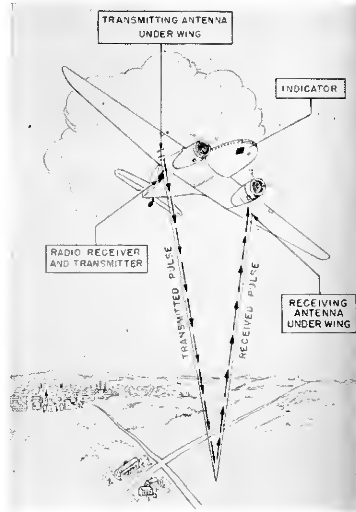
Army and Navy radar altimeters undoubtedly will be used in their present form by many commercial airlines. In the more distant future, radar altimeters may become standard equipment, even in the larger private planes. These altimeters show the actual height above ground or water, rather than the height above sea level or some other predetermined level as do conventional barometric altimeters. In addition, when flying at high altitudes the pilot or navigator need not make air temperature or barometric corrections of the radio altimeter readings. A radio altimeter and barometric altimeter may be used together to obtain corrected barometric readings for weather purposes over long ocean routes.

There are two types of radio altimeters now in general use. One of these altimeters is known as the RCA type AVQ-9. It weighs approximately 34 pounds installed. One of the units contains a small radar transmitter, a receiver, and the necessary power supply equipment. The second unit is a cathode-ray tube indicator and control unit. This indicator can be designed to cover any altitudes normally reached by airplanes.

Two Antennas Required

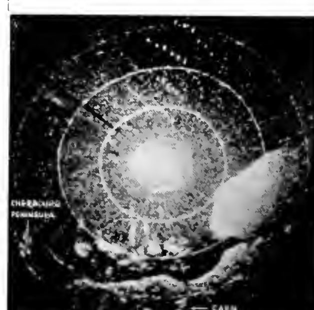
The transmitter-receiver unit may be installed in a remote position, with the indicator located near the pilot or navigator. The required two small antennas are installed on the underside of the wings or fuselage.

The fundamental operating procedure is well known. Radio pulses from the transmitting antenna travel to the ground and are then reflected back to the receiving antenna. The time of travel is measured and converted to distance by the indicator.



RADIO ALTIMETER GIVES EXACT HEIGHT OF PLANE BY MEASURING ELAPSED TRAVEL TIME OF MICROWAVE PULSE TO GROUND OR WATER AND RETURN.

The second type of radar altimeter is the RCA AVQ-6. This equipment weighs approximately 35 pounds installed. One large unit contains the transmitter, receiver, power supply and measuring circuits; one of the small units includes indicating meter and control switches. Two other small units are an altitude selector switch and indicator light unit. The large unit is located at a remote point, and the remaining units are mounted on the



ACTUAL SCOPE IMAGE OF FRENCH COAST AS RECORDED ON RADAR SCREEN IN PLANE. THIS PICTURE WAS TAKEN ON D-DAY.

instrument panel. Two small antennas are required and are mounted on the underside of the plane. This altimeter is available in single and double-range models, with altitude ranges of 0-400 and 0-4,000 feet. An additional feature of this model is an altitude limit switch which, when set to a desired altitude, allows automatic altitude control of a plane. The three indicator lights (red, amber and green) are included to inform a pilot of his altitude with respect to the desired altitude.

Operates on Different Principle

The AVQ-6 altimeter operates on a slightly different principle from the first radar altimeter described. The transmitter sends out a continuous radio-frequency signal whose frequency is continuously shifted up and down over a narrow frequency band at a low audio frequency rate (frequency modulated). Some of the radio energy travels directly to the receiving antenna and some of it travels to the ground whence it is reflected back to the receiving antenna. The energy that travels to the ground and back is delayed in time with respect to the energy going directly to the receiving antenna. Since the frequency of the transmitted signal is continually changing with time, there will be a frequency difference between the reflected and directly received signals. This difference is proportional to the altitude. Frequency-meter type circuits measure this frequency difference and cause the meter to indicate the plane's altitude above ground.

Both the pulse and the frequency modulation types of altimeters are used by the Army and Navy, and both will be used by civilian aviation. Designed by RCA, each has certain features that make it most suitable for certain applications. The FM altimeter in its present form is particularly useful at altitudes below a few hundred feet. This is the condition encountered in instrument landing.

The Loran navigation system is the outgrowth of a British system which was designed to guide bombers in their air-raids over Germany. The British principles were further developed by the Radiation Laboratory for the Army and Navy in this country. A series of ground stations has been installed on an almost world-wide basis in the past two years. Most of the work on the airborne receivers necessary to operate with the ground stations was done by the RCA Industrial Service Laboratory in New York and the latest design was manufactured at the RCA plant in Camden.

The Loran aircraft receiver is essentially a navigator's equipment rather than a pilot's, since it is used to obtain fixes on long over-ocean flights when celestial navigation is impossible because sun and stars are obscured by clouds. The time required to take and compute the fixes with the Loran is much shorter than celestial observation and the accuracy of the Radar system is as good as or better than that of the astronomical system. Fixes can be taken at distances of several hundred miles and sometimes at ranges of more than 1,000 miles from the ground stations.

Radar As Anti-Collision Device

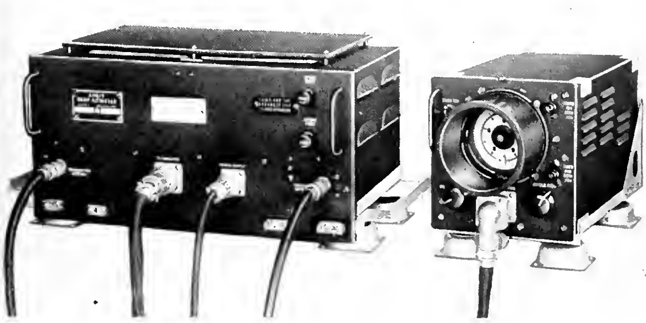
Collision prevention is one of the civilian applications of Radar most often mentioned. A good collision prevention device would be a valuable instrument, especially to a pilot "stacked up" in a solid overcast over a busy metropolitan airport. To be useful as a collision prevention device, a Radar system must not only detect the presence of an airplane and determine its distance, but it must also determine the altitude of the detected airplane with respect to the airplane carrying the detector, and the direction in which the detected airplane is traveling. Furthermore, the equipment should warn the pilot automatically of impending danger. It should not require the continuous attention of an operator in the airplane.

Radar Meets Requirements

Some of these requirements can be met by airborne equipment providing a Radar "picture." This "picture" will show the distance and direction of other airplanes but not their altitudes. A small auxiliary radio transmitter connected to an altitude measuring instrument installed in all airplanes could furnish the altitude information. (Such a device for automatically broadcasting altitude readings was considered by the Civilian Aeronautics Authority several years ago.) The combination of the two devices could furnish all information needed, but the full attention of an operator in the airplane would be required.

From the foregoing analysis, it is apparent that the commercial airlines will benefit immediately from the use of Radar altimeters and the Loran, while only the larger types of private planes will be able to carry these devices. Both private and commercial planes will benefit from the installation of Radar collision and traffic control devices on the ground, but several years of experimental work will be required before such systems will become generally available.

COMPLETE ALTIMETER INSTALLATION DESIGNED BY RCA TO COVER ANY ALTITUDE NORMALLY REACHED BY AIRPLANES.



HIGH ON THE STADIUM ROOF, AN NBC TELEVISION CAMERA CATCHES THE FORMATION OF WEST POINT CADETS PRIOR TO THE ARMY-NAVY FOOTBALL GAME AT PHILADELPHIA. PICTURES WERE TRANSMITTED TO WNBT, NEW YORK, OVER AN 80-MILE COAXIAL CABLE.

TELEVISION IS READY TO GO!

In Address to Radio Executives Club, Dr. Jolliffe Declared that All Elements of a Sight-and-Sound System Now are Ready for Public

GREATLY improved by wartime developments, television is ready to go, Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories, told the Radio Executives Club of New York, at the Hotel Roosevelt on November 15. All the elements necessary to the immediate expansion of an eminently satisfactory television service to the public have been developed, he said, and there is no technical reason for further delay in welding them into a system that "will give the American public a wonderful new service for which it has been waiting a long, long time."

Taking up in turn the camera, transmitter, network facilities and receiver, he highlighted the respective advances that have been made since 1940 and described their collective effect in producing high quality pictures for the home.

"Before the war," he said, "we used the Iconoscope—the "eye" of the television camera—to televise drama, sports events, films and other program material. The quality was good and the picture was reliable but we needed an excessive amount of light in the studio and fair weather out-of-doors.

"We also had the Orthicon, a pick-up tube approximately ten times as sensitive as the Iconoscope. It was particularly useful for outdoor events, such as football and baseball, but because it did not provide quite as much picture detail as the Iconoscope, the Orthicon did not solve the studio problem."

The next step, Dr. Jolliffe said, was the Image Orthicon, a development only recently demonstrated, which provides a camera tube 100 times more sensitive than the Orthicon.

"Although it is still in the development stage, the Image Orthicon is so good that we have every reason to believe that it can be used equally well in or out of the studio. Moreover, we can use it in other places where it was previously impossible to pick up a television picture at all.

"Using no more lights than are normally available in the ballroom of the Waldorf-Astoria Hotel, the National Broadcasting Company televised the recent Navy Day Dinner with the Image Orthicon. From this, it is apparent that we can take the television audience to the circus and the rodeo, to political conventions and to the halls of Congress."

Portability of equipment, another important factor in versatile programming, he said, has been helped greatly by the development of a complete set of cameras and associated units that can be placed in a station wagon and carried quickly to any desired point.

By utilizing experience and knowledge gained through their work on radar, Dr. Jolliffe said, engineers now are able to build transmitters that will produce all necessary power to give adequate service on any frequency within the present wave band.

"Before Pearl Harbor, we had available transmitters capable of operating at 5 kilowatts of power on frequencies between 40 and 108 megacycles. Now we can build them to operate at 50 kilowatts up to 108 megacycles and at 5 kilowatts all the way up to 300 megacycles. Furthermore, for the 5-kilowatt transmitters, we can design new antennas with sufficient gain to make the power equivalent to from 20 to 50 kilowatts."

Improvements in home receivers, he pointed out, are comparable to those made in cameras and transmitters. Previous objections to the small size of the reproduced image, he said, have been overcome by a new type of projection tube which provides a picture size of approximately 18 by 24 inches. In addition, he said, projection receivers have been improved to the point where the reserve of screen brightness permits showing of pictures in daylight.

Equals Best Home Movies

"The picture detail and contrast are good," he declared. "The result is comparable to the best 16 mm. motion picture."

Knowledge gained during the war, Dr. Jolliffe stated, will contribute not only to an improved quality in television pictures but also to lowering the cost of television receivers.

"We feel confident that we can manufacture direct-viewing and projection-type receivers at prices within the reach of the public in various income groups. The range probably will be from $150 to $200 for excellent direct-view table models, to $500 for the large projection console type."

The design of television antennas for private dwellings and small apartment houses, Dr. Jolliffe said, presents no problem.

"But for large apartment buildings," he added, "there is still work to be done in developing a satisfactory distribution system. This difficulty can be overcome in a short time. We have the necessary engineering knowledge, and the only question is one of design."

Network facilities, he said, are available in two forms, radio relays and coaxial cables, both of which are ready for immediate practical, commercial use. An automatic unattended radio relay system developed by RCA engineers and used as the basis of the multi-channel telegraph demonstration by Western Union a month ago can be utilized for the distribution of television for long distances across country.

Relay Tests to Continue

"We are not alone in this field," he continued. "The American Telephone and Telegraph Company recently revealed its radio relay developments, and has announced its intention of carrying on experiments in television relaying between New York and Boston."

A comparable station interconnecting system, he said, using coaxial cables installed by the Bell System, is spreading out across the nation and will span 1,500 miles by the end of this year.

In reviewing the coming demand for technical and servicing personnel in the television field, Dr. Jolliffe declared that the chief element of such a corps—trained manpower—is at hand. During the war, he reminded Club members, the armed forces trained thousands and thousands of men to maintain and operate complicated radio-electronic communications, navigation and radar equipment. This equipment incorporates most of the elements of television, ultra-high frequencies, cathode-ray tubes, wide band amplification, timing (synchronization circuits), etc. With some additional knowledge, the men trained in communications and radar will be ready for work as studio and transmitter technicians and as service men for home television sets.

Discussing permanency of present standards, Dr. Jolliffe stated that "the bugaboo of quick obsolescence in television has been overemphasized."

"Of course, there will be obsolescence; that is the only way the industry can grow. As long as research and development men work in the field there will be new things. If we wait for the perfect system, it will always be 'around the corner,' for men will think and will make new discoveries.

"The time is here when management must take television out of the engineering laboratory and give it a chance to grow up. We have coddled it as a baby for too long. It is bigger and stronger than we have thought. Its first strides will be bigger than a giant's, for it is equipped with Seven League Boots.

"By this I don't mean to say that television has reached the top of its technical development. We shall certainly see many more advances this year, next year and in the years to come.

"Ultimately, of course, we may expect such advances in all-electronic television as pictures in three dimensions and in color. We will have program transmission over world-wide networks, too. But these developments are still in the laboratory stage, and it will be a few years at least before they are ready for use.

"Meanwhile, we have the 'makings' of an industry that in all likelihood can eventually produce an annual income of between one and five billion dollars. Why wait?

Dividend Declared by RCA

At the Board of Directors meeting of the Radio Corporation of America held in New York on December 7, Brig. General David Sarnoff, President of RCA, declared the following dividends:

On the outstanding shares of First Preferred stock, $87\frac{1}{2}$ cents per share, for the period from October 1, 1945, to December 31, 1945, payable in cash on January 2, 1946, to holders of record of such stock at the close of business December 17, 1945.

On the outstanding shares of Common Stock, 20 cents per share, payable in cash on January 29, 1946, to holders of record of such stock at the close of business December 21, 1945.

DR. C. B. JOLLIFFE
EXEC. VICE PRESIDENT
IN CHARGE OF
RCA LABORATORIES
DIVISION

E. W. ENGSTROM
VICE PRESIDENT IN
CHARGE OF RESEARCH,
RCA LABORATORIES
DIVISION

E. C. ANDERSON
VICE PRESIDENT IN
CHARGE OF COMMERCIAL DEPARTMENT,
RCA LABORATORIES
DIVISION

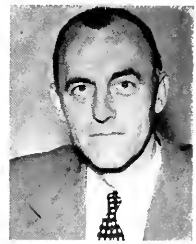
T. H. MITCHELL
EXEC. VICE PRESIDENT
RCA COMMUNICATIONS, INC.

L. W. TEEGARDEN
VICE PRESIDENT
IN CHARGE OF THE
RCA TUBES

J. W. MURRAY
VICE PRESIDENT
IN CHARGE OF THE
RCA VICTOR RECORDS

J. H. MC CONNELL
VICE PRESIDENT AND
GENERAL ATTORNEY,
RCA VICTOR

MEADE BRUNET
VICE PRESIDENT IN
CHARGE OF THE ENGINEERING PRODUCTS
DEPARTMENT,
RCA VICTOR



J. B. ELLIOTT
VICE PRESIDENT
IN CHARGE OF
HOME INSTRUMENTS,
RCA VICTOR

RCA EXECUTIVES PROMOTED

General Sarnoff Makes Announcement, Affecting Officials in New York, Camden and Princeton, Following Board Meeting on December 7.

ELECTION of E. W. Engstrom as Vice President in Charge of Research of RCA Laboratories Division and E. C. Anderson as Vice President in Charge of the Commercial Department of RCA Laboratories Division was announced December 7 by Brig. General David Sarnoff, President of the Radio Corporation of America, following a meeting of the Board of Directors. Dr. C. B. Jolliffe, Vice President in Charge of RCA Laboratories, was elevated to Executive Vice President in Charge of RCA Laboratories Division.

At the same time, five officials of the RCA Victor Division were elected Vice Presidents in charge of their respective Departments of RCA Victor. They are Joseph B. Elliott, Vice President in Charge of the RCA Victor Home Instruments; Meade Brunet, Vice President in Charge of the RCA Victor Engineering Products; L. W. Teegarden, Vice President in Charge of the RCA Tubes; J. W. Murray, Vice President in Charge of the RCA Victor Records, and J. H. McConnell, Vice President and General Attorney of RCA Victor.

Thompson H. Mitchell, at present Vice President and General Manager of RCA Communications, Inc., was elected Executive Vice President of RCA Communications.

Mr. Engstrom, as Director of Research of RCA Laboratories, supervised research and engineering which resulted in wartime advances in radar, television, radio and other electronic developments. Prior to his appointment to that post in 1943, he had served for thirteen years in RCA research positions. He is a graduate of the University of Minnesota and a Fellow of the Institute of Radio Engineers.

Mr. Anderson has been Commercial Manager of RCA Laboratories for the past five years. He joined the Company in 1922 as a sales representative in the New York area, and subsequently served as Assistant Manager of the RCA Tube Department and RCA License Administrator. He is a graduate of Columbia University, Columbia Business School and Harvard Graduate School of Business and Administration.

Mr. Elliott, who has been active

in the radio-phonograph sales field for 17 years, was appointed General Manager of the RCA Victor Home Instruments last July, returning to the RCA organization after serving for a time as a sales and advertising executive with another company. During the war, he was on special assignment as manager of RCA's field procurement operations and helped to organize the Company's huge wartime procurement program. He is a graduate of Georgia School of Technology and Columbia University.

Mr. Brunet became associated with RCA in 1921. He was in charge of production and distribution of RCA Radiotrons and Radiolas for five years and was appointed manager of the Radiola Division. In 1930, he advanced to Sales Manager, and later was promoted to various executive positions, including that of General Manager of the Engineering Products. He is a graduate of Union College.

Mr. Teegarden came to RCA in 1930. Three years later, he was elevated from East Central District Manager for radio tubes to tube sales head in the New York area, and in 1936 became New York District Sales Manager for all RCA products. He took charge of tube renewal sales in Camden in 1938, and soon after was appointed Manager of RCA's Tube and Equipment Department. Earlier this year he was named General Manager of the RCA Tubes.

Active in the record business since 1928, Mr. Murray joined RCA Victor three years ago as General Manager of the Phonograph Record Commercial Division, and was promoted to General Manager of the RCA Victor Records. From 1932 until 1939, he was engaged in the sales and manufacture of phonograph records in the Far East. Upon his return to this country, he continued these activities in the recording field. He is a graduate of Columbia University.

Mr. McConnell joined the Company in 1941 as a member of the Legal Department in Camden, and the following year he was appointed General Counsel of RCA Victor. He became General Attorney of the Division this year. A graduate of Davidson College, Davidson, S. C., Mr. McConnell received his Doctor of Laws degree at the University of Virginia.

IMPROVED ACOUSTICS IN NEW NBC STUDIO

A new studio embodying many distinctive features designed to improve its acoustics while presenting a pleasing atmosphere for audiences was unveiled recently by the National Broadcasting Company in Radio City.

Located on the sixth floor of the RCA Building and designated 6D, the new studio is equipped with 227 removable seats. The room is 30 feet wide and 67 feet long, with a stage 34 feet deep.

The ceiling of the new studio is sawtooth in shape. This irregularity reflects sound in a diffused pattern and at the same time gives proper reflection of the fluorescent lighting. To prevent stray humming noise, originating in the lighting units, from reaching microphones, control apparatus for the fluorescent lamps is installed outside the studio.

The rear wall of the stage is wholly reflective. Applied on it at random are thin global sections or "diffusispheres," as they have been termed. These rounded surfaces disperse sound waves, thereby eliminating the possibility of disturbing echoes. Draperies hung on the rear wall of the stage control acoustical conditions for proper microphone balance.

The side wall, into which the control room and clients' booth are inset, is composed of a series of non-parallel surfaces which prevent sound waves from being constantly reflected back and forth between opposite sides of the studio. Side-by-side placement of the two booths is unusual in studio design. This arrangement permits occupants of the clients' booth to observe technical operations through the plate-glass partition between the two rooms.

A different acoustical treatment is applied to the opposite side wall. Irregularly-shaped areas, like huge patches, extend outward a short distance from the wall, and the intervening area is covered with random-spaced "diffusispheres."

The rear wall of the studio is flat, treated over the major portion with a rock wool blanket under a perforated asbestos board to improve acoustical characteristics.

Construction of 6D was carried out under the supervision of O. B. Hanson, NBC Vice President and Chief Engineer. George M. Nixon handled the acoustical design. Architectural supervision was by W. A. Clarke and C. A. Rackey directed installation of equipment.

VIEWS OF NEW NBC STUDIO IN RADIO CITY SHOWING UNUSUAL FORMS OF WALL AND CEILING TREATMENT TO DIFFUSE SOUNDS AND PREVENT TONE-DESTROYING ECHOES. THE PATTERN OF ROUNDED SURFACES AND EMBOSSED PATCHES IS DIFFERENT FOR EACH WALL.

NBC SETS UP PLANNING GROUP

NETWORK ESTABLISHES NEW DEPARTMENT TO INITIATE DEVELOPMENTS IN POLICIES, OPERATIONS AND STATION RELATIONS.

By William S. Hedges
Vice President in Charge of Planning and Development, National Broadcasting Company

RECENTLY the National Broadcasting Company established a Planning and Development Department. This does not mean that heretofore there had been no planning in NBC. The conspicuous progress of NBC since its formation in 1926, had been accomplished by ideas and planning emanating from practically every department of the company. The development of a nation-wide network was based upon the principle of a geographic distribution of clear channel, regional, and local stations so located as to avoid undue encroachment of any one station upon the normal service area of another, with the ultimate objective of securing maximum coverage possible of the radio homes in the United States. Despite the limitations of unscientific (from a radio standpoint) distribution of populations and lack of availability of stations of the right type in every desired city, the National Broadcasting Company network today closely approaches the objectives set down by the Station Relations Department eight years ago. This is an example of planning and implementing a plan by persistent effort throughout the years.

Planning is as natural an instinct for mankind as the instinct of survival—indeed it plays a very large part in that basic instinct, for survival against the competition of other creatures endowed with intelligence can be accomplished only through planning. The old caveman's first plans were concerned with providing food and shelter for his family and protection against wild animals and marauding fellow humans. Fundamentally, mankind has not changed. To survive in business it is necessary to plan—to devise methods of improving the service now being rendered and to lay plans for utilizing new ideas, new technical devices and new procedures so that, as a minimum goal, competition will always be met if not surpassed.

During 1945, broadcasting celebrated its twenty-fifth anniversary. They have been fruitful years, in which a great industry has been developed, a great industry which has founded its success upon service to the American public. There have been many advancements in the art and science of broadcasting but the evolutions of the past twenty-five years have not wrought technical changes as sweeping as those that now confront us.

Changes Foreseen Before War

We could see those changes coming even before the war. FM had been introduced; television was a reality, and doubtless both would have been offered to the public on a large scale had it not been for the intervention of war. Neither government nor industry could devote much attention to FM or television while the war was on, but within little more than three months after V-J Day new allocations have been issued by the Federal Communications Commission for both FM and television. In fact the allocations were announced during the same month in which the broadcasting industry was celebrating Radio Week.

Thus twenty-five broadcasting years mark the end of an era and the beginning of a new one during which we can anticipate more revolutionary changes in the broadcasting system than have occurred during the first twenty-five years of broadcasting. It is not inconceivable that FM will supplant most local and many regional stations; nor is it impossible to visualize a complete integration of television with the sound broadcasting system. Such possibilities demonstrate the necessity for planning,—planning ways and means of providing the best service to the American public, utilizing the new systems of which we now have knowledge and the still newer developments which are beyond the horizon and hence presently unknown to us, and planning to maintain a position within the industry whereby the rewards will be commensurate with the service rendered.

Full Network Plan Succeeds

When it became apparent that a more widespread distribution of network programs of the more popular type was necessary in order for broadcasting to render a maximum service to American listeners, wherever located, a plan had to be devised. It was the full-network discount plan, which served as such a fine inducement that most of the programs on NBC now exceed the minimum requirements of the plan.

The National Broadcasting Company was less than ten years old, when it moved to Radio City, with the finest studios ever seen in broadcasting. It had, by that time, already acquired a fine plant in Chicago, with a studio and office setup which was far more complete in every detail than NBC's original home at 711 Fifth Avenue, New York City. But in spite of its elaborate facilities in New York and Chicago, NBC recognized the fact that Hollywood was destined to become a program originating point of tremendous importance. To meet this situation a new studio and office building was planned and constructed, and Hollywood today enjoys top rank as a program origination point.

One of the most far-seeing planners in the entire company has been the Engineering Department. It was necessary for the engineers to conceive of broadcasting on a much vaster scale than has ever been dreamed of before, when they made their plans for the installations at Radio City and thoughtfully provided for expansion even beyond what might have been regarded back in 1931 as the ultimate in planning. The Engineering Department must now concern itself with plans for FM and Television. They must be alert to every technical change; they must, as they have in the past, devise practical application of dreams and inventions of laboratory workers.

With all of these examples—and there are many more—of successful planning for NBC, why have a Planning and Development Department?

It all goes back to a fundamental concept which Niles Trammell, president, and Frank E. Mullen, vice-president and general manager, have of company management. They believe in the teamwork principle, which they have carried out by the establishment of NBC's Management Committee, which is comprised of the officers and department heads and with the creation of the Staff Operating Committee, made up of key men and women from each department.

Company Will Be Stronger

Through coordination of thinking, planning and acting the company will be stronger and more efficient in its operations and in meeting the problems of the future. Every department will be encouraged to continue its own planning, but the plans of each department will clear through the Planning and Development Department in order that any plan affecting other departments may be coordinated with the needs and desires of all departments concerned.

The Manager of the Planning and Development Department is James M. Gaines who brings into the department eight years of diversified broadcasting experience gained in publicity, advertising and promotion, research, station relations and programming. Direction of all engineering and facilities problems comes under the supervision of Philip I. Merryman who for many years has served as Director of Facilities Development and Research and in the Station Relations Department. The financial advisor to the Department is Harry F. McKeon, Controller of the National Broadcasting Company.

An objective view of NBC's new Planning and Development Department was contained in a recent issue of the business letter entitled "Planning for Business".

Under the heading "BUSINESS PLAN OF THE WEEK" the article said in part:

"Recently (the National Broadcasting Company) decided to establish a planning and development department. A vice president was put in charge to be assisted by four executives . . . these are an advertising and promotion man, a facilities-development executive, an engineer, and a controller.

"The separate departments at NBC still do planning, but keep the new department acquainted with their activities. Thus one department's planning that may have a bearing on some other plans can be coordinated with those. At the same time, possible conflicts and duplications in connection with the work of the new department are prevented through frequent exchanges of information.

"The planning department . . . also . . . initiates plans that are sometimes worked out by other departments. Knowing that departments can get so close to their jobs that they fail to see opportunities to do new and better things, the . . . (Planning) department is constantly on the alert to uncover opportunities for improvements.

"The new department isn't cumbersome. It operates elastically, because rapid adjustability is especially required in the fast-moving broadcasting business.

"Today at NBC the planners take up a finished plan with the president and the general manager, who can usually make prompt decisions on the broad principles presented with the plan. Thus they avoid the burden of the planning details that formerly hampered them in setting policy and in administration."

NBC STARS AND SHOWS SWEEP POLL OF EDITORS

Network Wins 15 Out of 25 First Places in Annual "Fame" Contest

NBC programs and personalities scored 15 out of 25 first awards—more than all other networks combined — in Motion Picture Daily's 10th Annual "Fame" poll of radio editors, columnists and critics in the United States and Canada, announced on December 12.

Bob Hope won three top honors in the poll. In addition to capturing the "Champion of Champions" designation, which is the highest program classification, for the fifth consecutive year, the NBC comedian was voted radio's "best comedian" and his program was voted the "best comedy show."

The remaining awards in the "best comedian" classification went to Fred Allen, who placed second; Ed Gardner and Edgar Bergen, tied for third, and Jack Benny, fourth—effecting a clean sweep for NBC in this division. NBC also took every honor in the "comedy show" classification, with the Bob Hope program first, Fibber McGee and Molly second, and Fred Allen's show third.

Wins Award for Sixth Time

Another perennial NBC winner was Bill Stern. His selection as the best sportscaster of 1945 marked the sixth time he has won this award.

Additional highlights of the poll were the selections of H. V. Kaltenborn as the best news commentator, Fred Waring's musical show, as the best daytime program, and Bing Crosby's designation as radio's best master of ceremonies and most popular male vocalist.

Other NBC winners were Fibber McGee and Molly, best comedy team; John Charles Thomas, best male classical vocalist; Gladys Swarthout, best female classical vocalist; Dinah Shore, best female vocalist in the popular music class; Harry von Zell, best studio announcer; Arturo Toscanini, best symphonic conductor, and "Information Please," best quiz show.

ENGINEERS VISIT RUSSIA

RCA Group Inspects Radio and Electronic Factories in USSR and is Impressed by Soviet Interest in American Developments.

ON May 10, 1945, four RCA men climbed aboard a big transport plane at La Guardia Field, New York. Three months later the group, consisting of Karl Dryer, E. A. Laport, B. F. Moore, Jr., and Dr. B. E. Shackelford, returned to the same take-off spot on a larger Army transport plane. In the meantime, they had crossed the Atlantic by ship from Mobile, Alabama, travelled down the Mediterranean to Istanbul, Turkey, across the Black Sea to Odessa, U.S.S.R., and thence by train to Moscow, their main objective. During their stay in Moscow, they astonished even American consular and Embassy officials with their ability to work rapidly and in close harmony with Soviet commissariats and high engineering officials of the U.S.S.R. Finally, after completing their mission in the Russian capital the quartet started homeward on August 1 by way of Leningrad, Helsinki and Stockholm where a west-bound transport plane picked them up for a fast hop to New York.

The trip was made with a twofold purpose, viz., to study technological conditions in the U.S.S.R. and to renew valuable commercial friendships made with Russian scientists who have visited Camden, Harrison and Princeton during and before the war years.

Representatives of Intourist, the Soviet organization which assists foreigners in their travels and hotel arrangements in that country, met the RCA delegation at Odessa and were at the service of the group throughout its stay in Russia. Not only did Intourist smooth out many of the problems that a visitor encounters in the Soviet Union but it arranged for registration with the militia, obtained theater tickets and assisted in arranging a banquet which the RCA visitors later gave for its hosts.

Travelers Get Cordial Welcome

The four men found a welcome and cordiality wherever they went. Two of the technical organizations which direct Soviet manufacturing and operating activities in radio and allied fields joined in giving the travelers three of the fabulous banquets for which the Russians are famous. Each dinner lasted for four or five hours.

During their entire stay in the U.S.S.R., the Americans were free to circulate in the community as they pleased, without special permission or passes. This freedom gave them an excellent chance to study the people and their customs. They made the most of the opportunity. This was a study well repaid, for the Russians were found to be very pleasant associates. On the trains and in other places where contacts were made, the individual citizen was friendly and cordial and often went out of his way to give information or be helpful. It also was found that Russians and Americans are in many ways alike and have many similar fundamental points of view. Consequently, they did not always feel in a foreign land, but sometimes very close to home.

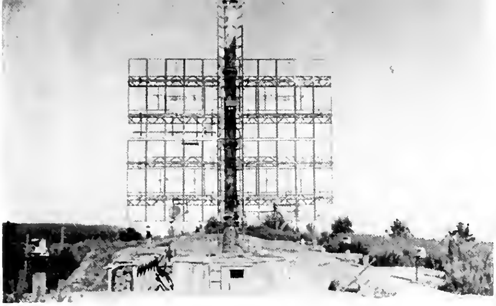
The group inspected factories manufacturing radio tubes and other items, and discussed with Soviet engineers current trends in radio development and equipment. Soviet engineers were keenly interested in developments in the United States during the war years when they had necessarily been engaged in the primary business of defending their own cities and homes. The devastation resulting from the fighting was only too evident in the factories as well as in the countryside.

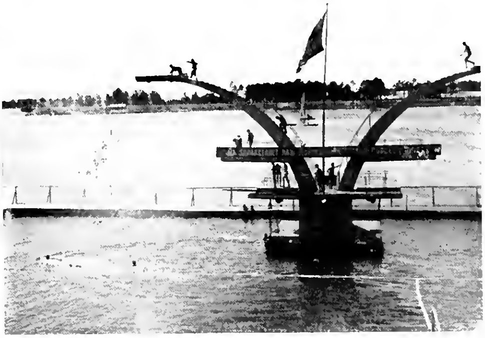
Talks with the various commissariats early revealed the deep interest of the Russians in late American equipment. They discussed the status of AM and FM receivers and transmitters and asked for details on the progress of television and facsimile in the United States.

Fear of Delays Unfounded

When the group arrived in Moscow, consular officials warned them that the Russians were likely to be delayed in starting the many joint meetings which had been scheduled. Hearing this, the visitors studied the calendar and wondered how long they would be delayed beyond their intended return date. Almost immediately they discovered that their fears were completely unfounded. By the time the Americans had ex-

LEFT: RIVER BOATS AT THEIR DOCK ALONG THE STOCKHOLM WATERFRONT. BELOW: A VIEW OF ONE SECTION OF GORKI STREET IN MOSCOW, ONE OF THE PRINCIPAL THOROUGHFARES OF THE RUSSIAN CAPITAL.





THE HUGE GRID OF AN EARLY GERMAN RADAR INSTALLATION DOMINATES THE COASTLINE ON A FINNISH SHORE. RIGHT: FLARING HORNS AND CROSSWAYS PROVIDE PLATFORMS FOR ACQUATIC SPORTS AT A MOSCOW VACATION SPOT.

pressed their final thanks and their genial hosts had replied with a sincere "Do Sveedanye!", the two groups had held 25 meetings and had visited many important spots. Frankly amazed, a representative of the U. S. Embassy could only ascribe this unusual accomplishment to the ability of the RCA delegation to work in full harmony with the Russians.

General living conditions in U.S. S.R., the visitors soon discovered, vary with the city and the extent of the war damage. At Odessa, headquarters were at the Hotel London, one of the first buildings in that Black Sea city to be rehabilitated. This probably was because the hotel was only slightly damaged and could be restored to use as soon as the necessary electrical and water supplies had been made available. Furnishings and accommodations showed the effect of the war years. There was evidence that many of the people had had insufficient food, although their appearance indicated that conditions were better. Although the party felt the extreme scarcity of luxury items, it was everywhere given the best available.

Moscow Conditions Are Better

Conditions were much better at the Intourist Hotel National in Moscow. Moscow had escaped for the most part the usual bombardment and bombing, and the hotels had been kept in condition in order that the necessary visitors to Moscow might receive the best possible hospitality. Each room assigned to the Americans was equipped with hot and cold water, and one room had private bath. The furnishings were not new but much superior to those found in many hotel rooms in our own country. Housekeeping and cleaning activities were so continuous that sometimes it would have been preferable to have the premises remain slightly dirty.

Menus Are Standardized

Regular hotel fare in Moscow was rather on the dull and uninteresting side, relieved occasionally by the inspiration of some dish which seemed to bring a breath of home. Within the limits of the ration tickets and powers of persuasion over the dining room staff, a particular dish was often made a repeat item. It was very pleasing, therefore, when the RCA foursome were invited to the American Embassy for luncheon or dinner. At intervals, it was desirable to patronize the government-operated commercial restaurants where ration cards were not necessary but where a good meal was costly. For instance, a typical menu included meat, 55 rubles; salad, 35 rubles; coffee, 10 rubles, and a plate of ice cream, 40 rubles. Since a ruble is equivalent to about 20 cents a complete dinner meant an outlay of nearly $40 a person.

The returned engineers will not soon forget their train passage through the Ukraine from Odessa to Moscow. Intourist secured for them a compartment with four berths in the only soft class car on the entire train but it was not an easy trip. The better rolling stock had been destroyed by the Germans and that which remained was not in good condition. There was no restaurant car and the food offered for sale at way-stations, while intriguing in appearance, was not recommended for recently arrived foreigners. The U. S. Army Mission in Odessa had supplied a huge sack of Army rations and utensils, and this largess, supplemented by hard-boiled eggs and black bread bought along the way, made mealtime worthwhile and interesting.

The railroad between Odessa and Moscow suffered heavily from the war. Every bridge, trestle and culvert had been destroyed and rebuilt with wood. A large proportion of the trackage had been pieced out with short sections of scrap rail, some of the replacements not over 5 feet long. As a consequence, train speed was limited and the 1,200 kilometer trip consumed 60 hours.

Subway Well Run

The subway, it soon was discovered, affords the best transportation in Moscow. The trains are clean and bright and are run on schedule. The fare is 40 kopecks or about 7½ cents.

Much of the success of the visit of the RCA group, from the personal standpoint as well as from that of business, was due to the most effective and cordial assistance of the staffs of the American Embassy and American Military Mission in Moscow. No problem was too complicated or too simple for them to be of real help, always given graciously.

FRANK M. FOLSOM, EXECUTIVE VICE PRESIDENT IN CHARGE OF RCA VICTOR (CENTER), DISCUSSES THE RCA-GIMBELS TELEVISION MERCHANDISING TEST WITH BERNARD GIMBEL (LEFT), PRESIDENT OF GIMBELS, INC., AND ARTHUR C. HOFFMAN, EXECUTIVE HEAD OF GIMBELS-PHILADELPHIA.

250,000 SEE STORE VIDEO

Television Proves Its Effectiveness as Merchandising Medium in First Department Store Experiment Conducted at Gimbels in Philadelphia

THE first extensive test of television's role as an advertising and merchandising medium for department stores was successfully carried out in October and November at the Gimbels-Philadelphia store in cooperation with the RCA Victor Division. In a run of three weeks, the intra-store displays were witnessed by 250,000 people.

Supervised by RCA Victor engineers, a complete studio and control facilities were set up in the store auditorium with accommodations for an audience of 500 at each program. RCA Victor television receivers were installed at 20 viewing centers or "telesites" throughout the store's seven floors, each room seating an average of 15 people. More than two miles of coaxial and audio cable were needed to connect the studio with the "telesites."

At the beginning of the project, specially written shows consisting of demonstrations of goods and services interspersed with entertainment were staged every half hour with each show limited to ten minutes. Audience reaction was carefully checked and from the information thus obtained, the studio productions were altered to derive the most favorable consumer effect. It was soon determined that shoppers preferred to watch actual demonstrations with little or no accompanying entertainment and the staging format was changed accordingly.

In conjunction with the regular shows, RCA Victor prepared a colorful exhibit of the company's television equipment and allied electronic and communications products in the foyer, adjacent to the auditorium. Among the products shown were the electron microscope, advance models of broadcast receivers and a display of tubes ranging from the miniatures used by the Army and Navy to the huge power tubes that transmit broadcasting and television programs.

Window Exhibits a Feature

One of the high-lights of the intra-store demonstration was the display of a series of five attractive television window exhibits. These displays were designed for RCA Victor by W. L. Stensgaard and Associates, noted industrial designers. The windows provided a graphic story of the evolution of television and the important part RCA has played in making possible this modern type of entertainment and merchandising. Their position in the street-level windows on the side of the store facing Market Street, one of Philadelphia's busiest thoroughfares, drew many passersby into the store to watch the actual programs.

In its final report on the "Shop-By-Television" experiment, Gimbels-Philadelphia officials said that the "store's sales for the period showed a considerable improvement" over Federal Reserve averages for the district.

The "Shop-By-Television" demonstration opened at the Gimbels-Philadelphia store on October 23 and extended through November 14. According to the store's report, 124,987 persons were checked into the auditorium studio to witness the actual telecasting program and another 100,000 made up the estimated attendance at the 20 telesites.

Visitors Give Impressions

In an attempt to evaluate the customers' reaction to television, RCA Victor's Market Research Department conducted a poll by questionnaire cards distributed to viewers at the telesites. Analysis and tabulation of the 2,373 returns showed that:

(a) More than 88% believed intra-store television would become a big aid to the store shopper.

(b) More than 62% indicated the "Shop-By-Television" feature had attracted them to the store.

(c) A greater percentage indicated "Yes" when asked if they intended to visit the departments selling the merchandise displayed during the shows.

(d) About 70% said this was the first time they had seen any type of television.

Because of the interest in intra-store television shown by department store executives throughout the country, RCA Victor has prepared an illustrated brochure titled "RCA Victor Television—Opening a New Merchandising Era for Department Stores," which has been widely distributed to leaders in the fields of advertising, selling and marketing.

According to the booklet, progressive management can profit in four ways from the use of video. The store may operate a complete television station, broadcasting entertainment and educational programs, to extend the firm's prestige and add to the force of its advertising. The second way is to operate a fully equipped studio within the store itself, televising fashion shows, product displays and demonstrations, which could be delivered by a wire link to a local sight-and-sound transmitter and televised from there as regular commercial programs.

The third use of television, suggested by the booklet, would be in the form demonstrated at Gimbels where the television system is limited to the store itself for the purpose of making additional sales to shoppers already there. And finally, the brochure points out, the exhibition of television in action would create a market for home television sets which the store could supply in the same way that it merchandises radio receivers and household appliances.

Gimbels - Philadelphia speculated on the possibility of national advertisers sharing some portion of the cost in intra-store television. Stating that there are enough national advertisers to "provide either scripts or films to be used in video productions to reduce cost of production," the report said these advertisers could pay for time on the television system as they now pay for space in newspaper advertisements appearing under the store's name. "This," the store said, "would make it possible for the expense of a television system to be self-liquidating."

TWO OF THE FIVE EYE-CATCHING WINDOW DISPLAYS WHICH ATTRACTED THOUSANDS TO THE DEMONSTRATIONS OF MERCHANDISE AT THE TWENTY "TELESITES" WITHIN THE GIMBELS STORE.

"RCA REVIEW" RESUMES

Publication of "The RCA Review" will be resumed in March, according to Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories. The Review has been suspended since April 1942 because of the ban placed at that time on the distribution of technical information related to war production. George M. K. Baker, staff assistant to Dr. Jolliffe, will be manager of the quarterly publication. Editorial and business offices will be at RCA Laboratories, Princeton, N. J.

First published in July, 1936, for the purpose of presenting research and development activities and accomplishments of RCA engineers, the Review became widely recognized in radio and electronic fields.

Purposes of the new "RCA Review" will be, for the most part, according to Dr. Jolliffe, similar to those of the earlier editions: To present for all scientists and engineers interested in electronics and related fields the latest information available from RCA activities as they affect the advance of electronics as a science, an industry and a service; to maintain a continuous permanent record of important RCA research and engineering advances in electronics and related fields; to provide RCA authors with a readily accessible journal of high prestige through which they may present research and engineering treatises, significant executive and management papers, with the assurance that such papers will receive the attention of outstanding scientists and engineers as well as others interested in the fields to which they pertain, and to maintain the prestige of the Radio Corporation of America, its companies and divisions in research and engineering by presenting written evidence of RCA achievements.

Mr. Baker was graduated from Annapolis in 1939. During his active service with the Navy he prepared manuals on various phases of electronics and most recently was attached to the staff of Admiral Nimitz as the Pacific Fleet Radar Countermeasures Officer, with the rank of Lieutenant Commander.

RCA Extends Communications

Fifty-Seven Countries Now Served by Direct Radiotelegraph Circuits from the United States; Fifteen Services Were Inaugurated During the War

WHEN German forces in 1940 swept into Czechoslovakia, first of the little nations to be invaded, the radiotelegraph link maintained by RCA Communications, Inc., between the United States and Czechoslovakia was broken. Other interruptions of direct service followed as the enemies, first in Europe and later in the Pacific extended their control. But the possibility of such catastrophies had been foreseen at RCA. Where the loss of one terminal serving as a relay point, affected others, arrangements were made either to detour messages around enemy-held territories or to establish new services. As the war turned in favor of the United Nations, RCA was prepared with new equipment and operating crews to move into reconquered capitals and reestablish regular radiotelegraph, radiotelephone and radiophoto services.

The story of the total destruction of RCA facilities at Manila on December 31, 1941, has been frequently told. Although this demolition, which was carried out under orders of the U. S. Signal Corps to prevent high-powered stations in the Philippines capital from falling intact into enemy hands, stopped all service to and from the Islands, the original interruption lasted for only nine days. On January 9, 1942, RCA Communications reopened its offices at Cebu on the island of the same name, and communications were reestablished immediately. However, after a few weeks Cebu was occupied by the Japanese and service to the Philippines ceased for the time being.

A month later, on February 10, a new direct radiotelegraph circuit between New York and Teheran, Iran, was opened by RCA. Previously, all radiotelegraphic traffic from the United States to Teheran had been routed by way of London. The new circuit of 6,000 miles provided faster service at a critical time.

The next expansion in 1942 took place on February 21 when RCA further strengthened the radio lifeline of communication between the U. S. and Australia with a new direct radiotelegraph circuit linking San Francisco and Wellington, New Zealand. Here again the new circuit eliminated a relay point at Australia with a consequent saving in message-delivery time. This accomplishment by RCA Communications was signalized by an exchange of congratulatory messages between President Roosevelt and Prime Minister Fraser.

New Circuit Outwits Enemy

Working in collaboration with the Dutch Government, RCA succeeded on March 11 in transmitting the first messages to the East Indies through Sumatra thereby circumventing the enemy which four days earlier had occupied Batavia, a former point of relay to the East Indies. An interesting sidelight in connection with the reopening of these facilities was the long course taken by one of the first messages. This dispatch was filed by a bank in Madras, India, for its branch in Medan, only 700 miles away across the Bay of Bengal. To reach its destination, the message went to Bombay by wire, then by radio to London where RCA picked it up and transmitted it to Medan via New York and San Francisco. Over 27,000 miles of the globe's surface was traversed by the message in order to span a distance of 700 miles.

March, 1942, continued to be an active period for the restoration of old services and the creation of new ones. On the 13th, a station on the vital island of Noumea, New Caledonia, handled its first traffic direct with San Francisco. On the 17th, RCA put into operation its new error-proof radiotelegraph printer on the New York-Buenos Aires circuit, and on the 21st, pictures flashed through the air 7,420 miles between Melbourne, Australia and San Francisco over the first direct radiophoto circuit ever operated between the two continents. Before the month ended, RCA Communications was able to announce a new radiotelegraph circuit connecting San Francisco direct with Kunming on the Burma Road in China.

Facilities Increase Rapidly

Through the remaining months of the year, RCA continued to make new facilities available to the rapidly increasing United Nations military forces. New York and Cairo were linked on June 23 by a two-way radiophoto circuit, the first such service between the two points. Bermuda commenced to benefit from direct radiotelegraph service with New York on August 10th, and on November 16th, the New York office of RCA Communications received by radiophoto from Sweden a picture of King Gustaf and guests to inaugurate a new service between the two countries.

The year 1943 saw the establishment of three new and important circuits. The west African port of Dakar was linked with New York on March 9; the first direct radiotelegraph service between Ecuador and New York went into regular operation on May 1, and a new radiophoto service to Berne, Switzerland was announced on September 21.

Following closely on the heels of the Allied occupation forces in Italy, RCA engineers opened a direct link between Naples and New York on February 1, 1944 and duplicated the feat on June 13 at Rome, using replacement equipment which was shipped from the United States in anticipation of the liberation of the Italian capital. With the Indian Radio and Cable Company as operators of the Bombay terminus, RCA inaugurated direct service to India on August 15.

Continuing the energetic follow-up of the victorious armies of the United Nations during the final days of the war, RCA facilities were established in Germany and Austria on August 3, 1945; with Tokyo on August 30 and with Shanghai on October 22.

The Vienna station was a mobile RCA unit, formerly located in Northern Italy and then flown, at the request of the U. S. Army, several hundred miles across the Mediterranean by a fleet of fourteen C-47 transport planes.

The Berlin station was shipped to Europe from this country and stored in Paris until arrangements could be made for its permanent installation in the German capital.

Prior to September 1939, at the beginning of World War II, RCA Communications, Inc., had direct radiotelegraph circuits to 42 countries. In mid-December of 1945, RCA had extended its coverage with 15 additional circuits. When service to Poland is resumed, RCA Communications will be operating 58 radiotelegraph circuits to practically every important country in the world.

H. G. BAKER PROMOTED

Appointed General Sales Manager of Home Instruments Division.

Henry G. Baker, formerly general purchasing director for RCA Victor has been appointed general sales manager of the Home Instrument Division.

Mr. Baker will have complete charge of sales, advertising and promotional activities for the Home Instrument Division which handles the manufacture and sale of radio receivers, television receivers and Victrola phonographs. In addition, he will continue to assist the newly appointed general purchasing agent in the organization and operation of the general purchasing department.

The new appointee entered the radio industry more than 25 years ago when, as senior partner in the firm of Baker Brothers, he pioneered in radio retail sales and merchandising in Newark, New Jersey. After serving as regional manager for the RCA Special Region of Army-Navy Electronics Production Agency, handling the expediting materials on all RCA contracts with the Army and Navy, he joined RCA Victor in 1943 as purchasing agent for the company's Indianapolis plant. In 1944, he was transferred to Camden as general purchasing agent for standard components and in April, 1945, he was made general purchasing director.

NBC TELEVISION MOVES TO NEW QUARTERS

Space Will Provide Rooms For Offices and Rehearsals.

OCCUPANCY of the newly-acquired space for NBC Television in the South Studio section of the sixth floor of the RCA Building in Radio City is expected early in the new year.

According to plans, the area will be occupied by personnel of the program, production facilities and administrative staffs of the NBC Television Department. The space, which measures approximately 10,000 square feet, provides for two large storage rooms, a conference room, two rehearsal rooms, twelve offices and a large reception foyer.

The first and largest of the storage rooms, which fronts on the corridor in the south studio section, measures 1,550 square feet and will extend upward through the seventh floor. This double floor space, which has the same dimensions as television studio 3-H, will be utilized for the pre-construction of all sets prior to the time the play is in the rehearsal stage. Since the studio and this storage room are the same size, it will be possible to erect the sets in exactly the same relationship and proportions as they will be installed later for the performance. In this space, the sets will be painted, decorated and furnished. Just before camera rehearsals begin, the old sets will be struck and the new ones taken downstairs for the next program.

The central floor space in this storage room will be utilized for machine tools, such as band saws, lathes and the like. Along one side, a movable paint-frame of about 30 to 35 feet will be installed. A platform will enable painters to stand in front of the set being painted and the walls will be shifted vertically to permit the painters to remain in the same position as they work.

Directly to the east of this storage room is a smaller, single-floor storage space measuring 527 square feet. Half of this room will be used for a paint stock- and paint-mix room; also it will have lockers and showers installed for workers. The other half of this smaller room will be used for raw material storage.

Down the corridor to the south is the second large-sized storage room of about 650 square feet which will be utilized for the storing of all scenic construction units. Two offices have been provided for the staff of the production facilities group next to this storage room.

The rehearsal rooms, which will be utilized by the producers for off-camera rehearsals, are located off the large double-floor storage room. One is 26 feet square; the other is 26 by 33 feet.

Ten offices for administrative and program personnel who are moving into the new space, line the east-west corridor and two larger offices are provided at the easternmost end of this corridor.

TRADE GETS FIRST RCA RADIOS BY AIR EXPRESS

RCA Victor's first postwar table model automatic radio-phonograph combinations left the company's Bloomington, Indiana, plant during the early part of November, carried by American Airline freight and air express to distributors throughout the country. This modern mode of shipment gave distributors the earliest possible opportunity to display the model and accept orders on those to follow. At the same time, it was announced that the initial sets would continue to be shipped to each region as anticipated increasing availability of parts permits factory production.

In some cases, distributors used the new sets as Victory Loan prizes to stimulate the community sale of bonds.

The Story of Music

THE NBC UNIVERSITY OF THE AIR PRESENTS:

NBC University of the Air also offers these three other important courses

THE WORLD'S GREAT NOVELS
Fridays, 11:30-12:00 P.M. (EST)

HOME IS WHAT YOU MAKE IT
Saturdays, 9:00-9:30 A.M. (EST)

OUR FOREIGN POLICY
Saturdays, 7:00-7:30 P.M. (EST)

THE STORY OF MUSIC—a course of 36 programs heard on Thursdays at 11:30 P.M. (EST) . . . brought to you by the National Broadcasting Company and the independent stations associated with the NBC Network . . . offers a delightful experience for all listeners who appreciate good music.

The purpose of this series is to unfold the history of music *through the performance of music.* Thus THE STORY OF MUSIC is presented in its own language . . . each program containing examples taken from the many different periods.

As is customary with NBC University of the Air courses, a supplementary handbook containing general background for the entire series of 36 programs is available at 25¢ per copy. Write to NBC, 30 Rockefeller Plaza, New York 20, N.Y.

• • •

NBC, as a service to its listeners, offers this and many more outstanding educational and cultural programs . . . programs which help to make *NBC "The Network Most People Listen to Most."*

National Broadcasting Company
America's No. 1 Network

A Service of Radio Corporation of America

RCA's new television camera has a super-sensitive "eye" that sees even in the dimmest light—indoors or outdoors.

As a result of RCA research, television broadcasts will no longer be confined to brilliantly illuminated special studios—nor will outdoor events fade as the afternoon sun goes down.

For RCA Laboratories has perfected a new television camera tube, known as Image Orthicon. This tube, a hundred times more sensitive than other electronic "eyes," can pick up scenes lit by candlelight, or by the light of a single match!

This super-sensitive camera opens new fields for television. Operas, plays, ballets will be televised from their original performances in the darkened theater. Outdoor events will remain sharp and clear on your television set—until the very end! Television now can go places it could never go before.

From such research come the latest advances in radio, television, recording—all branches of electronics. RCA Laboratories is your assurance that when you buy any RCA product you become the owner of one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20. *Listen to The RCA Show, Sundays, 1:30 P. M., Eastern Time, over NBC.*

RCA Victor television receivers with clear, bright screens will reproduce every detail picked up by the RCA super-sensitive television camera. Lots of treats are in store for you. Even today, hundreds of people around New York enjoy regular weekly boxing bouts and other events over NBC's television station WNBT.

RADIO CORPORATION of AMERICA

RESEARCH · MANUFACTURING · COMMUNICATIONS BROADCASTING

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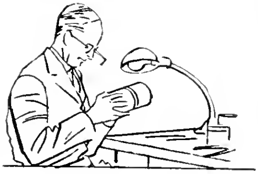
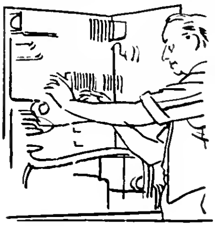
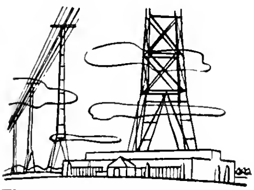
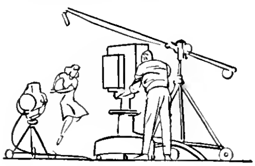
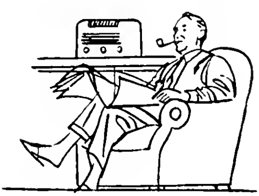










RADIO AGE

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

VOLUME 5 NUMBER 3

APRIL 1946

CONTENTS

COVER — The Navy's "Gorgon" is a jet-propelled bomb guided unerringly to its target by an RCA television camera in its plastic nose. The flying bomb has a top speed of 550 m.p.h. and carries a ton or more of explosive.

Radio Age, published quarterly by the Department of Information of the Radio Corporation of America, RCA Building, New York, N. Y., for the RCA services: RCA Laboratories, RCA Victor Division, RCA Communications, Inc., Radiomarine Corporation of America, National Broadcasting Company, Inc., RCA Institutes, Inc., RCA Service Company, Inc., RCA Patent Division and RCA International Division.

A TELEVISION CAMERA FOCUSES ON THE STATUE OF ABRAHAM LINCOLN WITHIN THE SHRINE ERECTED TO HIS MEMORY ON THE BANKS OF THE POTOMAC.

BRIG. GENERAL DAVID SARNOFF, ASSISTANT SECRETARY OF NAVY FOR AIR JOHN L. SULLIVAN, AND CHARLES R. DENNY, ACTING CHAIRMAN OF THE FCC, AT THE DEMONSTRATION OF AIRBORNE TELEVISION, HELD MARCH 21, AT ANACOSTIA, D. C.

Airborne Television Demonstrated

TWO SYSTEMS, DESIGNATED DURING WARTIME AS "BLOCK" AND "RING," ARE REVEALED TO PUBLIC FOR FIRST TIME IN SPECTACULAR AERIAL EXHIBITION AT NAVY AIR STATION, ANACOSTIA, D.C.

REVOLUTIONARY television news coverage over long and short distances, from cars, boats, planes and helicopters is foreseen by Brigadier General David Sarnoff, President of the Radio Corporation of America, as one of many possibilities opened by two systems of airborne television revealed to the public for the first time on March 21, in a joint Navy-RCA demonstration at the Navy Air Station, Anacostia, D. C. During the war the systems had been classified by the Navy under the security pseudonyms of "Block" and "Ring."

Naval authorities assigned to the demonstration a fast, high-flying JM-1 Marauder plane carrying Ring transmitting units capable of transmitting high-quality television pictures up to 200 miles. The plane cruised over Baltimore and soared on to Annapolis, picking up scenes and action along the way and transmitting the images directly to a bank of television receivers arrayed before guests in the Gymnasium Building at Anacostia.

Then proceeding to a rendezvous, miles away, the Marauder trained its television eyes on mock combat scenes that might have been duplicated in real battle only a few months ago—dive-bombing, smoke-screen laying, strafing, dog-fights. Instantly, the receivers at Anacostia came alive with authentic pictures of the action and viewers became eye-witnesses of events that were actually beyond the horizon. In this manner, command posts of the future will be able to see instantly combat action in distant terrain and make tactical decisions immediately.

During the period while the Ring-equipped plane was en route to the target area, two smaller planes with short-range, light-weight Block installations picked up scenes along the Potomac and over the capital, demonstrating another system of airborne television which has vast possibilities for usefulness to the armed services and to peacetime enterprises.

One of the Block-equipped planes was the two-motored RCA Victor "Flying Laboratory" and the second was a Navy training model. It was possible at Anacostia to bring in views flashed by first one and then the other and to receive a transmission from the No. 2 plane picking up No. 1 as the latter headed back toward the Air Station. As a finale in this phase of the demonstration, the No. 2 plane flew over the route followed by the visitors to the base and zoomed in low, buzzing the building in which guests were viewing the show. It then pulled up into traffic pattern, figuratively taking the television audience with it, and came in and landed.

Captain Robert Morse, Commanding Officer of the Navy Air Station, welcomed guests to Anacostia and introduced Rear Admiral H. B. Miller, Director of Public Information, U.S.N., and General Sarnoff.

Army and Navy Used Block

The Block airborne television system was used during the war by both the Army and the Navy, Admiral Miller announced, with the Navy handling all procurement, design and production problems in cooperation with RCA. He said the longer-range Ring system was developed in the latter stages of the conflict by the Navy and engineers of the National Broadcasting Company, RCA subsidiary.

The names Block and Ring were chosen as designations least likely to provide clues to the enemy as to the nature of the projects.

Secret wartime uses of the television systems by the armed services included:

Application as "eyes" in remote-controlled aircraft and surface craft guidance—such as directing pilotless, overage bombers or crash boats laden with explosives against enemy targets; for observation of gun fire and reconnaissance; use in observation planes for general artillery spotting, gun control, map-making and other reconnaissance work; transmission of messages including maps and charts between ships and aircraft; for observation of dangerous operations from protected or remote positions; for guidance of free-falling, radio-controlled aerial bombs, flying torpedoes, or assault drones; as a means of directing explosive-laden gliders against land or sea targets; for reading meters, gauges and other instruments in connection with tests during aircraft design, and for obtaining the equivalent of eyewitness information under conditions of space, speed or peril which would preclude the gathering of required information by personal observation or by other means.

Applications Are Disguised

The Army and the Navy, it was revealed, had security pseudonyms for some of these applications. For instance, a Block-equipped glider was known as "Blomb"; a Navy crash boat with television eyes was "Campbell"; Block's use in over-age bombers was "War Weary" and the television system for guiding bombs took the fabulous name of "Roc." During early tests the airborne equipment had the equally unrevealing sobriquet of "Jeepette."

Television pick-up and transmitting equipment that once might have filled a large room was re-designed, modified and built to "suitcase" compactness for military uses in the Block system. In fact, an entire unit built by RCA Victor Division for one Army application weighs but 50 pounds.

New Electron Tubes Designed

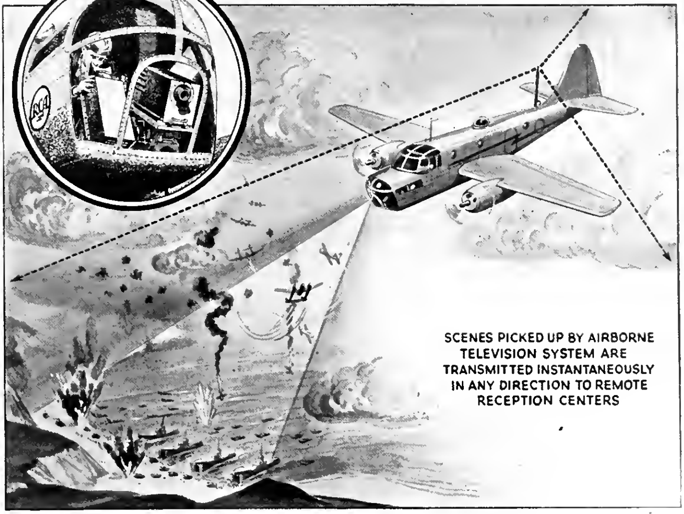
An important phase of the project after it emerged from RCA Laboratories was the designing of a wide variety of electron tubes for sending and receiving equipment. This phase, it was explained, was completed by engineers in the RCA Tube Department plants at Harrison, N. J. and Lancaster, Pa., who began work on tubes for television-guided bombs as early as 1939.

The tube engineers had built for portable field equipment an iconoscope (television's original pick-up tube invented by Dr. V. K. Zworykin of the RCA Laboratories Division, Princeton, N. J.) one-third the size of studio models. Toward the close of the war, use of the super-sensitive Image Orthicon tube extended Block's effectiveness in twilight hours and under adverse light conditions.

Pictures obtained in the Block equipment are viewed by the control operator on the screen of a special 7-inch kinescope—or electronic receiving "eye"—in a monitoring receiver.

BELOW: ENGINEERS MONITOR THE INCOMING SIGNALS AS THEY ARE PICKED UP FROM NAVY AND RCA PLANES DEMONSTRATING "RING" AND "BLOCK" AIRBORNE TELEVISION SYSTEMS IN THE AIR OVER WASHINGTON AND BALTIMORE. RIGHT: ACTUAL PHOTOGRAPH OF TELEVISION IMAGE TRANSMITTED BY "BLOCK"-EQUIPPED PLANE FLYING OVER SOLOMON ISLANDS, MD., AT AN ALTITUDE OF 1,000 FEET.

TELEVISION CAMERA OPERATOR POINTS THE SENSITIVE ICONOSCOPE THROUGH NOSE OF PLANE TO PICK UP TERRAIN BENEATH. RIGHT: DIAGRAM SHOWING HOW AIRBORNE TELEVISION SYSTEM WOULD BE UTILIZED IN AN AMPHIBIOUS OPERATION TO TRANSMIT SCENE OF ACTION TO COMMAND POSTS ON SHIP OR LAND.



The Block television unit produces 40 frames a second in sequential scanning, with 350 lines on the receiving screen. Its transmitter has a peak power output of 60 watts at 264 to 372 megacycles, and special transmitting antennas have been designed for each of its 10 workable channels.

NBC began work on the Ring System in 1939, and had succeeded in testing airborne transmission and reception before the war halted commercial research. The Navy became interested in the project in 1942, and in 1943 NBC installed a unit in a Navy plane for experimental purposes.

Tests Made Over Washington

In tests over Washington, D. C., last July, Ring showed its capability of transmitting high quality television pictures over a 200-mile radius from an altitude of 22,500 feet. Even at dusk, it was able to observe movements of traffic and recognizable landmarks. The Ring equipment employs two cameras, one in the nose and one in the waist of a plane.

Ring uses interlaced scanning such as that in commercial television broadcasting. But even greater resolution is achieved, it was said, by reducing the field frequency from 60 to 40, and the frames from 30 to 20 a second. This enables production of 567 lines on the receiver screen, as compared with 525 lines in commercial television. The Ring transmitter produces a peak output of 1.4 kilowatts at 90 or 102 megacycles and a specially designed antenna gives uniform radiation in all directions from the plane.

"Walkie-Lookie" is a Prospect

General Sarnoff, who is Chairman of the Board of the National Broadcasting Company, said that he foresees airborne television opening the way for coverage of events with instantaneous transmission of eyewitness views at the scene and at the exact time of their occurrence. This coverage can include fires, floods, train wrecks or other happenings of public interest and, he added, the way is opened for development of the "walkie-lookie" — a light-weight, portable television camera with which a reporter might cover street scenes as readily as he does now with a news camera.

O. B. Hanson, Vice President and Chief Engineer of NBC, described the Ring development as "a major pioneering achievement which greatly enhances television's flexibility."

Mr. Hanson said the work on the Ring system was conducted under the direction of Robert E. Shelby, NBC Development Engineer, G. M. Nixon, Assistant Development Engineer, Harold P. See, senior television supervisor, and others including F. J. Somers, L. R. Moffett, A. L. Hammerschmidt, W. L. States and A. E. Jackson of the NBC engineering staff.

Credit for developing the Block system went to Dr. Zworykin, for originating the idea; R. D. Kell, of RCA Laboratories Division, and W. J. Poch, RCA Victor engineer, for advance developments; Merrill Trainer, David Cole, Anthony Wright and Kenneth Chittick, RCA Victor engineers, for product and design; and Otto H. Schade, Dr. R. B. Janes and C. E. Haller, of the RCA Tube Division, for electron tube development.

Navy personnel who assisted greatly in the development of the two airborne television systems include: Lieutenant Commander Forrest Griffiths and Lieutenant W. E. Thorp, electronics design engineers of the Bureau of Aeronautics, and R. S. Taylor, civilian Navy engineer, who assisted in Block television arrangements for this show; also Commander T. W. Chew and C. L. Stec, of the Special Weapons Section, Electronic Division, Bureau of Ships.

History of Airborne Television

TWELVE YEARS AGO, LONG BEFORE START OF WAR, DR. ZWORYKIN OUTLINED PLANS FOR AERIAL TORPEDOES GUIDED BY SELF-CONTAINED TELEVISION CAMERA AND TRANSMITTER.

DR. V. K. ZWORYKIN HOLDS THE IMAGE ORTHICON WHOSE HIGH SENSITIVITY MADE POSSIBLE THE DEVELOPMENT OF AIRBORNE TELEVISION.

THE idea behind airborne television, the revolutionary form of sight transmission which was demonstrated publicly for the first time last month, originated twelve years ago, according to an account of its history disclosed by E. W. Engstrom, Vice President in Charge of Research of the RCA Laboratories Division.

It was in the spring of 1934—five and a half years before the start of World War II—that Dr. V. K. Zworykin, Director of the Electronic Research Laboratory, RCA Laboratories Division, formulated plans for such a system to serve as "electronic eyes" in guiding radio-controlled flying torpedoes.

Taking cognizance at that early date of formation by the Japanese of a Suicide Corps to control aerial weapons, Dr. Zworykin, recognized television pioneer, was revealed to have written:

"There have been quite a number of attempts to devise an efficient flying weapon. The aerial bomb is the simplest form, and the recent improvements in aerial ballistics make these bombs a most formidable modern weapon. The use of such a bomb requires usually a close approach of the bombing airplane to the target, thereby subjecting the plane to the barrage of the anti-aircraft batteries. It follows that simultaneous improvement in anti-aircraft artillery as aerial bombing is developed has considerably lessened the effectiveness of the latter weapon.

"Considerable work has been done also on the development of radio-controlled and automatic-program controlled airplanes having in mind their use as a flying torpedo. The possibilities of such airplanes were demonstrated repeatedly in various countries during the past few years. Both these methods, however, have the same fundamental difficulty, viz., that they can be used efficiently only by trained personnel at a comparatively close range, thereby being subjected to anti-aircraft gun-fire. Both radio and automatic-controlled planes lose their efficiency as soon as they are beyond visual contact with the directing base.

Japs Organized Suicide Corps

"The solution of the problem evidently was found by the Japanese, who, according to newspaper reports, organized a Suicide Corps to control surface and aerial torpedoes. The efficiency of this method, of course, is yet to be proven but if such a psychological training of personnel is possible, this weapon will be of the most dangerous nature. We hardly can expect to introduce such methods in this country, and therefore have to rely on our technical superiority to meet the difficulty."

Dr. Zworykin then declared that "one possible means of obtaining practically the same results as the suicide pilot is to provide a radio-controlled torpedo with an electric eye," and added: "This torpedo will be in the form of a small steep angle glider, without an engine, and equipped with radio controls and iconoscope camera. One or several such torpedoes can be carried on an airplane to the proximity of where it is to be used, and released. After it has been released the torpedo can be guided to its target with the short-wave radio control, the operator being able to see the target through the 'eye' of the torpedo as it approaches."

He pointed out that the carrier plane would receive the picture viewed by the torpedo while remaining at a distance beyond anti-aircraft barrage, and remarked that it would be unnecessary to have direct visibility of the target from this plane, since the informa-

BY SKILLFUL DESIGN, ELEMENTS OF THE "BLOCK" SYSTEM HAVE BEEN COMPRESSED INTO THE 50-POUND UNIT SHOWN ABOVE AT LEFT. RIGHT: THE SAME EQUIPMENT INSTALLED IN ITS PLACE IN THE PLANE'S NOSE.

tion would be supplied by the torpedo from a much closer range. As the torpedo neared the target, its "eye" would provide a picture facilitating aiming with great accuracy.

"This," Dr. Zworykin commented, "introduces an entirely new principle in ballistics, since in all existing methods the operator has no way of controlling the projectile once it has been released."

The RCA television pioneer included in his memorandum details as to radio-control equipment involved in the flying torpedo, and went so far as to estimate that this entire equipment, the television transmitter and all, could be built to weigh only 140 pounds.

In that memorandum and in a supplementary memorandum written in the latter part of 1935, a year and a half later, Dr. Zworykin told how the system might be applied in more elaborate form to an explosive-carrying plane which, like the flying torpedo, could be radio-controlled and guided to enemy targets by television. Such aircraft, he pointed out, had the advantage of easy launching from land points or from vessels at sea. His estimate of the total weight of a satisfactory radio and television system for this use was 160 pounds.

Test Flights Made in 1937

As early as 1937, television research engineers of RCA Laboratories, under the direction of R. D. Kell, made flight tests with airborne television transmitting equipment, and Waldemar J. Poch, an RCA Victor development engineer, had solved many of the technical problems involved in reducing the size of the television equipment.

Research work on the project progressed steadily and before United States' entry into the war, RCA had succeeded in building aerial television equipment that weighed but 113 pounds. This weight was further diminished by improvement of equipment and reduction of the size of the television pickup tube.

Aids to Military Supremacy

In summarizing his report, Mr. Engstrom pointed out that Dr. Zworykin's 1934 vision came true on all counts—Japanese use of the Kamikaze or Suicide Corps became for them an effective and dangerous weapon, but out of America's technical superiority emerged radar, the proximity fuse, airborne television and a host of other ingenious devices which all played an important part in achieving military supremacy.

GROUP JOINS WITH NBC IN UN PROJECT

The American Association for the United Nations, one of the country's leading educational groups, will cooperate with the National Broadcasting Company in NBC's long-term United Nations' project, according to a joint announcement by Clark M. Eichelberger, director of the A.A.U.N., and Sterling Fisher, head of the NBC University of the Air. Activities of the Association are devoted exclusively to the fostering of United Nations' understanding through 12 regional offices and 61 branches.

With the cooperation of more than 40 of America's greatest civic, educational and religious groups, the A.A.U.N. has officially adopted NBC's United Nations Week, scheduled for observance in September.

BISHOP G. BROMLEY OXNAM AND BRIG. GENERAL DAVID SARNOFF AT THE CONVENTION OF THE FEDERAL COUNCIL OF CHURCHES OF CHRIST IN AMERICA, HELD AT COLUMBUS, OHIO.

URGES CLERGY TO GUIDE MANKIND IN ATOMIC ERA

Technological Advances are Outstripping Spiritual Progress, Gen. Sarnoff Tells Federal Council of Churches of Christ in America.

CIVILIZATION now is at the crossroads because "technological advances have outstripped our spiritual progress," Brigadier General David Sarnoff, President of the Radio Corporation of America, declared in an address before the Federal Council of the Churches of Christ in America at Columbus, Ohio, on March 5. The address was broadcast to the nation over the network of the National Broadcasting Company.

"Man is out of stride with the march of science," General Sarnoff said. "He must rise spiritually and intellectually, as well as technologically, if he is to become not the slave but the master of science. Should he fail in this objective and release atomic power to blow up the spiritual and humanitarian barriers that hold back the Apocalypse, then death, famine, fire and pestilence, inflamed by war, will race across the hemispheres."

General Sarnoff asked the question: "Who can open the mind of man to this fearsome possibility of annihilation?" His answer was: "Not the engineer—for he is concerned with machines. Not the politician—for he deals with men as he finds them. The church, therefore, must awaken man to the fact that, as never before, he is his brother's keeper. There is no security in isolation."

Cooperation Through Strength

Cooperation with our fellowmen can be achieved "only through strength," asserted General Sarnoff, and added: "To be weak or unprepared, is to live in fear, and that would not be conducive to peace and brotherhood. America must be strong. Our Nation must not neglect its moral and physical strength, or its national security, if we are to assist in rehabilitation of a world suffering from the ravages of war.

"Science and industry," he continued, "are equipped to create new instrumentalities and services and to make them available for the welfare of mankind. But the clergyman and the educator must help to stimulate their proper use and to discourage their misuse. . . . They must inspire the motives that are the mainsprings of man's intelligence.

"Our great national concern, therefore, should center on man himself, and not revolve solely around machines or electrons.

Man is More Complex

"We know how to build and control machines and how to make them work. But man is more complex. We must look into his heart, and his mind. Through such instruments as the electron microscope, science peers deeply into the sub-microscopic world to see virus and bacteria, but it cannot look into the soul, or scan the inner consciousness of man. Even to the church, man is a mysterious creature. While the engineer learns more about the machine, the problem of the clergy is to learn more about man so that it may guide him spiritually in his technological advance."

In the field of radio, for example, so rapid were the wartime advances that scientists achieved what they themselves would not have believed possible five years before, General Sarnoff said. He stressed the fact that it is the *use* of the invention —not the invention itself—which is significant. Recalling that radio travels at the speed of 186,000 miles a second, he pointed out that it can spread an untruth as easily as a truth, at the same speed. Therefore, it is the *use* to which radio is put that determines its contribution to the welfare and peace of mankind.

"Your own Federal Council of the Churches of Christ in America," General Sarnoff declared, "was among the first to realize the great value of radio science as manifested in broadcasting. Early radio listeners will long remember the venerable Dr. S. Parkes Cadman. He showed the way for the use of the microphone in the church."

Now through television and frequency modulation, popularly known as FM broadcasting, the church finds new servants at its command, he added, and declared: "Television comes not with the threat to replace the rural church and city cathedrals. Instead, it presents new opportunities to those who will adopt it to their purposes and the needs of the modern world. . . . Again through science, the church has found a new missionary. And again we see evidence that science and religion are two powerful forces, which can work for the good of all mankind."

General Sarnoff described television as "a tree of science with many branches," and cited the fact that out of its techniques scientists have produced the famed electron microscope and radar, the wartime miracle. He said that radar's recent epic achievement in contacting the moon represented "far more than man's ingenuity at work in such a triumph."

World Is Uneasy

Pointing out that the wartime science that split the atom—the science that created radar and a host of other inventions—has created an uneasy peace, General Sarnoff described the world as uneasy not because of scientists, but because all nations wonder what man will do with the handiworks of discovery and invention.

"Ever before us, like the recurring phrase of a symphony," he said, "is the question—what will man do with atomic energy? There is no assurance as yet that he will limit its use to peacetime industrial purposes, and to the improvement of our daily life. The ominous possibility that radio-controlled atomic bombs may be aimed across the oceans or projected across the hemispheres has made man apprehensive."

General Sarnoff referred to forthcoming experiments with the atom bomb in the Pacific to study its effect on old warships as targets, and declared: "Whether we shall go on from this great atomic experiment at Bikini Atoll to harness the atom for greater destruction, or whether we shall apply the new power to peace for the welfare of man, is yet to be seen. One thing is certain—the world definitely has passed into the Atomic Age."

It would be a tragic end, warned General Sarnoff, if man should turn to science for implements of atomic warfare in which he will lose his soul and obliterate civilization.

Man Must Decide Quickly

"Therefore," continued General Sarnoff, "it is imperative that man think quickly how he can use these newborn forces for the betterment of the world and the preservation of peace. The atom's power for good far exceeds its power for evil, if man—with faith in himself and his fellow men—works as hard and with as much ingenuity to achieve a higher degree of national and international morality, as he has worked to produce steam, electricity, electronics and atomic energy."

Calling the attention of his audience of churchmen to the importance of spiritual guidance in the days ahead, General Sarnoff stated: "The task of awakening the soul of man and raising his moral level is your mission, your privilege, and your opportunity. You are the custodians and guardians of the spiritual lives and aspirations of mankind. For neither science nor politics is a substitute for religion. Science and religion are not opposed to each other. Both seek the eternal truth.

"Science alone cannot guarantee security for civilization. Yet the problems facing man cannot be solved without science. Sometimes it seems as if the Lord challenges man to use his intelligence. He makes some lands fertile, others arid; He hides coal and oil in the rocks and fish in the seas. He makes the electron and the atom infinitesimal and the radio waves invisible.

"Man has been on earth a long time; he has had to toil by the sweat of his brow and he is tired by that toil. He has had to go into the mines and into the forests for fuel; he has had to go into the fields to cultivate the soil and to depend upon the elements for his harvest. Much of his work is unproductive, for even in converting energy into electric light, most of the energy is lost in useless heat. Man cannot survive without food, shelter and clothing; yet, all people on this earth do not share equally in these basic needs of life. And this inequality breeds discontent, hostility and war.

"Man stands facing a great threat and a thrilling opportunity. The possibilities of science enable him to look bravely at the stars and to seek a finer destiny. He needs most, the faith and the spiritual guidance that would lead him to apply his new knowledge to peaceful pursuits. For the hope of peace that is lasting and a world that is free, lies within the soul and heart and mind of man."

"NOW THROUGH TELEVISION AND FREQUENCY MODULATION, THE CHURCH FINDS NEW SERVANTS AT ITS COMMAND."

Trade-Mark With a Heritage

FOR 45 YEARS, THE FAMILIAR PAINTING OF "NIPPER" HAS BUILT GOOD-WILL AND SALES FOR VICTOR RECORDS AND VICTROLA PHONOGRAPHS.

By Abraham S. Greenberg
Patent Department,
Radio Corporation of America

THE trade-marks of Radio Corporation of America have a sound heritage, a heritage acquired through the happy combination of the 26-year radio engineering prestige of RCA and the 47-year musical eminence of Victor, supported by the courageous vision and faith of Eldridge R. Johnson, founder of the Victor Talking Machine Company, and Brigadier General David Sarnoff, President of RCA. Over the years, these trade-marks have become one of the Company's most valuable assets, yet the history of their conception and development has never been fully recorded.

Universal Goodwill Created

The story starts with "His Master's Voice," one of the most famous trade-marks in advertising annals. This painting of the alert black-and-white fox terrier, now familiarly known as "Nipper," is said to be more widely known than any work by Rembrandt or Whistler. Yet few know the painter's name or how he came to use the dog for his model. Nipper's lifelike pose, typical of his breed, has amused people whenever products bearing the trade-mark have been sold. Millions of dollars have been spent to make the symbol popular and the outlay has been more than justified by the returns. It is doubtful if any manufacturer has ever created such a backlog of universal good-will through a trade-mark, as RCA has done through ownership and use of the illustration.

The history of "His Master's Voice" begins in London, the home of Francis Barraud, originator of the painting. Trained as an artist from early youth, Barraud attained a moderate degree of success in his chosen profession. It was, however, by "His Master's Voice" that he achieved world-wide fame. As a gesture of appreciation, Barraud, in his later years, was pensioned by the Gramophone Company, Ltd., which had purchased his painting for commercialization. Upon Barraud's death on August 29, 1924, Alfred Clark, Managing Director of that company, wrote a eulogy to his memory, a circumstance rare in the annals of trade-marks. Here are the facts of the origin of "His Master's Voice" as narrated by Mr. Clark in his tribute:

"Mr. Barraud's brother had a fox terrier, named Nipper, extremely loyal to his master, and inclined not to be over-friendly with anyone else. Mr. Francis Barraud, shortly after his brother's death, suggested one day that he would like to take Nipper for a walk, and to his surprise Nipper immediately attached himself to him. They became such fast friends that Mr. Barraud eventually took Nipper to his own home, and there he remained throughout his little life.

"At that time Mr. Barraud was the owner of a small phonograph, of the type that employed wax cylinder records, and when he played these records he noticed the peculiar interest which Nipper took in the sound that came from the trumpet. He would prick up his ears immediately the phonograph began to talk, listening intently until the record had ceased playing. Watching him one day, Mr. Barraud conceived the idea of putting Nipper and the phonograph on canvas and giving it the title "His Master's Voice." I have often talked to Mr. Barraud about this, and he has always assured me that there was nothing more than this to the story of how he hit upon the idea. It simply came to him, and he immediately transferred it to canvas.

A Brass Horn Was Needed

"His first effort, consequently, was a picture in which the old-fashioned cylinder phonograph was shown standing in front of Nipper. He took it to a company then prominent in the sale of wax cylinder phonographs to see whether they were interested enough to acquire it. They did not seem at all im-

FRANCIS BARRAUD, ENGLISH ARTIST, SITS BEFORE THE ORIGINAL PAINTING OF NIPPER NOW WIDELY USED AS SHOWN BELOW TO PROMOTE RCA VICTOR PRODUCTS.

"HIS MASTER'S VOICE"

FROM THIS SMALL MACHINE SHOP ROSE THE GREAT 80-ACRE PLANT OF RCA VICTOR AT CAMDEN, N. J. IN THIS BUILDING, ELDRIDGE JOHNSON, FOUNDER OF THE VICTOR COMPANY, WORKED WITH EMIL BERLINER TO PERFECT "THE TALKING MACHINE."

pressed by the originality and beauty of the picture, but asked for time to think it over. Mr. Barraud was keenly disappointed, and recounted his non-success to an artist friend, who suggested that the picture might be brightened up by painting a brass horn in place of the black horn which was issued on the phonographs of that period. Mr. Barraud had never seen a brass horn, and asking his friend where one could be obtained, he was told that there was a little company in Maiden Lane off the Strand, called The Gramophone Company, which might possibly lend him one.

A Memorable Day in 1899

"And so, on a very memorable day in September, 1899, Mr. Barraud came into the little office of the then infant Gramophone Company in Maiden Lane, and asked for the loan of a brass horn. This somewhat unusual request brought forth explanations, which resulted in Mr. Barraud showing the manager, Mr. William Barry Owen, a photograph of his picture, and in Mr. Owen's immediate request to see the painting itself. The painting, which was then still in the hands of the hesitating phonograph company, was eventually refused and returned to Mr. Barraud, who at once brought it to Mr. Owen, with a suggestion that he could easily paint out the phonograph and paint in a gramophone. It took only a short time to do this, and the original picture then entered into the possession of The Gramophone Company.

"This original, which now hangs in a special recess over the fireplace in the oak-panelled Board Room of the Company's Head Office at Hayes, still shows traces in relief of the marks of the brush outlining the old wax cylinder phonograph.

"Since then Mr. Barraud has painted a great many copies of the picture, and these occupy honoured positions in various gramophone centres throughout the world. A very fine copy which he recently presented to the Company now hangs at the British Empire Exhibition at Wembley. From the moment of the acquisition of the picture by The Gramophone Company, its unique charm became evident. It was instantly popular. Photogravure copies were made and distributed by thousands, and were framed and proudly hung as works of art in the homes of England."

Story Shifts to America

Our story now shifts to America and to Camden, N. J. One day in 1896 a man named Emil Berliner walked into a machine shop in that city to have some repairs made on a little gadget that had been placed on the novelty market. It was a hand-operated "Gramophone". The machinist was intrigued with the little contrivance, despite its raucous tone and crude reproduction. That machinist was Eldridge R. Johnson. He was quick to recognize the improvement—the first basic improvement — that Berliner had made in Edison's original development, namely, the flat disc record rather than a cylinder. Being a sensitive inventor as well as a keen business man, Johnson devised a spring motor that unwound at an even speed and which could be manufactured at a reasonable price. The Berliner-Johnson partnership of 1898 lasted until 1901 when the Victor Talking Machine Company was formed with Mr. Johnson as President.

Johnson's Valuable Assets

Eldridge R. Johnson, founder of the Victor Company, acquired the American rights to the Barraud painting in 1901. He had little capital in those days, but he had unlimited faith in his talking machine and especially in the trade-mark of the listening dog. These were his chief assets and, as the world knows, he made the most of them.

Many versions exist as to how the trade-mark "Victor" came into being. It is probable that the versions are exceeded in number only by the places on the Delaware River where Washington is supposed to have crossed. But here is a terse but authentic account, as told in 1944 by Robert Hathaway who was Johnson's secretary:

"There was a very fine bicycle, better than the one he owned, being pedaled around Camden, called Victor, which he would have liked very much to possess; he liked its name, and so when the demand for his talking machines continued to grow he decided to name them 'Victor.' "

Birth of a Famous Name

In 1905, Eldridge Johnson had been revolving in his mind the advisability of a new name for the cabinet type of talking machine in which no horn or amplifier of any kind was exposed. The horn had been turned downward and inclosed in the cabinet of the machine. The machine thus became a piece of furniture, and Johnson was shrewd enough to realize that a new trademark was needed for the new product. He desired particularly to avoid using the word "gramophone." In a letter sent to his attorney on June 9, 1905, Johnson wrote:

"The word 'Victrola' is similar

to nothing that I ever heard of and seems to me to have a sound suggestive of music, and would in all probability be the best word to use."

Thus the trade-mark, "Victrola," was born.

A few great artists at first reluctant to make recordings because of early imperfections, were finally induced to record. Enrico Caruso was one of the first. He led, others followed. Soon the greatest music in the world interpreted by the greatest artists was being imprinted on Victor records.

From the beginning, Eldridge Johnson wisely spent much for advertising. Orders poured in; his plant and company expanded. The bicycle shop of 1898 became a huge plant of over 80 acres.

Before long, the familiar "Nipper" pose appeared in every "Victor" advertisement, on all promotion material, on every "Victrola" phonograph, on millions of records and even on all shipping cases. Meanwhile, the "Red Seal" trademark had come to signify the finest in musical recordings.

Scene Shifts to New York

Our story now shifts to New York City, where in 1919, Radio Corporation of America was organized to serve the interests of the public and the government and to establish American preeminence in radio. By 1920 the lusty radio infant had definite advertising and publicity plans and ideas, with the matter of names, brands and trademarks constantly before the management. The trade-mark "RCA" in monogram style was going through an evolutionary process, as related in these pages (RADIO AGE —Oct. 1945).

One memorable evening in 1921, at the Fifth Avenue home of Dr. Alfred N. Goldsmith, at that time Chief Engineer of RCA, were gathered David Sarnoff, Dr. Goldsmith and Elmer E. Bucher. Before them was the very "Radio Music Box" which David Sarnoff had envisioned in 1916. It was a uni-control broadcast receiver operating with miniature tubes on dry batteries and having a self-contained loud speaker. It was the broadcast receiver which had been christened "Radiola" by General Sarnoff as early as April 1920, at a meeting held in Schenectady to determine what the instrument was to be like.

A Dream That Came True

One can picture the mental reactions of David Sarnoff on that evening a quarter of a century ago as he listened to the programs originating from the Wanamaker store broadcasting station, for early in 1916 he had put his dream on paper in a memorandum to E. J. Nally, first president of RCA:

"I have in mind," the note said, "a plan of development which would make radio a 'household utility' in the same sense as the piano or phonograph. The idea is to bring music into the house by wireless. . . . The 'Radio Music Box' can be supplied with amplifying tubes and a loudspeaking telephone, all of which can be neatly mounted in one box. The box can be placed on a table in the parlor or living room, the switch set accordingly and the transmitted music received. . . . By the purchase of a 'Radio Music Box', . . . members of the family could enjoy concerts, lectures, music, recitals, etc., which may be going on in the nearest city within their radius. . . . Aside from the profit to be derived from this proposition, the possibilities for advertising for the Company are tremendous; for its name would ultimately be brought into the household, and wireless would receive national and universal attention."

The "Radiola" receiver used "Radiotron" tubes. The same three men, Sarnoff, Goldsmith and Bucher, appear to have been responsible for the trade-mark "Radiotron." The term was chosen after considering a dozen or more names. It was singularly appropriate, for translated it means "Radio Thing." Truly it was the thing or device which made radio possible.

Radio's growth was phenomenal and the three basic trade-marks of RCA soon were blazoned across the country in newspapers, magazines, on billboards and over the radio. They were destined to become household expressions in a radio-conscious decade. Consider these facts: By 1929, at the end of 30 years, the phonograph industry of this country had equipped 13,000,000 homes with phonographs.

Expanding Factory Facilities

RCA Victor Division of Radio Corporation of America today is expanding its manufacturing facilities at Camden, N. J., Nipper's original home in this country. Furthermore, the Company's plants at Hollywood and Indianapolis, are being equipped to take full advantage of technological progress in the manufacture of records, phonographs and radio-phonograph combinations. At all of these places, and at Harrison, Lancaster, Bloomington and Princeton, the marvels of television, tubes and electronics will flow out to a post-war people eagerly waiting for them. These products, too, will bear the established trade-marks. Nipper, who was the household companion of the 1910's and 1920's appears destined to be the most familiar dog of the 1940's.

SINCE ITS ORIGIN IN 1899, THE TRADE-MARK OF "HIS MASTER'S VOICE" IS BELIEVED TO HAVE BEEN SEEN BY MORE PEOPLE THAN ANY OTHER COMMERCIAL SYMBOL.

A GROUP OF RETURNED GI'S STUDY A UNIT OF RADIO EQUIPMENT UNDER THE GUIDANCE OF AN EXPERT INSTRUCTOR.

GI'S GO BACK TO SCHOOL

War Veterans Seeking Training in Radio and Television as Basis for Careers Tax Expanded Facilities of RCA Institutes.

By Charles J. Pannill
President,
RCA Institutes, Inc.

ATTRACTED to the school by its 35-year reputation as an educational center for young men seeking a thorough training in radio and electronic fields, more than 900 war veterans have enrolled at the RCA Institutes to acquire the knowledge that will help them gain responsible positions in the field they have chosen for their careers. As students in the Institutes, many of them are supplementing the training they received in radio operations during their months in uniform. When expert classroom and laboratory instruction is added to this field experience, the graduate leaves the school with a comprehensive knowledge of the science of electrical communication. He should then be able to fill a position in laboratory work with manufacturing organizations, as a studio or transmitter technician with broadcasting stations or as a member of the technical staff of communications companies.

Although the Institutes recently increased its facilities substantially, the expansion was not sufficient to take care of the demand. On March 4, 1200 students were enrolled. Hundreds more are on the waiting list for future sessions. Many of them cannot be accommodated until early 1947.

A staff of 57 instructors and department heads is available for assignment to the day and night classes in the various courses.

RCA has cooperated closely with the Veterans Administration in the training of GI's. The VA subsidizes the trainee for the matriculation and tuition fees and for the necessary books and supplies. To receive this aid, the veteran must follow a definite procedure. First he communicates with his local VA office and files an application for a Certificate of Eligibility which he then presents to the Institutes with an Application for Enrollment. The courses he takes naturally depend on his previous schooling and experience but the curriculum is broad enough to meet the demands of most applicants.

The General Course is recommended to the man who seeks a thorough knowledge of the radio industry as a whole. Together with the broad, fundamental training, the student in this course receives practical and complete training in each of the basic specialized branches of the art. With this background the Veteran is in a position to choose the field which he intends to follow as a career.

High School Course Essential

Enrollees in the General Course must have completed 4 years of High School including certain requirements in Algebra, Geometry and Physics. For those who lack these prerequisites the Institutes offers a Preparatory Course.

The General Course runs for 2 years with classes held daily for 50 weeks each year.

When the Veteran has completed the course he has acquired solid training in mathematics, physics, electrical technology, audio, video and radio frequencies. He is then prepared to enter any of the many branches of electrical communications. Jobs are open to him as studio or transmitter technician with broadcasting companies testing or field servicing and in the research and laboratory operations of manufacturing organizations.

A high percentage of the students currently enrolled in the General Course are planning to advance into television technology with the intention of becoming technicians in that branch of radio.

ELECTRONIC BEAN-SORTERS

With Uncanny Accuracy, Machines Built Around RCA Cathode-Ray and Phototubes Separate Good Foods from Bad.

By M. J. Carroll
Equipment Tube Sales,
Radio Corporation of America

THE fellow who says "it doesn't amount to a hill of beans" has never tried to sort one. Otherwise, he'd know that a hill of beans is nothing trivial. But aided by one of the growing industrial uses of electron tubes, the formerly tedious task becomes a speedy, foolproof, automatic operation.

Equipped with RCA phototubes for eyes and an RCA cathode-ray tube for a brain, the electronic sorting machine "looks" at each bean individually and separates the good ones from the bad ones much faster and more accurately than could human sorters.

Approximately 1,000 of these "super sorters", all manufactured by the Electric Sorting Machine Company, of Grand Rapids, Michigan, and employing RCA phototubes, cathode-ray tubes, and control tubes, are now processing about one and one-half million pounds of food each day in plants from California to Virginia and in Canada. Each installation consists of at least sixteen machines. The foods include beans of various kinds, seed corn, peanuts, coffee, and even potatoes.

Although this application of electronics has recently enjoyed a dramatic growth, the idea is not new. It has met the test of years of practical experience, an installation having been made as early as 1931 in a Grand Rapids plant. A. G. Curtis, president of the Electric Sorting Machine Company, reports that the average life of RCA electron tubes used in this installation has been estimated at more than 8,800 hours.

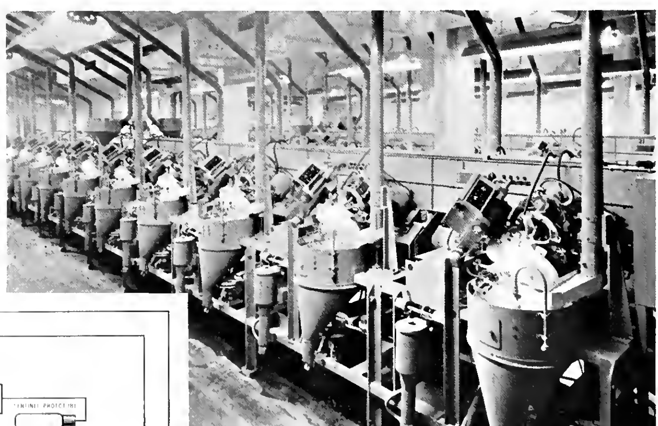
Light Controls Action

In the sorting of beans, acceptance or rejection of each one depends on the respective percentages of red and green light reflected by it. The mechanical design of the machine provides for feeding the beans, one at a time, through an optical system consisting of an incandescent lamp, a focusing lens, two mirrors, and two phototubes.

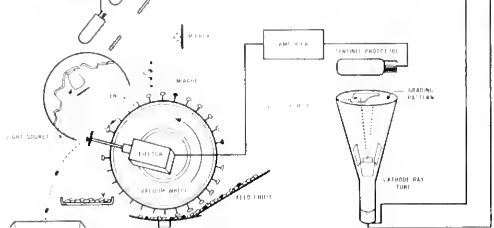
Light from the lamp is reflected by the bean through the lens to the first of the two mirrors. This mirror is what is known as a "partial" mirror or "50 per cent" mirror. It reflects part of the light through a red color filter to the first phototube, but transmits another part of the light to the second mirror, which reflects it through a green color filter to the second phototube. The first phototube is especially sensitive to red light, the second to green light.

The output of each phototube is amplified and fed to one of the two pairs of deflection plates of a cathode-ray tube. This permits one phototube to control the horizontal sweep of the electron beam in the cathode-ray tube, while the other phototube controls the vertical sweep of the beam. The degree to which the beam is deflected in either direction is governed by the respective amounts of red and green light reaching the phototubes.

A partial mask covers that part of the face of the cathode-ray tube on which the electron beam will appear when controlled by the color range of an acceptable bean. When a bad bean passes through the optical system, the color of the reflected light affects the output of the phototubes, and this in turn alters the sweep of the electron beam so that it appears outside the mask. Any position of the electron beam outside the masked area actuates a third phototube whose output is amplified to operate an ejector mechanism which rejects the faulty bean.



LONG ROWS OF ELECTRONIC SORTING MACHINES IN THIS MICHIGAN PLANT INSPECT EACH BEAN AS IT PASSES INTO THE HOPPER AND REJECT ALL IMPERFECT ONES. BELOW: DIAGRAM SHOWING HOW PHOTOCELLS AND CATHODE RAY TUBES DETECT AND EJECT LOW-QUALITY BEANS.



THE UNITED STATES OF AMERICA

TO ALL WHO SHALL SEE THESE PRESENTS, GREETING:

THIS IS TO CERTIFY THAT
THE PRESIDENT OF THE UNITED STATES OF AMERICA
IN ACCORDANCE WITH THE ORDER ISSUED BY GENERAL
GEORGE WASHINGTON AT HEADQUARTERS, NEWBURGH,
NEW YORK, ON AUGUST 7, 1782, AND PURSUANT TO ACT
OF CONGRESS, HAS AWARDED THE MEDAL

FOR MERIT
TO
DAVID SARNOFF

FOR EXTRAORDINARY FIDELITY AND EXCEPTIONALLY
MERITORIOUS CONDUCT

GIVEN UNDER MY HAND IN THE CITY OF WASHINGTON
THIS EIGHTH DAY OF FEBRUARY 1946

GENERAL SARNOFF RECEIVES THE MEDAL FOR MERIT FROM MAJ. GENERAL H. C. INGLES, CHIEF SIGNAL OFFICER OF THE U. S. ARMY, WHO REPRESENTED PRESIDENT TRUMAN AT THE CEREMONY.

PRESIDENT HONORS SARNOFF

MEDAL FOR MERIT AWARDED PRESIDENT OF RCA FOR "PERFORMANCE OF OUTSTANDING SERVICES."

THE Medal for Merit was presented to Brig. General David Sarnoff, President of Radio Corporation of America, by Maj. General H. C. Ingles, Chief Signal Officer of the United States Army, who represented President Truman at a presentation ceremony held March 18 at Radio City.

The citation, read by Colonel Jay D. B. Lattin, Signal Officer 2nd Service Command, Governor's Island, said:

> DAVID SARNOFF, for exceptionally meritorious conduct in the performance of outstanding services to the United States as President, Radio Corporation of America, from October 1942 to March 1944. Mr. Sarnoff placed the full resources of his company at the disposal of the Army whenever needed, regardless of the additional burden imposed upon his organization. He encouraged key personnel to enter the service, and at his direction RCA engineers and technicians rendered special assistance on numerous complex communications problems. He fostered electronic advances which were adapted to military needs with highly beneficial results. The wholehearted spirit of cooperation which Mr. Sarnoff inculcated in his subordinates was of inestimable value to the war effort.
>
> (signed) Harry Truman

General Sarnoff was previously awarded the Legion of Merit on October 11, 1944, for "exceptional meritorious conduct in the performance of outstanding service" when he was on military service overseas.

General Ingles, in opening the ceremony, recalled the fact that General Sarnoff had been presented the Legion of Merit by the War Department for his activities during his military service abroad. General Ingles said that he had been delegated by the President of the United States to present the Medal of Merit to General Sarnoff, who, in a civilian capacity, made outstanding contributions to the Government of the United States in war and peace.

General Sarnoff, in accepting the Medal, said that this award was particularly gratifying because it represents recognition of the work of his associates throughout the RCA organization, as well as of him. He praised the outstanding accomplishments of the men and women of RCA who have contributed to the nation's welfare in war and in peace. He assured General Ingles that the workers of RCA would continue to do their utmost to maintain liaison with the armed forces to help promote scientific progress and preparedness, both of which he described as vital to the security and prosperity of our nation.

TELEVISION AT UN COUNCIL

RCA SERVICE ALSO INCLUDES DIRECT RADIOTELEGRAPH CIRCUITS TO MORE THAN FIFTY NATIONS.

USE of television for the first time to facilitate press and radio news coverage of world events, and the installation of facilities for the handling of press matter and official messages to all parts of the world, represent RCA's service to the opening meetings of the United Nations Security Council, at Hunter College, New York City.

A television camera in a balcony booth overlooking the Council auditorium was connected by coaxial cable to twelve RCA Victor television receivers located in a special viewing room near press quarters. These receivers made it possible for 200 press and radio representatives who were unable to find space in the Council chamber to see every gesture and action of UN members while listening to the proceedings over loudspeakers.

One of the outstanding features of the installation was the Image Orthicon camera tube which made unnecessary the intensely brilliant special lighting required by conventional television cameras. Ordinary room lighting was sufficient to provide a normal picture on the twelve receivers.

Microwave Relay Used

In addition to the television sets at Hunter College, NBC installed six receivers in studio 8G, Radio City, for the use of executives, dignitaries and members of the press. The pictures picked up by the Image Orthicon at Hunter were transmitted by microwaves to Radio City, a distance of eight miles.

To serve delegates of the eleven nations represented on the Council, as well as observers and press representatives of more than forty additional countries, RCA Communications, Inc., installed world-wide radiotelegraph facilities at Hunter College, capable of handling 200,000 words a day to and from Council headquarters.

Two communications centers, each equipped with two printers were set up on the auditorium floor and in the room assigned to the press. Messages filed at either location flashed to the offices of RCA Communications at 66 Broad Street and continued from there over the Company's high-speed circuits to their overseas destinations. Facilities were similar to those installed last year at the UN Conference in San Francisco, from where more than a million words were transmitted throughout the world over RCA circuits.

RCA INITIATES RATE REDUCTIONS

DRASTIC reductions in international telegraph rates, proposed by Thompson H. Mitchell, Executive Vice President of RCA Communications, Inc., have been approved by the Federal Communications Commission to go into effect May 1. Under the new tariff schedules, rates would be reduced to not more than thirty cents per full-rate word from all places within the United States to all points in the world where communications services now are available.

Comments by the FCC

In a public statement expressing satisfaction with the RCA proposal, the Commission said:

"These reductions are in line with the Commission's policy that the public interest, particularly at this time, requires the cheapest, fastest, most abundant international communication service consistent with sound operating economics.

"The reductions are especially timely because of the contribution that a free flow of information can make toward international cooperation and the stimulation it can afford to world trade in this reconversion era."

At the Bermuda Conference last fall, Mr. Mitchell stated, it was agreed by the United States and British delegates that a ceiling rate of thirty cents per full-rate word should apply from all points of the United States to all places within the British Empire.

The latest action taken by RCA, Mr. Mitchell explained, would provide for extension of the principle to all messages going from the United States to any part of the world including more than eighty additional countries, territories and islands to which the rates currently range from thirty-three cents to one dollar and fifteen cents per ordinary word. This would mean, in effect, he said, that to all points in the world where telegraph charges now are in excess of thirty cents a word, such rates would be reduced to a uniform basis of not more than thirty cents, with charges of 20 cents a word for code, 15 cents a word for deferred service and 10 cents a word for radio letters. At the same time, RCA proposed to reduce ordinary press rates from a maximum of up to forty-three and a half cents a word to a maximum of six and one half cents a word from its offices in foreign countries outside the British Commonwealth.

Millions Saved in Tolls

"The full effect of these drastic reductions may be expected to save millions of dollars each year in telegraph tolls to the American public," Mr. Mitchell added. "This action by RCA Communications, Inc., is a tribute to American methods of scientific research and technological development under private enterprise, and a demonstration of the benefits that can be enjoyed by the public."

AN RCA IMAGE ORTHICON CAMERA IN THE BALCONY OF THE UN SECURITY COUNCIL AUDITORIUM SUPPLIES PICTURES AND SOUND TO TELEVISION RECEIVERS IN THE OVERFLOW ASSEMBLY ROOMS AT HUNTER COLLEGE, NEW YORK CITY.

Freedom to Listen

PLAN TO ESTABLISH INTERNATIONAL BROADCASTING SYSTEM PRESENTED TO UNITED NATIONS BY GENERAL SARNOFF.

ESTABLISHMENT on a world-wide basis of the principle of "Freedom to Listen," and the erection of an independent international broadcasting system owned and operated by the United Nations and known as "The Voice of UN," was suggested by Brig. General David Sarnoff at a private dinner given in honor of UN officials by the Radio Corporation of America and the National Broadcasting Company in the RCA Building on April 4. General Sarnoff proposed the following plan for international broadcasting by the UN:

Any medium of communication that would increase the knowledge and understanding of the peoples of the world, about the problems of the world, would increase the effectiveness of the United Nations and advance the cause of world peace.

One effective way to help achieve this purpose is to provide a world-wide system of mass communication that can reach all peoples of the world freely and simultaneously.

A two-point plan for progress along these lines was submitted for consideration by the United Nations:

1. Establish the principle of "Freedom to Listen" for all peoples of the world. This is as important as "Freedom of Speech" and "Freedom of the Press."
2. Establish an independent international broadcasting system to be known as "The Voice of UN." This system should be owned and operated by the UN. It should have a world-wide range and be used for broadcasting the public proceedings of the United Nations, for disseminating its information to listeners everywhere, and for spreading knowledge and understanding among the peoples of the World. "The Voice of UN" should broadcast in the principal languages employed throughout the World. The UN should continue to afford to other broadcasters and the press the privilege of broadcasting and publishing its proceedings and information.

In submitting his plan, General Sarnoff said:

"The practical problems involved in adopting and executing this plan, are both technical and political. The technical problems can be solved. The political problems require for their solution the consent of the member nations of the UN and their united will to make the plan work."

Benton and Lie Endorse Plan

These proposals were endorsed in statements by Trygve Lie, secretary general of the UN, and William Benton, assistant secretary of state of the United States.

"General Sarnoff has crystallized an idea and hope that has been in many minds," said Mr. Benton. "His experience and position as a great pioneer in the development of domestic and international broadcasting gives any proposal from him great weight. The objective of such a plan, he said, should be to deepen the sense of world community on which the cause of peace rests."

Pointing out the possible difficulties in securing agreement of what to broadcast from such a station, Mr. Benton said that the effort to secure such agreement would in itself be valuable, "for it would lead to the discovery and widening of the values the nations hold in common. The proposed United Nations Educational Scientific and Cultural Organization would be the appropriate agency to take responsibility for the educational and cultural aspects of the programming."

People Must Understand Aims

"The aims and objectives of the United Nations," Mr. Lie said in his statement, "can only be achieved if they are fully understood by all the peoples of the world. It is particularly gratifying that it should come from one of the greatest private broadcasting organizations in the world."

Mr. Lie also announced that the recommendation for the setting up of an independent broadcasting station had been approved by the Preparatory Commission of the United Nations at the end of last year.

Among the guests at the dinner in addition to Mr. Lie were Dr. Quo Tai-chi, president of the United Nations Security Council; Benjamin V. Cohen, counselor to the Department of State; Wilder Foote, Director of Information of the U. S. Delegation; Benjamin A. Cohen, assistant-secretary general for public information; Arthur Sweetser, special advisor to the secretary general; William H. Stoneman, personal assistant to the secretary general; Vernon Duckworth Barker, chief of the Radio Division, Department of Public Information, and Frank E. Mullen, vice president and general manager of NBC.

NEW FIELDS FOR TUBES

War Experiences Made Industry and Commerce Realize Versatility of Modern "Genii in a Bottle," Now Available for Peacetime Uses.

By L. W. Teegarden

Vice President in Charge of Tube Department, RCA Victor Division

THE modern "genii in a bottle" which we know as the electron tube has been mustered out of military service to resume, among other important peace-time jobs, a new career which may well become his greatest. He has come out of the war with his sleeves rolled up and both feet in the factory—a field in which he had scarcely begun to exercise his power and skills before war limited its expansion, but one in which, at the same time, war needs inspired new services.

The electron tube, after a quarter-century of service in the entertainment and communications field, is now ready to realize its full, vast potentialities as a toiler in peaceful commerce and industry. We believe that the year ahead will be marked by a substantial start toward that realization, and that eventually our production of tubes for non-radio purposes will exceed that for radio applications.

While the prospect of rapidly increasing industrial electronics applications features our outlook for 1946 and 1947, it is also noteworthy that projected immediate postwar sales of RCA receiving tubes for home radios, which are again in production, show an increase of 153 percent over prewar sales.

Until the close of the war, and therefore during the greater part of 1945, all development and production facilities of the RCA Tube Division, in common with virtually all other RCA facilities, were devoted to fulfillment of the needs of our armed forces and those of our allies, and war production and other home front activities having the common goal of a victorious peace.

When peace returned to the world, the electron tube industry was one of the few businesses which found itself in the fortunate position of having no major reconversion problems requiring modification of facilities. The nature of tubes made by RCA for war purposes was very much the same as that of the majority of those to be made in the immediate postwar period. Consequently, we were able to begin production of tubes for civilian and commercial purposes just as rapidly as wartime restrictions were lifted and the demand developed.

Total gross sales of RCA electron tubes of all kinds rose to a wartime peak 445 percent in excess of the 1939 level. The immediate postwar level is expected to be 162 percent above that of 1939. An unprecedented demand for power, cathode-ray, and special-type tubes for wartime applications in electronic devices such as radar equipment and vastly expanded communications facilities accounted for the largest portion of the total wartime increase in production.

In the receiving tube field, where general production for home radio receivers was shifted to meet military requirements, production was increased only some 200 percent over prewar levels.

In contrast, production and sales of cathode-ray tubes, used principally before the war in the field of measuring and testing, with a very small number going into television, increased by an astounding 4500 percent—primarily as a result of the application of these tubes in radar. The major postwar field for

ABOVE: DEFT HANDS CEMENT CERAMIC INSULATION IN PLACE ON TUBE ELEMENTS. LEFT: SECTION OF THE AGEING RACK WHERE ALL TUBES UNDERGO SPECIAL TREATMENT BEFORE SHIPMENT.

PART OF THE MILLIONS OF GLASS ENVELOPES AWAITING THE NEXT STEP IN TUBE MANUFACTURE AT THE RCA PLANT, HARRISON, N. J.

such tubes will again reach wartime peaks. Nevertheless, we confidently predict that peacetime demand for these tubes will ultimately exceed peak wartime production.

We believe that the prospect for immediate production, sales and employment in the electron tube industry compare very favorably with those of any other industry. As regards long-term prospects, we know of no industry having greater potentialities. There is literally no individual, no industry, no service, that is not a potential customer for electronic products or equipment, and therefore for electron tubes. RCA's potential tube business, and that of the industry, is limited primarily by man's ingenuity in creating the buying power necessary for its realization, rather than by technical considerations or want of ideas.

these tubes will be television. For the immediate future, we anticipate an increase of about 1200 percent over prewar levels. We foresee a demand far in excess of even wartime levels, however, as soon as television is established on a nationwide basis.

RCA sales of power tubes, which before the war were largely for use in radio broadcast transmitters, increased during the war by about 1400 percent. In the early postwar period they are expected to be about 60 percent above prewar levels. While we foresee a substantial expansion of business in the transmitter field, principally resulting from construction of new television and FM transmitters, the bulk of the increase in demand for power tubes is expected to come ultimately from applications in non-radio electronic equipment.

More Power Tubes Needed

High-frequency heating equipment for industry, for example, will require many times the power tubes currently employed in the radio broadcasting industry. One company alone has recently installed high-frequency heating equipment at a yearly rate of some 10,000 kilowatts total capacity, whereas the total rated output power of all broadcasting stations in the United States is only 3,700 kilowatts. Another company is contemplating the installation of such equipment with 1,000,000 kilowatts capacity at one plant, with plans to install similar equipment at four other plants if the original installation proves as successful as is anticipated.

Special Tubes in Great Demand

Special-type tubes, particularly the phototube group, found many important military applications during the war, and production and sales of such tubes rose to a peak 611 percent above their 1939 levels. Their potential field of peacetime applications is almost limitless, since electron tubes are now being made to perform all of the functions of the five senses and there is literally no industry which cannot employ electronic devices to advantage in its operations. For the immediate period we anticipate production and sales of special-type tubes at a rate about 105 percent in excess of prewar levels.

It is obvious from the foregoing figures that we face our greatest problem in providing immediate utilization of war-expanded facilities for the production of power, cathode-ray, and special-type tubes. It appears that a number of years will elapse before production of

RCA BEGINS CONVERSION OF TELEVISION SETS

Conversion of pre-war RCA Victor television receivers to accommodate the new frequency channels allocated by the Federal Communications Commission was begun by RCA Service Company, Inc., early in March on a schedule that calls for completion of the work in June.

Under a plan established by RCA, service shops in New York, Philadelphia, Chicago and Los Angeles area will, on request from a set-owner, either direct or through the RCA dealer in the area, bring in the chassis, incorporate revised circuits, and then re-install and test it in the owner's home. All known owners of RCA Victor television receivers have been notified by letter that the service is available at a charge of $30.

The new allocations have shifted the frequencies of existing television stations, both by changing frequency bands for given channel designations and by moving stations to new channels.

The new allocations are: Channel 1, 44 to 50 megacycles; Channel 2, 54 to 60; Channel 3, 60 to 66; Channel 4, 66 to 72; Channel 5, 76 to 82, and Channel 6, 82 to 88.

RCA EARNINGS INCREASED IN 1945

Annual Report Says Company's Main Peacetime Objective Is to Serve World Through Production of Radio Instruments and Operation of Services Unsurpassed in Quality and Dependability.

THE chief aim of the Radio Corporation of America since V-J Day has been to "serve the world at peace by producing radio instruments and by operating services unsurpassed in quality and dependability," Chairman James G. Harbord and President David Sarnoff speaking for the Board of Directors, reported in a joint statement issued to stockholders on February 27. The Annual Report which was mailed to 215,000 stockholders, covered the 1945 operations of RCA, its divisions and subsidiaries.

Net earnings of Radio Corporation of America in 1945 amounted to $11,317,068, compared with $10,263,291 in 1944. After payment of preferred dividends, earnings were equivalent to 58.8 cents a share compared to 51.2 cents a share in 1944.

Total gross income from all sources amounted to $279,503,615 compared with $326,421,913 in 1944, a decrease of 14.4%.

Working capital at December 31, 1945, amounted to $62,108,118, compared with $57,446,901 at the close of 1944.

The total earned surplus at December 31, 1945, amounted to $49,038,127, an increase of $5,393,040, over earned surplus at the end of 1944.

The Annual Report contained the following tributes to RCA for its contribution to victory: On September 1, 1945, Secretary of the Navy, James V. Forrestal, wrote, "Among the companies which gave our fleet the power to attack, yours has been preeminent. You and all the men and women who have worked with you deserve, therefore, to carry into peace a special pride in a great national achievement. On this day of final victory, the Navy sends you its sincere thanks."

Gen. Somervell's Tribute

Lieut. General Brehon B. Somervell, then commanding the Army Service Forces, in a letter to RCA dated September 7, 1945, said: "Your company has played a very important part in producing equipment and supplies which have been such a decisive factor in winning the war. You and your associates and employees must have a deep sense of satisfaction as you look back upon your accomplishments on the war and production front. Now that the war is won, I want to express to you the gratitude and appreciation of the Army Service Forces for the magnificent achievements of your organization."

The Report referred to the future of radio as an art and an industry that promises expansion of commercial radio activity through new services, new products and new processes. Declaring that hundreds of electron tubes developed by RCA to meet war demands have been instrumental in opening new fields of usefulness in communication, transportation and manufacturing, the Report disclosed that a record-breaking total of 20,000,000 miniature tubes alone—many of them new types—were manufactured by RCA during the war years.

So numerous and so full of opportunities for public benefit were the wartime advances achieved by the RCA Laboratories Division that victory brought no breathing spell to its scientists and engineers, the Report revealed. RCA research, it was stated, turned to the task of

MANY RADAR ANTENNAS, INCLUDING THE TYPE SHOWN AT THE LEFT WHICH WAS USED BY THE U. S. SIGNAL CORPS TO REACH THE MOON, HAVE BEEN MANUFACTURED BY RCA. BELOW: A TUBE-MAKING MACHINE WHICH CONTRIBUTED TO THE COMPANY'S RECORD WARTIME PRODUCTION.


A HIGH DEGREE OF SKILL IS NEEDED TO ASSEMBLE THE SMALL ACORN TYPE TUBES (LEFT) AND ELEMENTS OF THE LARGER TUBES (ABOVE).

applying newly created advances to useful peacetime systems and instruments.

The RCA Laboratories operates on a three-point program which includes development of projects which are speedily applicable to civilian needs and commercial production; research providing for the constant flow of new technical knowledge and developments in radio and electronics; and, continued close cooperation with the military services of the United States, maintaining appropriate liaison for specific military research in radio and electronics to help guarantee the scientific preparedness and security of the Nation.

Scientists Made Radio History

The Report stated that contributions of research scientists and engineers at RCA Laboratories made radio history. Listed among the greatly diversified number of projects in which these scientists were in the forefront are radar, loran (long-range navigation), sonar (underwater sound) and shoran, described as the most accurate system of blind bombing developed during the war. Capable of pinpoint accuracy, shoran is said to be showing great possibilities in air navigation and in mapping the vast unsurveyed areas of the earth.

During 1945, a 300-megacycle television transmitter developed at RCA Laboratories reached the stage at which field tests could be made of a complete system utilizing such an installation, and at the same time research and development in other phases of television were reflected in a vastly improved black-and-white television system, employing the new supersensitive RCA Image Orthicon pickup tube and a correspondingly sensitized kinescope receiving tube.

New FM Circuit

Development of a new FM circuit, called the "ratio type detector," by RCA Laboratories, and of new types of radar antennas to extend radar's peacetime uses also were described. The new FM circuit aids in eliminating interference and has superior merits over circuits previously employed for FM reception, particularly in low-priced receivers.

The pioneering of RCA in television and microwaves provided basic techniques for the Corporation's outstanding contributions to radar, and the sight that television gave radar for war purposes is disclosed to have now provided new services of safety in aviation and shipping. As a further scientific achievement based upon a combination of television and radar techniques, RCA has developed Teleran—a new and complete system of air navigation for preventing collisions, controlling traffic, performing instrument approaches to airports and assisting in the general navigation of aircraft.

Despite drastic terminations of government war contracts, the Annual Report stated, the RCA Victor Division at the end of 1945 had a substantial volume of unfilled government contracts for radio-electronic apparatus and electron tubes. Some of the Company's plant facilities, nevertheless, were reconverted to civilian production within eight weeks after the war ended, and by the close of the year 75,000 small radios and table model Victrola radio-phonograph combinations had been built.

Deliveries also were begun on a new line of improved FM (frequency modulation) broadcast transmitters and other broadcasting equipment. Production of motion picture theatre reproducing and sound-film recording equipment, formerly supplying needs of the armed forces, was rechanneled to the commercial market; an all-time high in the production and sale of RCA Victor phonograph records was achieved during 1945, and the company plans to have home television receivers on the market this summer.

New Services Open New Markets

"Television," the Report pointed out, "is only one of the new services which promises to broaden the market for electron tubes, many types of which were developed by RCA for wartime use."

RCA Victor is revealed to have assembled more than 5,000,000 proximity fuses. Created for use in projectiles, the proximity fuse consists of a miniature radio sending and receiving station which detonates the shell at the moment of most devastating proximity.

The Report announced the consolidation of foreign trade activities of the Corporation in the RCA International Division and, with the resumption of world-trade since V-J Day, an expansion of these activities. With distribution strengthened, the outlook for foreign sales is declared to be favorable. RCA operates subsidiary companies in Argentina, Australia, Brazil, Canada, Chile, England, India and Mexico.

The National Broadcasting Company, which throughout the conflict devoted an extensive portion of its program to the war effort, is now on a full schedule of peacetime broadcasting, and at the same time is developing television broadcasting as a service to the public.

Message Traffic Increased

The volume of international radio-telegraph traffic handled in 1945 was the largest in the history of RCA Communications. The traffic represented an increase of approximately 70% compared with 1944. New circuits were established, in cooperation with the United States Army, with Berlin and Nuremberg, Germany and Vienna, Austria, and in the western hemisphere direct service between San Francisco and Rio de Janeiro was inaugurated to supplement the New York-Rio circuit. Service on a normal basis was resumed with Holland, Belgium, Norway, Czechoslovakia, the Philippines, Shanghai and Japan.

Marine Radio Services

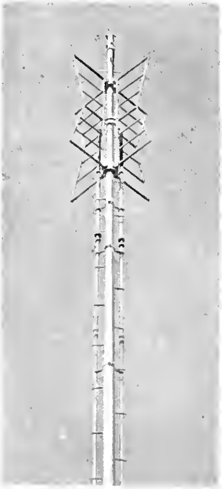
Upon completion of the government's emergency shipbuilding program in 1945, the Radiomarine Corporation of America turned from its task of supplying radiotelegraph and radiotelephone equipment and other electronic devices for war uses to the production of apparatus designed to meet needs of passenger and cargo ships. The Report revealed that Radiomarine built for war uses more than 40,000 major units of marine radio installations. In its peacetime program the Company will make available radar and loran navigational equipment in commercial designs and add to its line new long distance, automatic radiotelephone apparatus. It proposes also to modernize its coastal communication stations.

RCA Institutes Adds Courses

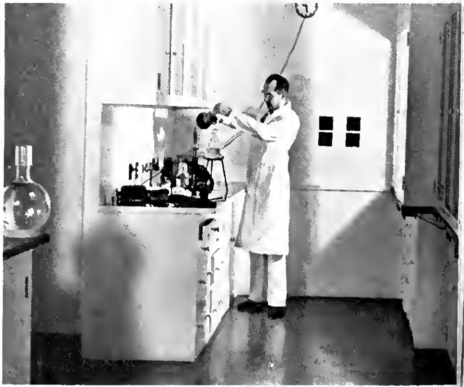
During 1945, RCA Institutes proceeded with the training of radio technicians in regular vocational and technological courses, and added two vocational courses in operation and repair in the interest of returning servicemen. Enrollment reached 1,000 of whom 600 were war veterans sponsored by the Veterans Administration. In addition, special courses in television technology were conducted in New York, Chicago and Los Angeles for the benefit of broadcast station engineers.

The Board of Directors in 1945 approved an RCA Scholarship Plan to encourage the training of promising young students of the physical sciences. Selected upon recommendations made to the RCA Education Committee by the college deans, each of those chosen are designated "the RCA Scholar" at the university where he is enrolled and receives from the Company a scholarship of $600 for the academic year. The plan provides for the award of as many as thirty scholarships during the academic year 1946-47, fifty during 1947-48, and sixty for each academic year thereafter.

As of December 31, 1945, RCA personnel numbered 32,985, representing an increase of 10,072 over the total at the end of 1939, the last year before national defense activities were reflected in employment figures. From 1940 through 1945, a total of 8,559 RCA employees joined the armed services of the United States. More than 1,818 have returned to the Corporation and others are being employed as they return. One hundred and forty-five employees died in the service of their country.



LEFT TO RIGHT: NEWLY DESIGNED SUPER-FM ANTENNA FOR FREQUENCY MODULATION STATIONS; AN EMPLOYEE EXAMINES PRESSING OF AN RCA VICTOR NON-BREAKABLE RECORD; SCIENTISTS IN RCA LABORATORIES CONSTANTLY EXTEND THE SCOPE OF RESEARCH IN RADIO AND ELECTRONICS.



FROM THE STEPS OF THE LINCOLN MEMORIAL, A TELEVISION CAMERA POINTS ACROSS THE REFLECTING LAKE TO THE LOFTY WASHINGTON MONUMENT.

LOOKING-IN ON THE CAPITAL

NBC Television Brings Lincoln Day Scenes from Washington to New York over New 228-Mile Coaxial Cable that Links the Two Cities.

By A. Burke Crotty
Director, Field Programs, Television Department, National Broadcasting Co.

NBC has added another achievement to its already long and impressive list of television program firsts!

The latest and one of the most significant took place February 12th when the Lincoln Day Ceremonies at the Nation's capital were televised for the pleasure of viewers in the New York and Schenectady-Albany-Troy areas. Television set owners saw, for the first time in the history of visual broadcasting, a complete program relayed from Washington to New York City, a distance of 228 miles, where it was broadcast over WNBT, and rebroadcast over WRGB, Schenectady. From the opening "shot" until the final view of the towering Washington Monument, audiences were fascinated by the realization that they were watching events as they took place hundreds of miles away.

The ceremonies at the Lincoln Memorial were televised in a program dedicating and inaugurating the first Washington-New York coaxial cable, the first leg of what is shortly to become a nation-wide video network.

The event was unique in another respect. It was the first time that the three New York television stations — the National Broadcasting Company, the Columbia Broadcasting System and the Allen B. DuMont Laboratories — had pooled their equipment and personnel in a joint venture. Each company assumed a portion of the over-all show and the program as a whole was made available to the New York transmitters of the participating firms.

Following a pre-program survey of the sites involved, video and audio lines were ordered and as many arrangements as possible were made in advance to minimize the interference with NBC's New York programming schedule. Timing was figured so closely, in fact, that the engineering crew and the equipment for the telecast did not leave New York until the completion of the Cavalcade of Sports program from Madison Square Garden on the evening of Friday, February 8th. In the early hours of February 9th, NBC's mobile unit rolled away from the Garden on its way to Washington. The full crew consisted of four program people and fourteen engineers.

Early Sunday morning the crews installed the equipment and began to complete arrangements for the telecast, fitting together, like a giant jig-saw puzzle, the hundreds of details to be arranged if the program was to be successful. Tentative camera locations were selected, microphone positions planned, opening script written, band located and announcer rehearsed.

While all of these things were being done at the Memorial, an NBC production man had moved into the Master Control and Switching Position at the telephone company's test board in downtown Washington. To him had been assigned the task of coordinating the entire program and the synchronization of all switches. This would be no trivial assignment in a radio broadcast but this was television with many sound and picture switches that must be made instantaneously. Several hours were devoted to rehearsing these changeovers from New York to Washington; Capital to Studio, Studio to Memorial and so on. It is a credit to everyone involved that each of the eight switches during the program was clean and sharp.

Snow Upset Rehearsal

Original plans had called for a running camera rehearsal at the Memorial on Monday for the purpose of setting a routine and se-

ABOVE: THE ICONOSCOPE CAMERA FOLLOWS GENERAL EISENHOWER AS HE LAYS THE PRESIDENT'S WREATH AT THE BASE OF THE LINCOLN STATUE. AT RIGHT, TOP: NBC'S ENGINEERING CREW UNLOADS EQUIPMENT FOR THE LINCOLN'S DAY TELECAST. BELOW: PART OF THE CEREMONY IS PICKED UP BY ONE OF THE TELEVISION CAMERAS LOCATED AROUND THE MEMORIAL.

lecting the opening "picture shot." However, the plans were treated to a rude shock on Sunday evening when six inches of snow, with no regard for television plans, blanketed Washington. The grounds at the Memorial on Monday were so wet that to run out the camera cables might have jeopardized the entire program. Reluctantly, the field staff did a little testing, ran a few switching rehearsals and called it a day, leaving the major portion of dressing the show to be done in the few hours available on Tuesday morning before the scheduled telecast time.

Engineers Make Final Check

At 6.00 a.m. on the 12th work started. Engineers made their final checks, cameras were put in position for the first time, and a final selection of shots was planned. Two Orthicon cameras were employed outside the Memorial, one well out on the lawn for an over-all shot and the other on the steps to pick up the Marine Band, the laying of the wreaths, and the arrival of General Eisenhower. Inside the Memorial the new camera with RCA Image Orthicon tube was moved into position to provide shots of the famous statue and to show the Chief-of-Staff as he placed the President's wreath.

At 12 noon the program opened with a short film introduction from New York, and with the words "We take you now to our Nation's Capital" the huge Capitol dome flashed on the screens. From the shot of Washington taken from the Capitol roof the scene switched to the marble steps as four members of Congress and the then FCC Chairman, Paul A. Porter, descended the steps and approached the camera where they were interviewed by announcer Bill Henry.

Following the interviews on the Capitol steps the scene switched again to a studio location in downtown Washington where, through the use of maps and charts, the audience was given a non-technical explanation of the make-up and routing of the new coaxial cable.

Another switch from the studio and television viewers in New York saw the famous Lincoln Memorial as the camera, in a long shot, panned up the walk to a view of the classic structure.

Eisenhower Placed Wreath

At 12:30 sharp, General Dwight D. Eisenhower, Army Chief of Staff, arrived to place President Truman's wreath at the foot of Lincoln's statue. Television cameras followed his progress as he walked between the long lines of the Guard of Honor, composed of soldiers, sailors and marines.

As the General stepped between the marble columns the music stopped and the Image Orthicon picked him up as he approached the statue, stepped back, stood a few moments in reverence and then saluted.

As he turned about to march away the audience was treated to one of those unrehearsed incidents for which television is rapidly becoming known. One of the press photographers realized that he had failed to get satisfactory pictures of the proceedings. He intercepted the departing General and asked him to re-enact the wreath laying. The Chief of Staff, who became an idol of the GI because of his unpretentious, democratic manner, willingly obliged. New York viewers saw him return to the sculpture and repeat the routine.

As the General left the memorial to re-enter his car, the Image Orthicon camera "panned up" to frame a striking distant view of the Washington Memorial and the Capitol Building rising through the ground haze far beyond the Reflection Lake.

A 4-Fold Refresher Course

Engineers from Subsidiaries of RCA International Division Meet in New York to Inspect Company's New Developments.

By E. A. Laport
Chief Engineer, RCA International Division

FOR four action-packed weeks ending in mid-March, RCA's International Division was host to a group of key-men from the Company's foreign subsidiaries who had been invited to New York to participate in an engineering refresher course, the first of its kind to be held by the Division. These men—fourteen in all—were chosen from the sales and engineering staffs of the various Engineering Products Divisions. In the group were representatives from England, Argentina, Brazil, Chile, Peru, Canada and China.

The Refresher Course was instituted because of the need at this time for a renewal and strengthening of liaison between parent company and subsidiaries. For more than five years the world turmoil prevented most of the subsidiary companies from maintaining the usual close relationship with RCA International headquarters. During that time, a whole new world of technology had evolved for the engineer, and sales personnel were faced with a set of changed world conditions in which they must conduct their business.

The Refresher Course was organized with a four-fold purpose: to acquaint all representatives with the latest accomplishments of RCA; to coordinate future sales and engineering activities; to review the entire post-war program of sales and developments in all fields; and to discuss ways through which mutual efforts might best be coordinated to advance RCA business internationally.

Beginning with their arrival in New York, the group faced an intensive program of meetings, organized tours of plants and laboratories, demonstrations and informal discussions. The first evening was marked by a dinner at the Netherland Club where Mr. F. T. Zinn, Acting Managing Director of RCA International, greeted the visitors and introduced Mr. E. N. Clark, the new Managing Director of International.

Experts Address Visitors

The daily meetings that followed were addressed by qualified experts from the sales, research and engineering staffs of all divisions. Among those heard were W. A. Acton, H. W. Teschmacher, C. S. Harris, T. Robinson-Cox, J. F. Sternberg, D. S. Bond, J. C. Walter, R. D. Kell, M. Trainer, J. Rowe, H. E. Gihring, R. R. Beal, C. W. Latimer, T. H. Mitchell, Geo. Shecklin, I. F. Byrnes, C. W. Hansell, W. S. Sparks, C. F. Frost, H. O. Peterson, F. R. Deakins, J. L. McMurray, J. B. Knox, J. M. Brian, A. B. Oxley, H. M. Hucke, R. R. Welsh, L. F. Jones, H. J. Nevitt, V. M. Farel, W. Lyons, K. Streuber, D. W. Lansing, M. D. Faige, J. T. MacLamore, E. A. Hinsdale, L. A. Garten, P. A. Cantelli, V. E. Trouant and others.

Inspection trips were made to the RCA Victor plants at Camden, N. J.; the transmitting and receiving stations of RCA Communications, Inc., at Rocky Point and Riverhead, L. I., the RCA Laboratories at Princeton, N. J.; the National Broadcasting Company studios in Radio City; the NBC international shortwave stations at Bound Brook, N. J., and the operating headquarters of Radiomarine Corporation of America and RCA Communications in New York City. One of the most extensive field trips was to RCA Victor, Ltd., at Montreal, with detours to the Dorval airport and Beaconsfield radio stations, where RCA aviation equipment is in use for airport traffic control, cone of silence marker and communications.

Attending the Course were E. F. Eskenazi, C. de Oliveira and Walter Obermuller of RCA Victor Radio, S.A., Rio de Janeiro; L. C. Simpson, RCA Victor Argentina, S.A., Buenos Aires; R. E. Lee, RCA Representative, Lima, Peru; C. Baumann, Corporacion de Radio de Chile, Santiago; P. A. Turner and Fred Muller, RCA Photophone, Ltd., London; Igor Tornovsky, RCA Victor Company of China, Shanghai; H. S. Walker, K. R. Patrick, K. R. Swinton, E. L. Gardner and J. B. Knox of the RCA Victor Company Ltd., Montreal. In addition, fifteen men of RCA International home office participated in all or part of the course.

ENGINEERS FROM RCA'S FOREIGN SUBSIDIARIES ATTEND A SESSION OF THE REFRESHER COURSE CONDUCTED BY THE INTERNATIONAL DIVISION.

AWARDS TO RCA OFFICIALS

WARTIME ACHIEVEMENTS BRING LEGION OF MERIT MEDALS TO SPARKS AND VAN DYKE; FOLSOM RECEIVES MEDAL FOR MERIT FOR HIS SERVICE TO THE NAVY.

HIGH government honors for their accomplishments in the performance of important wartime projects have been conferred on three RCA officials. Frank M. Folsom, Executive Vice President in Charge of RCA Victor Division, received the Medal for Merit for his services as Chief of the Procurement Branch of the Navy Department's Office of Procurement and Material; Commander Arthur Van Dyck, assistant to Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories, received the Legion of Merit for his work as Officer in Charge of Navigational Aids, and Sidney Sparks, Traffic Manager of RCA Communications, Inc., also was the recipient of the Legion of Merit for his achievements as Officer in Charge of the War Department Signal Center at Washington, D. C.

Forrestal Presents Award

Mr. Folsom's award was presented by Secretary of the Navy James V. Forrestal who in August, 1944, had presented Mr. Folsom with the Navy's highest civilian honor, the Distinguished Civilian Service Award.

The Medal for Merit citation, signed by President Truman, noted that Mr. Folsom had recognized "the basic changes in Navy procurement necessitated by the large volume of war production," and that he "improved and modernized the procurement procedures of the Department by instituting new systems of contract clearance, contract negotiation, price analysis and cost controls. His skill and ingenuity in adapting sound business practices to the Navy's wartime procurement needs," the citation concluded, "materially speeded up the procurement of the weapons of war and saved the Navy millions of dollars." Mr. Folsom was Chief of the Procurement Branch from February, 1942 to December, 1943.

Commander Van Dyck received the Legion of Merit from Rear Admiral Monroe Kelly, Commandant of the Third Naval District, acting for Secretary Forrestal. The citation, read by Admiral Kelly, said:

"For exceptionally meritorious conduct in the performance of outstanding services to the Government of the United States as Officer-in-Charge of Navigational Aids in the Office of the Chief of Naval Operations during the period from April 19, 1943, to October 1, 1945. Exercising initiative and sound judgment, Commander Van Dyck successfully developed and established the Long Range Electronics Navigational Aids system in the United States Navy and, developing universal operating methods and procedures, formulated world-wide plans for Loran installations. Contributing materially to the successful completion of vital combat operations by coordinating such plans with the United States Army and the military forces of our Allies, Commander Van Dyck greatly increased the striking efficiency of the Allied forces."

Commander Van Dyck joined RCA in 1919, becoming manager of the Technical and Test Department in 1929. He was appointed Manager of the RCA Industry Service Laboratory, upon its formation in 1930 and directed its activities until he was called to active service in the Navy in April, 1943.

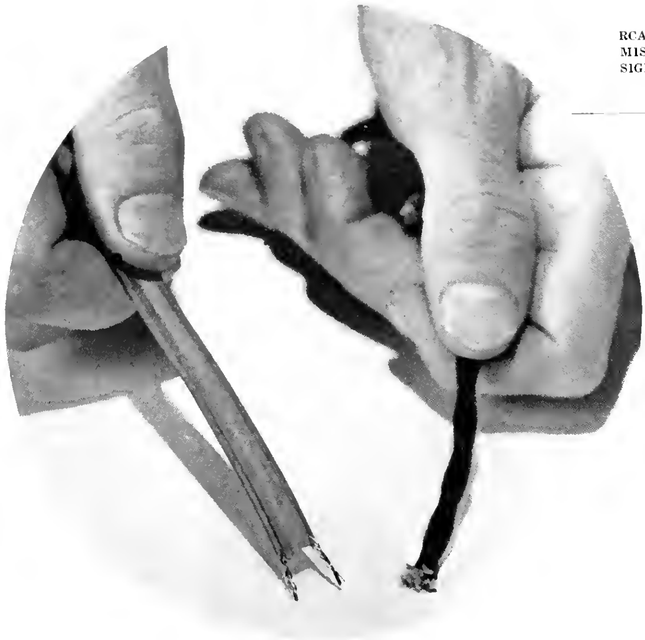
Sparks Cited for Technical Skill

Mr. Sparks was commended in his citation for "skillfully applying his technical knowledge and rich background of experience" to Army problems. The citation continued: "His meritorious achievements were a direct contribution to the Nation's war effort and will be of permanent benefit to peacetime communications." Major General Frank E. Stoner, assistant Chief Signal Officer, U. S. Army, presented the award to Mr. Sparks.

SECRETARY FORRESTAL PRESENTS THE MEDAL FOR MERIT TO FRANK M. FOLSOM, EXECUTIVE VICE PRESIDENT IN CHARGE OF RCA VICTOR DIVISION.

ARTHUR VAN DYKE, ASSISTANT TO DR. C. B. JOLLIFFE, RECEIVES THE LEGION OF MERIT FROM REAR ADMIRAL MONROE KELLY, COMMANDANT OF THE THIRD NAVAL DISTRICT.

MAJ. GENERAL FRANK E. STONER CONGRATULATES SIDNEY SPARKS AFTER PRESENTING THE LEGION OF MERIT MEDAL TO THE TRAFFIC MANAGER OF RCA COMMUNICATIONS.



RCA'S NEW RIBBON-LIKE TELEVISION TRANSMISSION LINE (LEFT) SAVES MOST OF THE SIGNAL STRENGTH WHICH WAS LOST IN THE OLD-TYPE CABLE (RIGHT).

BETTER TELEVISION ANTENNAS

Brighter, Clearer Pictures Assured by New Aerial and Transmission Line Which Triples Strength of Signals.

IMPROVED antennas and a new roof-to-living room transmission line which together provide brighter, clearer pictures on home television receivers than any similar equipment previously available have been developed by RCA Victor engineers, it was revealed by Joseph B. Elliott, vice president in charge of RCA Victor's Home Instrument activities, at a meeting of the American Television Society in New York on February 14.

Mr. Elliott also disclosed that RCA Victor plans to produce a de luxe Radio-Television-Victrola combination providing three separate and distinct sources of entertainment in a single cabinet. A low-cost table model sight-and-sound receiver retailing for about $200 will be available first, Mr. Elliott said.

To help develop the largest possible television audience in the shortest possible time, he said, the first RCA Victor receivers will be low cost, high quality television sight-and-sound table models, using 7-inch and 10-inch direct-viewing kinescopes.

"The first RCA Victor television receivers, we expect, will be made available for sale during 1946 in metropolitan New York, Albany-Schenectady, Chicago, Philadelphia and Los Angeles, and later in Washington, Cincinnati, and Fort Wayne," Mr. Elliott stated. "By mid-1947, about 24% of the nation's population in 9,086,000 wired homes will be within the effective service range of television, according to conservative estimates."

To Establish Service Stations

Declaring that pre-war experience indicates that television manufacturers should assume a major responsibility for installing and servicing their television instruments, Mr. Elliott revealed that RCA Victor plans to establish its own service shop facilities, manned by thoroughly competent and trained personnel, in all of the initial television market areas—New York, Philadelphia, Los Angeles, and Chicago. In addition, he said, the company will undertake an intensive, well-planned program of continuous education to train wholesale distributors, retailers, and members of the service profession in the techniques of television installation, servicing, and maintenance.

Technical Improvements

The new RCA Victor "Bright Picture" transmission line forms an important new link in the chain of technical improvements in television equipment which RCA has announced since the close of the war, it was pointed out. It closes the gap between dramatic advances in television cameras and camera tubes, such as the RCA Image Orthicon, and equally important improvements in home television receivers.

The improvement in picture signals delivered by the transmission line is made possible by the use of a new war-developed plastic, known as polyethylene, for the insulating material required to provide uniform spacing between the wires in the line.

Clearer Pictures Result

In homes on the fringe of a television station's coverage area, where the picture obtained with other types of transmission line might be too weak to be useful, Mr. Elliott said, a picture that is three times better is provided when the new line is used. In addition, he revealed, the new transmission line, in combination with the improved antenna and improved circuits in new RCA Victor television receivers, makes it possible for the first time to receive programs from any of the television channels without readjusting the antenna. The new transmission line will shortly be made available through RCA Victor distributors.

INLAND WATERBORNE TRAFFIC IS MOVED FASTER AND CHEAPER WITH THE AID OF NEW TWO-WAY RADIOPHONE SYSTEMS.

NEW 6-WAY RADIOPHONE

Radiomarine Develops Complete Automatic System to Meet Special Conditions of Inland Ship-to-Shore Communications.

By I. F. Byrnes

Vice President in charge of Engineering, Radiomarine Corp. of America

MARINE radiotelephone communication on the Mississippi River and its connecting waterways, as well as on the Great Lakes, presents interesting problems. Vessels which operate in these areas require two-way communication over short, medium and long distances. Use of a single frequency, or a narrow band of frequencies, would be inadequate for the continuously changing ranges involved.

For example, a towboat pushing a long string of loaded barges may start its trip near St. Louis and end it at the mouth of the Mississippi near New Orleans. During this long trip, communication is required, not only with land stations, but also with other vessels.

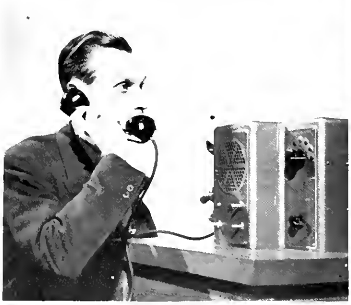
In order to provide efficient coverage for the various ranges, frequencies have been allocated in the 2-, 4-, 6- and 8-megacycle bands. The lower frequencies are suitable for short distance communication, and as the required range increases, the higher frequency channels are employed. This type of service makes it necessary for the vessel to be able to receive calls when any one of the assigned frequencies is used by the land station. A single receiver with band-switching facilities would not meet the problem since it would require frequent readjustment, and would be limited to receiving only one channel at a time.

Equipment is Automatic

Radiomarine has developed a new type of automatic radiotelephone for the Mississippi and Great Lakes areas which embodies six separately pretuned receivers for simultaneous operation as well as a six-channel radio transmitter, all incorporated in a single cabinet. The receivers for the higher frequency channels, in the 4-, 6- and 8-megacycle bands, are arranged to actuate an automatic bell ringing device so that the land station may dial the vessel's number in order to place a call. The three lower-frequency channels which are in the 2- to 3-megacycle band are connected to a loud speaker. This permits vessels to call by voice, or a land station to do likewise for short-range service.

Since the equipment is automatic in operation, it may be located in any convenient place and remotely controlled from one or two compact remote control units. Normally one of these units is installed in the wheelhouse and the second unit in

COMMUNICATION FROM A SHIP TO A LAND STATION IS ESTABLISHED THROUGH THE REMOTE CONTROL UNIT (BELOW) AND THE COMPACT 75-WATT TRANSMITTER AT THE RIGHT.



the Captain's quarters. Upon receipt of a call the user lifts the handset which starts the transmitter motor generator and then places the channel selector switch in the correct position to set the transmitter and its respective receiver automatically to the desired channel.

New Features in Design

Each remote control unit uses an ingenious system of indicator lights located directly above the channel selector switch. When a land station calls the ship through the automatic ringer on any one of the high frequency channels, the appropriate indicator light glows. This tells the Captain the correct channel to be used in answering the call. In the same way, when a call is initiated on the vessel and the channel selector switch placed in the proper position, the radio transmitter and receiver are automatically connected for operation on the desired frequency.

Noteworthy features of the receiver design are high sensitivity, freedom from adjacent channel interference, and reliable operation directly from the shipboard 115 volt d.c. power supply. All six receivers are "line operated" and require no power conversion equipment. Since the receivers are frequently in operation 24 hours per day, the elimination of rotating equipment or vibrator power supplies, is conducive to long life and minimum "wear and tear." Other circuit features of the receivers include noise limiters, for minimizing sharp interfering static or noise pulses, and flat AVC (automatic volume control) circuits which maintain loud speaker and earphone levels at a uniform value.

Cabinet is Shock-Proof

The complete transmitter-receiver assembly is housed in a shock-mounted aluminum cabinet 60 inches high, 32 inches wide and 14 inches deep. The transmitter motor generator and its automatic starter are located inside the cabinet, thereby eliminating additional wiring for these units.

MINUTE PARTICLES OF METALS EMBEDDED IN THESE PLASTIC SHEETS ARE DETECTED INSTANTLY BY RCA ELECTRONIC METAL DETECTOR.

HIDDEN PARTICLES DETECTED

Electronic "Sherlock Holmes" Gives Warning When Foreign Objects Find Their Way Into Industrial Products.

AN electronic Sherlock Holmes made of metal and plastics, that will "spot and arrest" metal particles of any kind which may be "hiding out" in non-metallic industrial materials, has been designed and built by the RCA Victor Division. This industrial "wonder tool" is expected to be invaluable for the protection of quality and prevention of machinery damage and lost production time in foods, plastics, rubber, textiles, lumber, paper, explosives, and many other industries.

The electric reaction set up in the device when metal is present in materials being inspected can be used to light a warning lamp, ring a bell, stop a continuous process, mark the contaminated object, or deflect it into a special channel or receptacle for rejects. Objects or materials can be passed through the inspection aperture on an endless conveyor belt or by means of a chute. The device will accommodate conveyor speeds up to 600 feet per minute without impairment of inspection efficiency.

The completely self-contained unit is approximately the size of a wardrobe trunk.

Unlike magnetic metal detectors, which will react only to magnetic metals such as iron and steel, the RCA device will detect any kind of metal or alloy, including iron, copper, brass, lead, aluminum, stainless steel, and others. Ultra-sensitive, it will react to minute as well as larger pieces of metal, and the reaction is independent of the depth of the imbedded particle.

In operation, materials passing through the inspection aperture are screened by a high-frequency electromagnetic field, which is generated by coils imbedded in plastic panels at the top and bottom of the aperture. When metal is present in the material being screened, that fact is detected by a sensitive electron tube amplifier which triggers either a signaling device (lamp or bell) or an automatic marking or ejection mechanism, or a combination of both.

The device can be operated in complete safety by regular factory employes.

Television—A Social Influence

NEW WONDER OF MASS COMMUNICATION GIVES EVIDENCE OF BECOMING GREATEST SINGLE DEMOCRATIZING AGENT SINCE INVENTION OF PRINTING

By John F. Royal
Vice President in Charge of Television, National Broadcasting Company

From an Address to the General Federation of Women's Clubs, Cleveland, Ohio.

MY VISIT here is to tell you about a new guest coming to your homes in the very near future. The name is TELEVISION, and she will be beautifully gowned in a black-and-white dress.

You have been hearing much about this new wonder of mass communication, this new art of sight and sound combined, and I assume you have a natural curiosity about it.

Except for the spoken and written word, there have been only six major innovations of method in human communications: printing, telegraphy, telephone, the movies, radio—and now, Television. The invention of each, in turn, has resulted in social and psychological changes and advances of a revolutionary nature.

In television are combined in one medium the singular advantages of each of the others. Mass communication became possible, for example, with the invention of the printing press. The telegraph gave wings to the transmission of ideas and messages, made possible their dissemination over great distances in shorter time. The telephone added the intimate quality of the human voice to the transmission of messages. The motion picture film made it possible for these ideas and messages to be dramatized visually, and recorded for the enjoyment of greater numbers of people. Along came radio—to reduce the dimensions of the globe to the proportions of a loud speaker, as it carried messages instantaneously and inexpensively to and from the farthest regions of the earth into the living room. Radio, within the space of a single generation, eradicated provincialism and fostered the greatest upsurge in all time. And now comes television—adding vision and animation to the speed and immediacy of radio communication.

On or about June 1st, or soon thereafter, television sets should appear in the dealers' windows, but not everywhere. These first sets will be distributed where transmitters are now in operation. This means New York and vicinity, Schenectady, Philadelphia, Chicago and Los Angeles.

Outlook for Color Television

There are some who—crying in the wilderness—are suggesting that television should wait for color. One executive of a company crusading for delay has said that the public will wait indefinitely for color. I feel that to be an absurd statement. Our country was not made great by waiting. Progress never waits.

We have experimented with color and recently gave a public demonstration at the RCA Laboratories in Princeton. At that time we stated that color—I mean good color—will ultimately be a reality in television, but it is far from being ready for public acceptance at this time. That is not the opinion of one company, but rather the joint opinion, the consensus, of the engineering staffs in the entire industry, with a few minor exceptions.

There is nothing in our lives with a greater psychological effect than color, but it must be handled with care. When good and practical color in television is ready for your homes, our company will have it. Many of you are familiar with the many trying years of color effort by the motion picture industry. Much of the same uncertainty faces us in our color problem in television. Matthew Henry, many years ago, said: "Many a dangerous temptation comes to us in fine gay colours that are but skin-deep." We feel color in television at the moment is only skin-deep.

Entertainment for All

In television, as in sound radio, there will be entertainment and education for all, as the resources of the theatre, the university, the concert stage, the sports arena and the whole wide world are tapped by the television camera and supplemented by motion picture film.

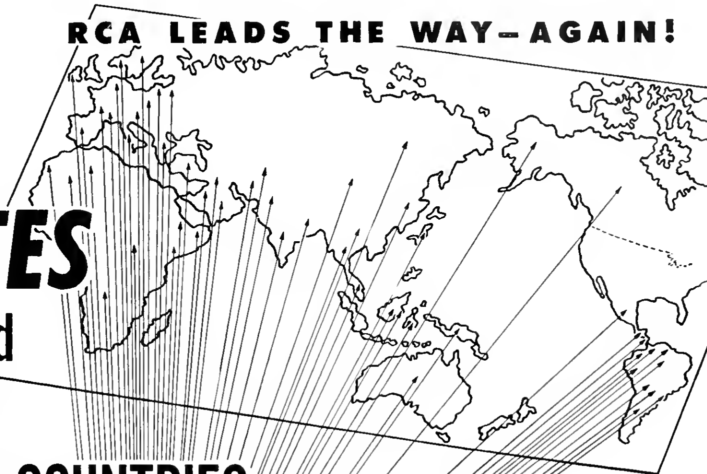
More even than sound, television, which enables man to see as well as hear—and seeing for himself comprehend better—gives evidence of becoming the greatest single democratizing agent since the invention of printing.

Because television will enable many people to observe the same event at the same time, television will build a consciousness of equality and a community of interest. This consciousness will be enhanced by the fact that television will enter directly into the home and have the distinct personal appeal of allowing people to see things for themselves as they really appear.

Educationally, television will enable the best of current thinking about human affairs to be presented vividly to millions of people in their homes as well as to children in schools.

The success of television will be a joint responsibility — yours and ours. Its potential powers will go beyond anything we have ever imagined. We invite your cooperation, your advice and suggestions, and by this means our way of living can be made better, and together we can create a more relaxed and peaceful world.

RCA LEADS THE WAY—AGAIN!



RCA
INITIATES
Unprecedented Low Rates to ALL FOREIGN COUNTRIES <u>From any point</u> in the United States

. . . when approved by the Federal Communications Commission.

—this new rate schedule permits persons at any telegraph point in the United States to communicate *"Via RCA"* with any part of the world for the same low rates applicable to the "gateway" cities of New York and San Francisco.

RCA

Eliminating extra charges in non-gateway cities—previously ranging up to four cents a word—the proposed schedule calls for new low rates as follows—

From any telegraph point in the United States to any telegraph point in the world, messages filed "Via RCA" to cost

NOT MORE THAN

30¢ *per Full Rate Word*
20¢ *per Code Word*
15¢ *per Deferred Word*
10¢ *per Night Letter Word*

LOWEST RATES IN HISTORY

This standardization and reduction of RCA international telegraph rates is expected to effect annual savings to the American public of well over a million dollars in telegraph tolls.

Telegrams to all parts of the world may be filed at any Western Union office and marked *"Via RCA"* (no extra charge). Such messages, sent on and after the effective date of the new schedule, will be billed at the REDUCED RATES.

RCA COMMUNICATIONS, INC.

A Service of Radio Corporation of America

Head Office: 64 Broad Street, New York 4, N. Y.

Telephone HAnover 2-1811 Teletype NY 1-1346

THE NBC UNIVERSITY OF THE AIR

The National Education Association will observe NBC's United Nations Week

In order to stress the world's need for unity and understanding in the building of an enduring peace, NEA will join with the National Broadcasting Company in the observance of NBC's United Nations Week—September 1 through 7.

In schools throughout the country, NEA, with its 850,000 teacher-members, will co-ordinate its activities with those of NBC's affiliated stations in this worthy project: PEACE NOW—OR NEVER!

The National Broadcasting Company's United Nations project is long-term—beginning many months before its United Nations Week. With the endorsement of the State Department, the co-operation of the American Association for the United Nations and the NEA, NBC launches this activity in early June.

Throughout the nation, NBC affiliated stations in every community will conduct local peace campaigns tying-in with the national project. Beginning June 7, the first of the *University of the Air* courses to be devoted exclusively to the fostering of United Nations understanding will be broadcast. The long-range activities of stations, NBC and participating groups will culminate in NBC's world-wide United Nations Week—a week of peace programs to make America peace-conscious.

National Broadcasting Company

America's No. 1 Network

A Service of Radio Corporation of America

PORTRAIT BY KARSH—OTTAWA

Marian Anderson

evokes the profound emotional power of Brahms' "Alto Rhapsody" for you in a deeply expressive new recording

Recorded with the San Francisco Symphony Orchestra and Municipal Chorus, Pierre Monteux, Conductor. Two Red Seal Records in Showpiece SP-13. $2.25 exclusive of taxes.

THE WORLD'S GREATEST ARTISTS ARE ON RCA VICTOR RECORDS

Printed in U.S.A.

RCA Laboratories provides another great achievement in television—the "mirror-backed" Kinescope, or picture tube.

New "searchlight brilliance" for home television!

Now, large screen television pictures are twice as bright—yes, *twice as bright* as ever before!

You can "count every eyelash" in the close-ups. You'll almost want to shake hands with the people on your television screen—so great is the illusion that they are actually in your living room.

This new sharpness and brilliance is achieved through the new RCA "mirror-backed" Kinescope, or picture tube, perfected at RCA Laboratories.

It has a metallic film—eight-millionths of an inch thick. This metallic film acts as a reflector, allowing electrons to pass through to the screen but preventing light rays from becoming lost through the back of the tube. Just as the reflector of a searchlight concentrates its beam—so does this metallic film reflector double the brilliance and clarity of detail in home television receivers.

Similar progress-making research at RCA Laboratories is being applied constantly to all RCA Victor products—assuring you that anything you buy bearing the RCA monogram is one of the finest instruments of its kind science has achieved.

• • •

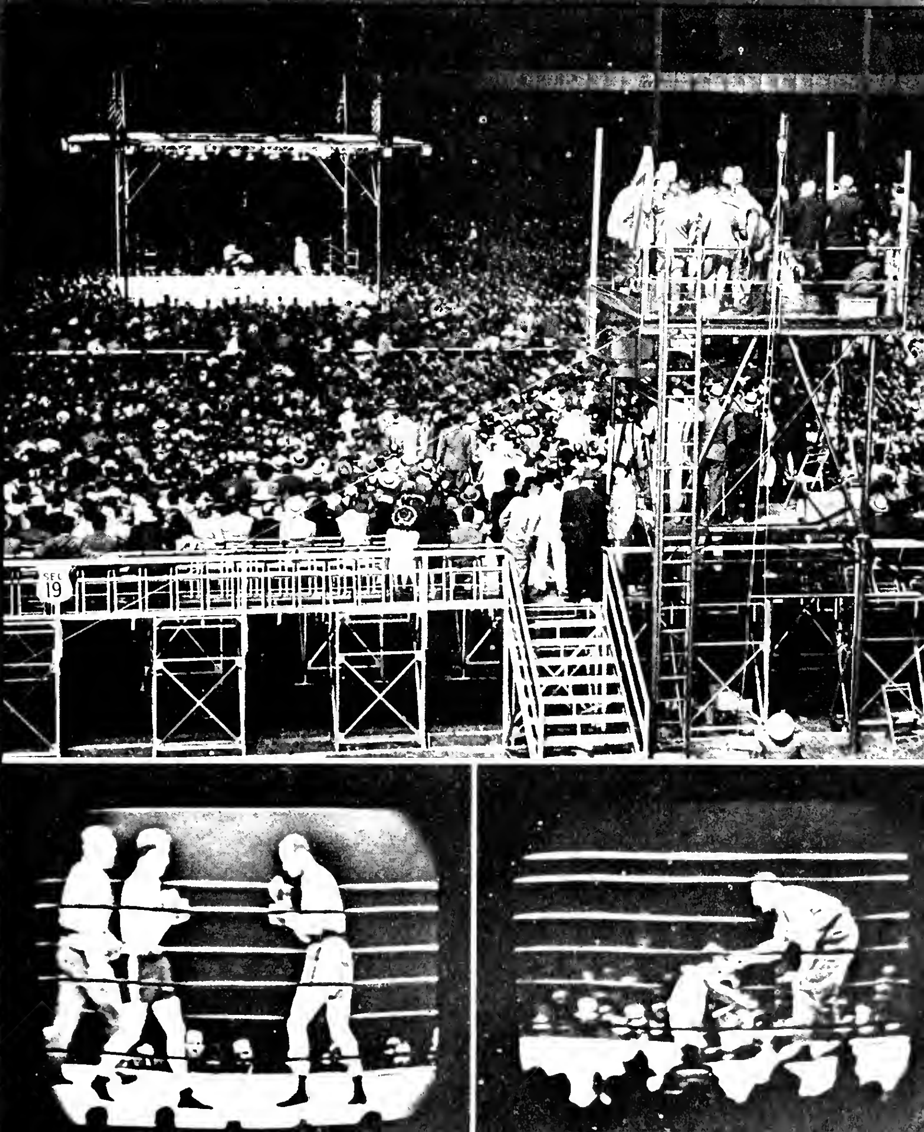
Radio Corporation of America, RCA Building, Radio City, New York 20. Listen to The RCA Victor Show, Sundays, 4:30 P.M., Eastern Time, over the NBC Network.

RCA Victor home television receivers will be available in two types. One model will have a direct-viewing screen about 6 by 8 inches. The other type will be similar to the set shown above—with a screen about 15 by 20 inches. Both instruments are being readied for the public with all possible speed and should be available this year.

RADIO CORPORATION of AMERICA

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

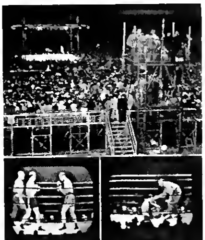


RCA

1946

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



COVER

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BC's television cameras
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Services of RCA are:

RCA Laboratories Division
•
RCA Victor Division
•
RCA Communications, Inc.
•
marine Corporation of America
•
nal Broadcasting Company, Inc.
•
RCA Institutes, Inc.
•
RCA Service Company, Inc.
•
RCA International Division

VOLUME 5 NUMBER 4 JULY 1946

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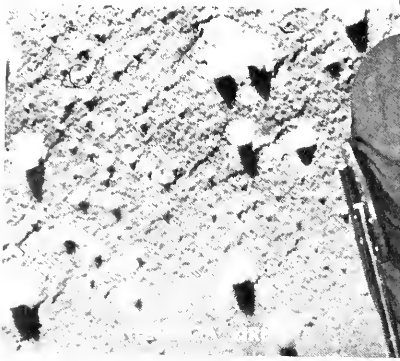
RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.
DAVID SARNOFF, *President*

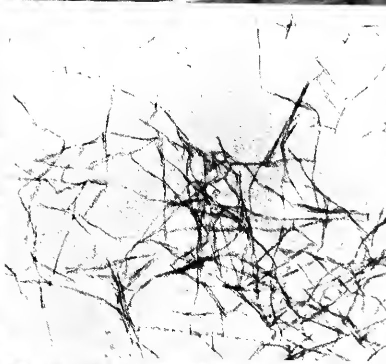
LEWIS MACCONNACH, *Secretary* ARTHUR B. TUTTLE, *Treasurer*

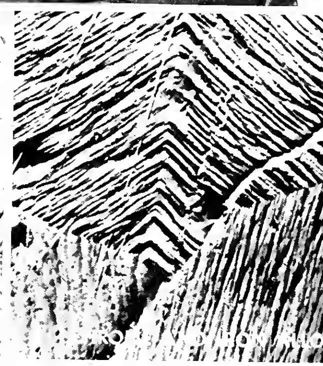
Radio Age is published quarterly by the Department of Information,
Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N. Y.

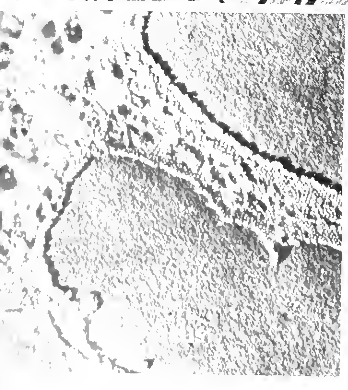
UNSEEN WORLDS

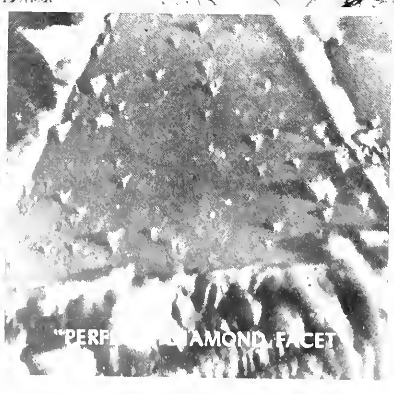
THROUGH ITS TREMENDOUS MAGNIFYING POWER, THE RCA ELECTRON MICROSCOPE, SHOWN AT RIGHT WITH DR. V. K. ZWORYKIN, PERRY C. SMITH AND DR. JAMES HILLIER, REVEALS PREVIOUSLY INVISIBLE SPECIMENS OF LIFE AND INERT SUBSTANCES IN THE SUBMICROSCOPIC WORLD. BELOW ARE TYPICAL MICROGRAPHS TAKEN FROM THE ELECTRON MICROSCOPE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

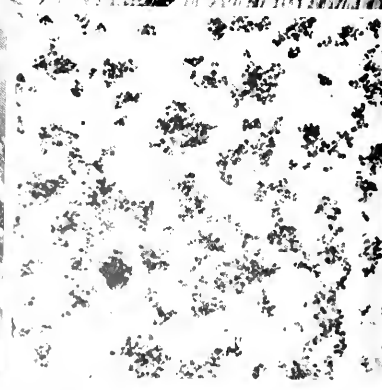












The Atom's Challenge

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.

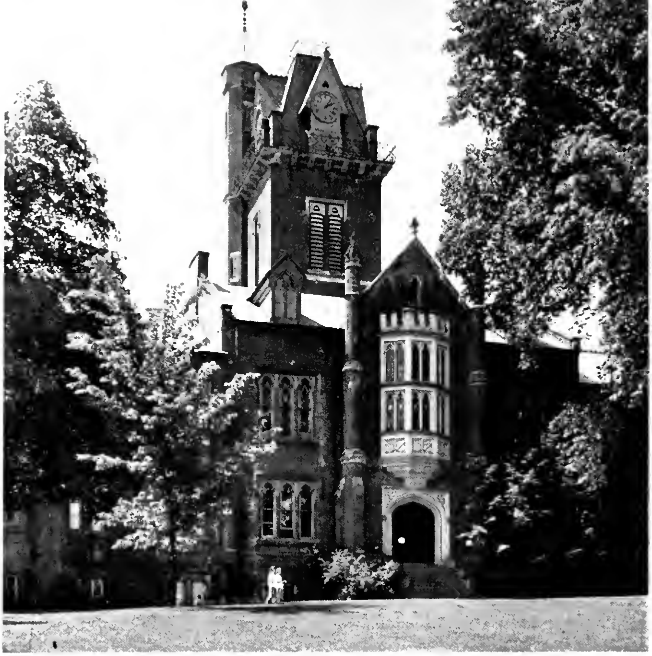
Knowledge and the Atom

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 observed 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.

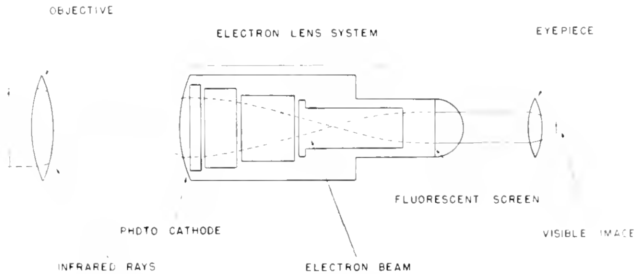


DIAGRAM OF IMAGE TUBE SHOWING HOW OBJECTS, ILLUMINATED BY INFRA-RED LIGHT, ARE MADE VISIBLE TO OBSERVER.

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.

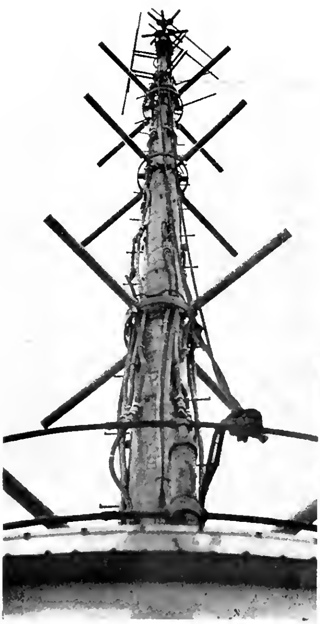
On a single supporting mast, there are three antennas which will radiate waves of four different frequencies, Hanson disclosed. The television portion consists of an array of 16 elements, all of which combine to concentrate toward the horizon the waves of two separate services, television picture and 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

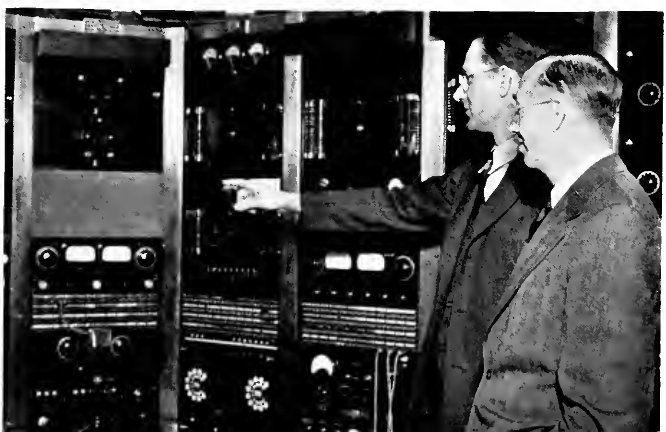
"NBC engineers have been performing pioneer research and development work in the field of television for more than 15 years," Hanson said. "The result of their labors has been the development of a practical system of television in which the public can have fullest confidence."

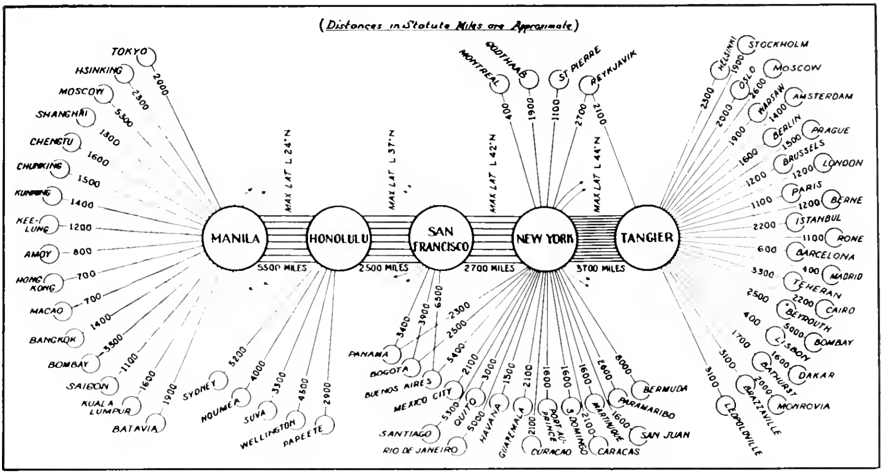
The transmitter which has served WNBT and its predecessors since early in 1931 has been replaced by a new RCA picture transmitter. The sound transmitter, also an RCA model, has been installed alongside.



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.

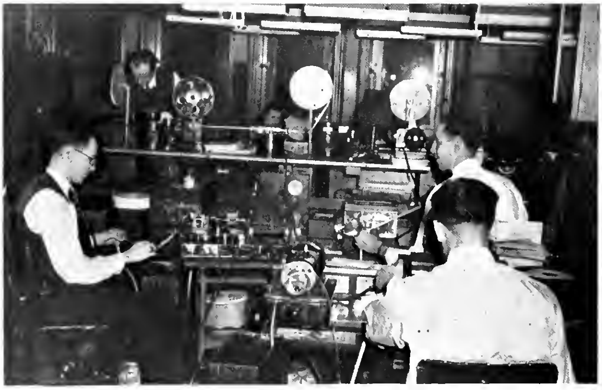
Concrete steps in the execution of the Pandora Plan, which already have been accomplished, were preceded by the drastic rate reductions which RCA Communications, Inc., placed into effect May 1, 1946.

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

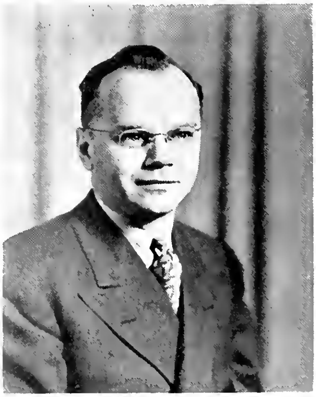
During the last year of the war, RCA designed and produced a highly-directional listening device for use on submarines. This device is capable of picking up sounds over a wide frequency range (both audible and supersonic), from any source and from great distances, without disclosing its own location. 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.

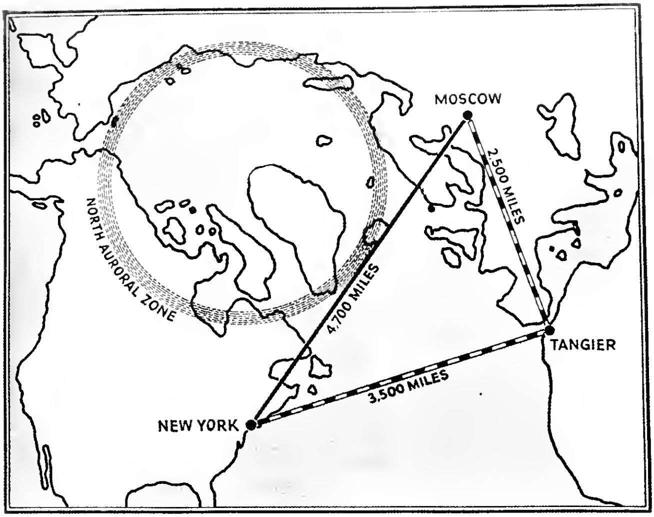
Sonar equipment proved an aid to navigation as well as detection of enemy vessels, inasmuch as echo-ranging can be used to locate reefs and shorelines and to obtain other data necessary to navigation.

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.

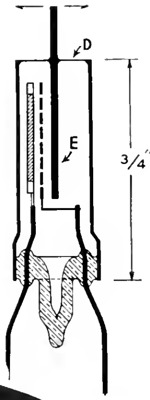
Complete Tube is One Inch Long

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.

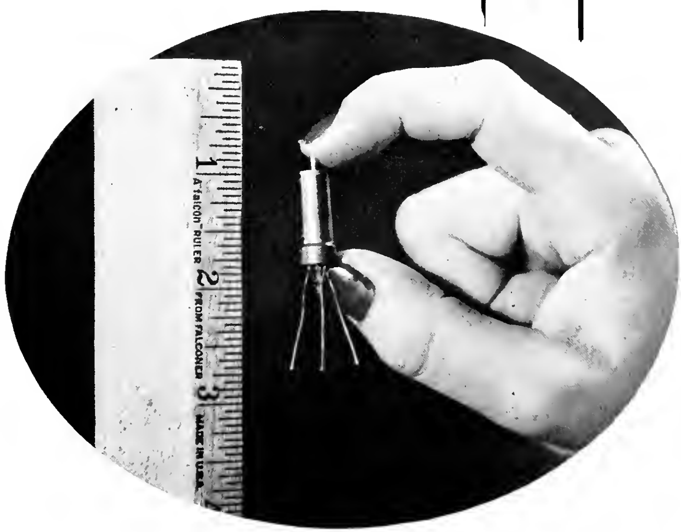
Dr. Harry F. Olson designed and built a preliminary model at the RCA Laboratories, at Princeton. Soon afterward, the project was transferred to the RCA Victor tube development section at Harrison, where the work was continued by George Rose.

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.

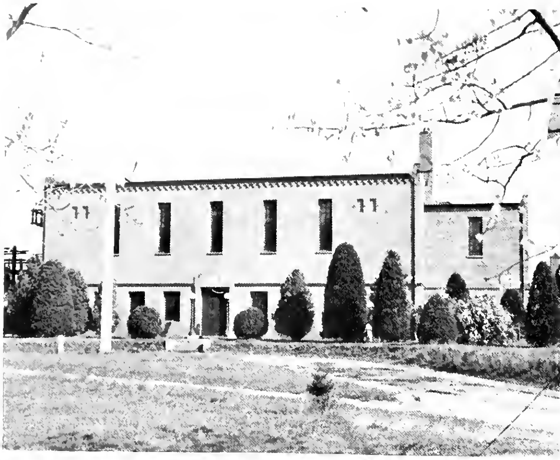
When used in a phonograph pickup, the tube will perform up to the highest requirements of fidelity and sensitivity. At the same time, it provides for a system having low acoustic noise and needle "chatter". Life tests have demonstrated the ability of the tube to withstand severe treatment over long periods 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.

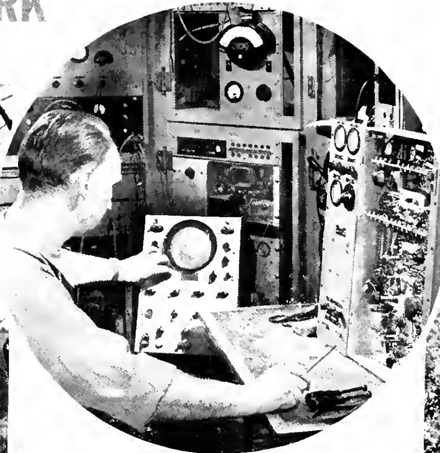


BELOW: THIS VIEW SHOWS THE COMPACT SIZE OF THE VIBROTRON. PROTRUDING THROUGH THE TOP OF THE TUBE IS THE ROD OR LEVER WHICH TRANSFERS MECHANICAL MOTION FROM THE OUTSIDE INTO THE HIGH VACUUM OF THE INNER CHAMBER, AS PICTURED IN THE SKETCH AT THE RIGHT



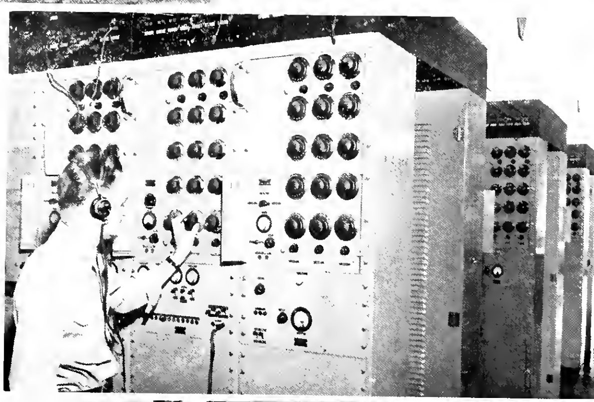
RIVERHEAD • NEW YORK





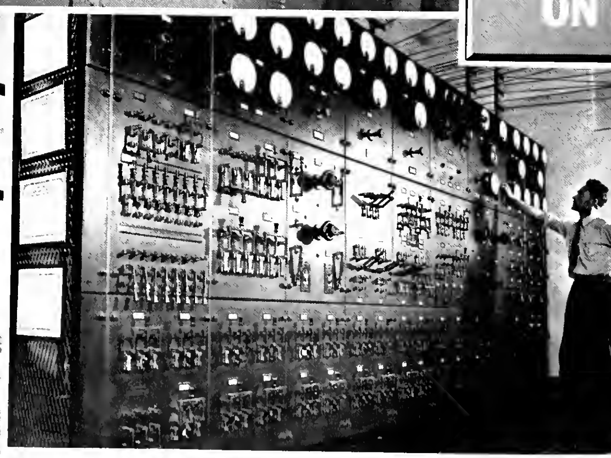
THE OSCILLOGRAPH PROVIDES A "PICTURE" OF THE PERFORMANCE OF RECEIVERS.

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



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

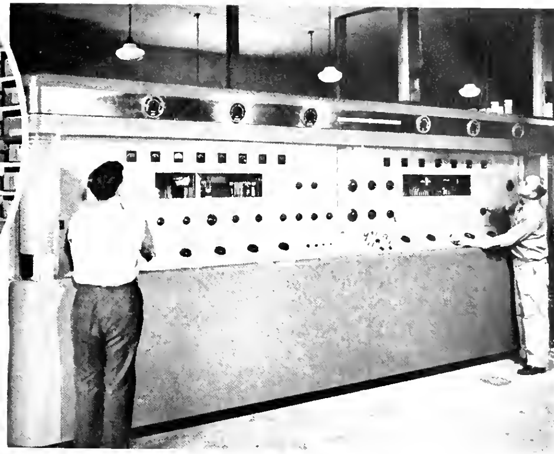
THE WIRES ON THESE POLES COMPRISE A RADIO RUNWAY FROM MANY NATIONS.



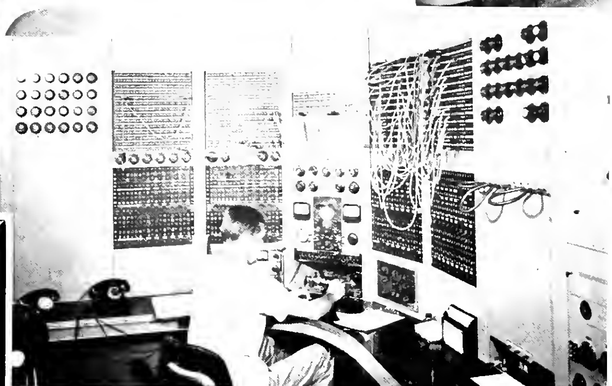
THE POWER CONTROL BOARD OF RCA "RADIO CENTRAL" ON LONG ISLAND.

ROCKY POINT-NEW YORK

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

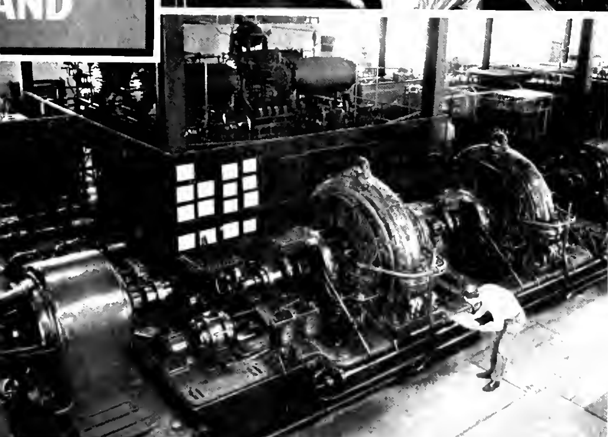


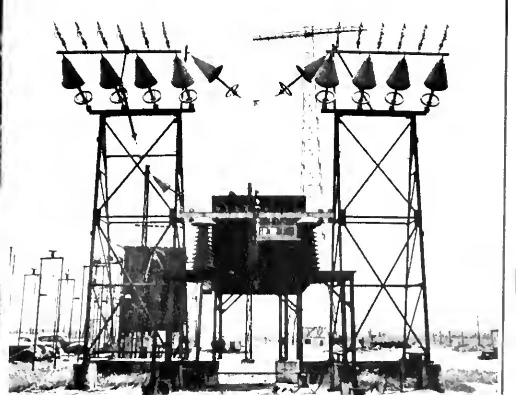
SHORT-WAVE BROADCAST TRANSMITTER USED FOR RELAYING RADIO PROGRAMS TO VARIOUS PARTS OF THE WORLD.



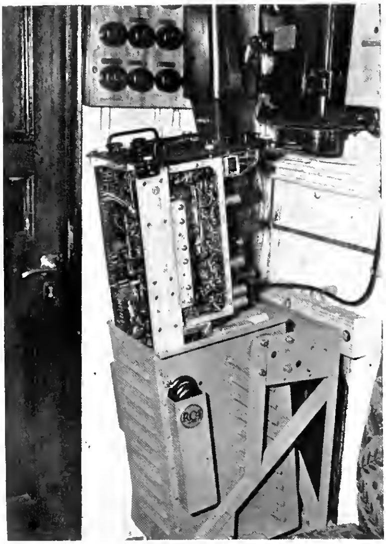
THROUGH THIS CONTROL BOARD MESSAGES FROM THE RCA CENTRAL OFFICE IN NEW YORK ARE ROUTED TO MORE THAN 58 COUNTRIES.

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 navigators 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.

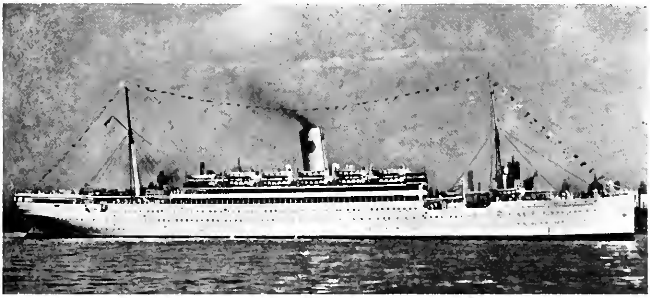
Radiomarine is cooperating with the Lake Carriers' Association, of Cleveland, in plans for tests of radar instruments on the Great Lakes. The Association, which represents leading shipping interests in that region, proposes an experimental program to integrate the uses of radar into a complete system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

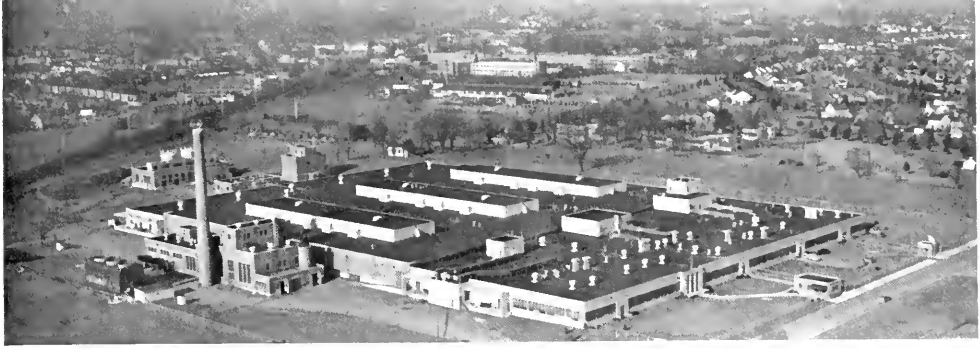
Radiomarine Corporation of America was revealed to have applied its latest developments in radio communication and electronic navigation apparatus to shipping on the high seas, as well as on the Great Lakes, rivers and harbors. Loran — long-range navigation equipment—is being given trials on passenger 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 super-ballyhooed fisticuffs marked a historic milestone."

Charles Butterfield, Associated Press:

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

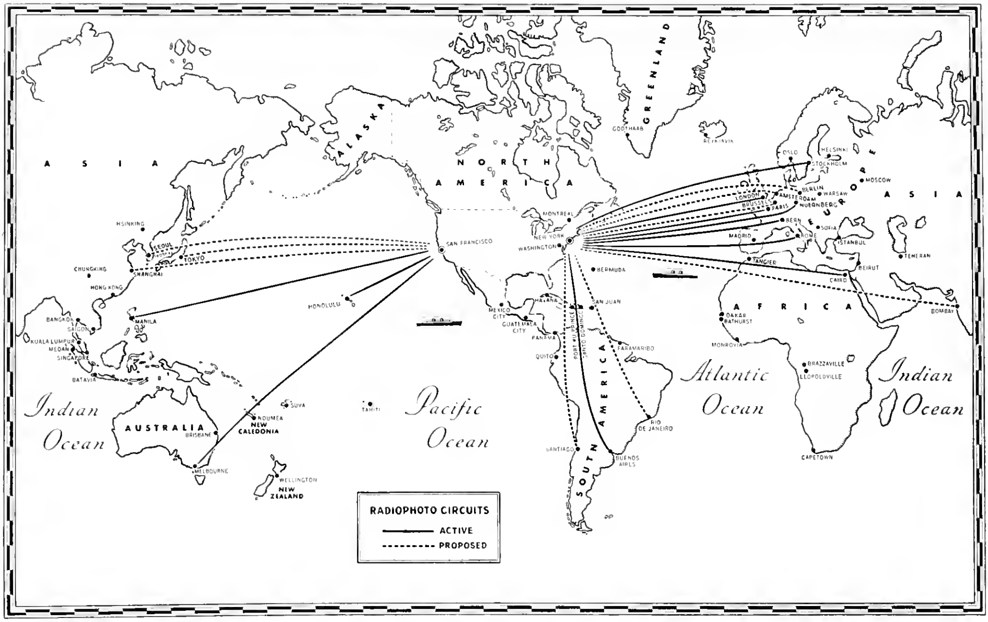
Ed Leamy, World-Telegram:

"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.

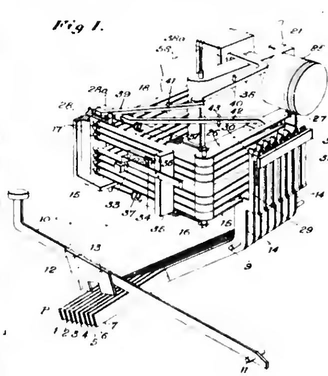
New Circuits Are Planned

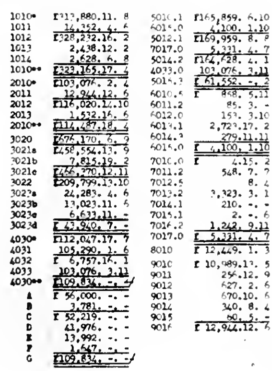
Equipment is being readied to operate circuits to Santiago, Rio de Janeiro, Amsterdam, Brussels, Berlin, Bombay, Shanghai, Seoul and Tokyo.

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*	£313,880.11. 8
1011	14,352. 4. 6
1012	£328,232.16. 2
1013	2,438.12. 2
1014	2,628. 6. 8
1010**	£323,165.17. 4
2010*	£103,076. 2. 4
2011	12,944.12. 6
2012	£116,020.14.10
2013	1,532.16. 6
2010**	£114,487.18. 4
3020	£676,170. 6. 9
3021a	£458,554.13. 9
3021b	7,815.19. 2
3021c	£466,370.12.11
3022	£209,799.13.10
3023a	24,283. 4. 6
3023b	13,023.11. 6
3023c	6,633.11. -
3023d	£ 43,940. 7. -
4030*	£112,047.17. 7
4031	105,290. 1. 6
4032	£ 6,757.16. 1
4033	103,076. 3.11
4030**	£109,834. -. 4
A	£ 56,000. -. -
B	3,781. -. -
C	£ 52,219. -. -
D	41,976. -. -
E	13,992. -. -
F	1,647. -. -
G	£109,834. -. -

5010.1	£165,859. 6.10
6015.0	4,100. 1.10
5012.1	£169,959. 8. 8
7017.0	5,331. 4. 7
5014.2	£164,628. 4. 1
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5015.3	£ 61,552. -. 2
6010.5	£ 858. 5.11
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7016.2	1,242. 9.11
7017.0	£ 5,331. 4. 7
8010	£ 12,449. 1. 3
9010	£ 10,989.13. 5
9011	256.12. 9
9012	627. 2. 6
9013	670.10. 6
9014	340. 8. 4
9015	60. 5. -
9016	£ 12,944.12. 6

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.

• • •

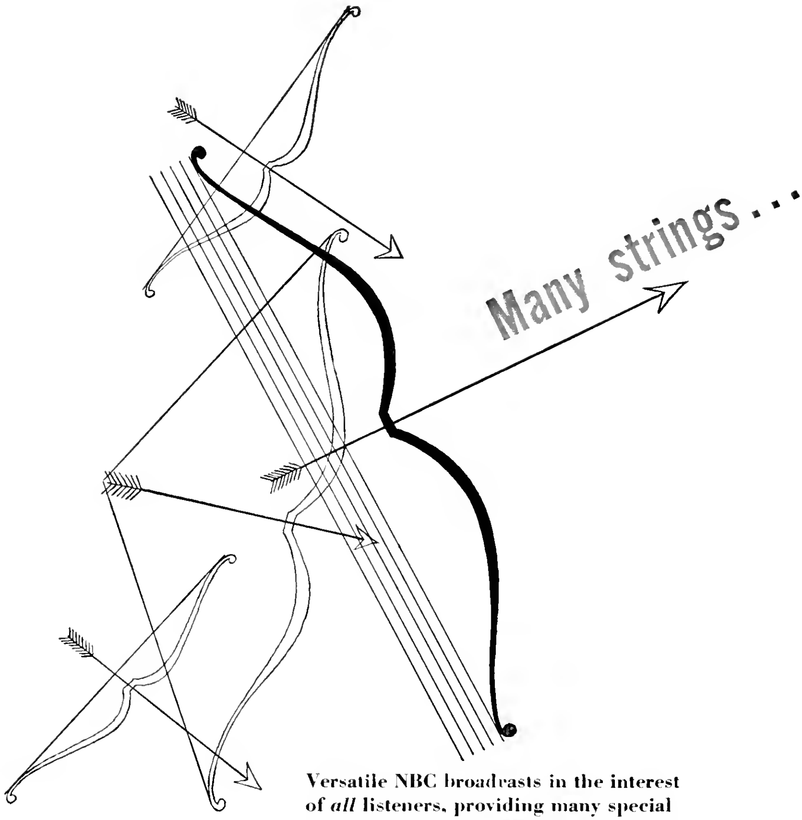
Leaders in government and industry of all nations look to RCA for technical consulting advice, for new and better products in radio and in electronics.

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.*

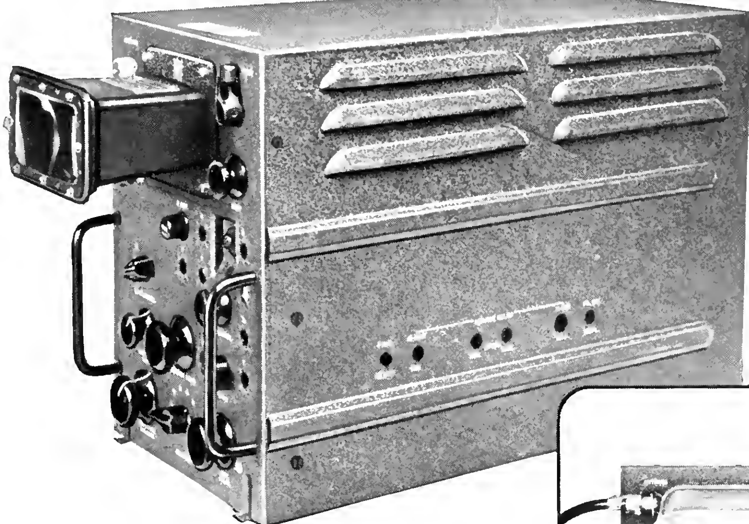
America's No. 1 Network

A Service of Radio Corporation of America

. . . the National Broadcasting Company

LORAN BY RCA

Available Now for Commercial Aircraft

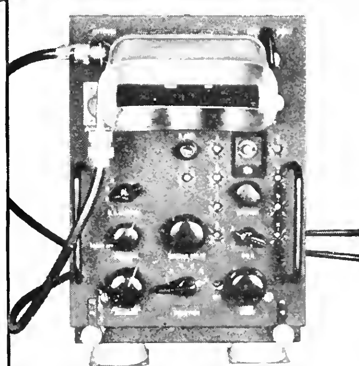


RCA, basic designer of all air-borne LORAN equipment used in this country and largest producer of LORAN for military installation now makes this modern aid to navigation available for commercial aircraft.

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.



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

RCA

AVIATION SECTION

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

CTOBER

Here it is!

RADIOMARINE's RADAR

Indicator Unit—Waist-high for operating convenience.

- Large clear picture
- Accurate indication
- Easy to operate

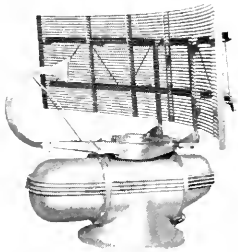
Viewing scope: 12-inches in diameter with fixed and movable Azimuth Scales. Calibrated in one-degree divisions.

Range: 100 yards to 50 miles in 4-range scales.

High resolution in range and bearing. Uses 3.2 centimeter band for narrow-beam width.

True or relative bearings used with Gyro System are North stabilized.

Designed especially for shipboard use



Antenna Assembly—Mounts on standard Navy flange. Compact, lightweight, aluminum and stainless steel construction. Reflector only 62-inches wide.

Radiomarine's new Radar is sturdily built, powerful and dependable. It is an accurate navigational aid that speeds shipping schedules. It is an efficient anticollision device.

In fair weather or foul, Radiomarine's Radar discloses the location of channel markers, buoys, landmarks and harbor traffic. Landfalls, other ships, icebergs, and small, low objects are readily picked up over a wide range.

Radiomarine's easy-to-operate Radar, like all of its other dependable equipment, is backed by Radiomarine's world-wide service organization.

Write for full information

For further information and specifications on Radar by Radiomarine, write to: Radiomarine Corporation of America, Dept. 10-H, 75 Varick Street, New York 13, N. Y.

RCA

RADIOMARINE CORPORATION of AMERICA

A SERVICE OF RADIO CORPORATION OF AMERICA

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

COVER

New RCA Victor table model television receiver which is now in production. The instrument tunes to 13 station channels and provides a bright, clear picture 6½ x 8½ inches.

VOLUME 6 NUMBER 1 OCTOBER 1946

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Services of RCA are:

RCA Laboratories Division
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RCA Victor Division
•
RCA Communications, Inc.
•
Radiomarine Corporation of America
•
National Broadcasting Company, Inc.
•
RCA Institutes, Inc.
•
RCA Service Company, Inc.
•
RCA International Division

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.

RCA IMAGE ORTHICON CAMERAS PICK UP ARMY-CORNELL GAME AT WEST POINT FOR TRANSMISSION OVER NBC'S TELEVISION STATION WNBT, NEW YORK.

40 YEARS IN RADIO

DAVID SARNOFF, PRESIDENT OF RADIO CORPORATION OF AMERICA, HONORED AT DINNER ON THE FORTIETH ANNIVERSARY OF HIS ENTRY INTO THE FIELD OF RADIO

Friends and associates of Brigadier General David Sarnoff met in New York at a dinner on the evening of September 30, to observe the 40th anniversary of his entry into the field of radio. Lieutenant General J. G. Harbord, Chairman of the RCA Board of Directors, as toastmaster, read the following messages:

From the President of the United States—

I have heard with pleasure about the dinner which is being given you tonight in honor of your forty years in the radio industry. I wish I could be with you. I should like to associate myself with your colleagues in the deserved tribute they are paying you for your part in the development of radio. Your forty year span of service with radio is almost exactly the span of the radio industry itself. Yours has been a significant part in bringing it from its infancy to its present imposing stature. The whole world of communications is your debtor. I have specially in mind at this time your fine contribution to the war effort and what you are now doing through UNESCO in the promotion of cultural relations with other countries. With your associates in the industry, I salute you warmly and send my very best wishes for your continued success and happiness.

HARRY S. TRUMAN

From the Governor of the State of New York—

Hearty congratulations to you and your associates on your fortieth anniversary in radio. It is a high tribute to all of you that radio has come through so many critical years stronger and better able than ever to serve the needs of the American people. With every good wish,

THOMAS E. DEWEY

From the Mayor of the City of New York—

Dear General Harbord:

At the time I accepted an invitation to attend the dinner in honor of my good friend, General David Sarnoff, to mark his fortieth anniversary in radio, I fully intended to be present. In fact, I looked forward to that pleasure. However, as I explained to General Sarnoff over the telephone this morning, circumstances have developed which make it impossible for me to attend. I will certainly be present at the predinner reception.

I had the pleasure of meeting General Sarnoff in Rome, Italy, in 1944. Since then, particularly since the first of the year, I have had no hesitancy in calling upon him for his advice and counsel whenever I believed I needed it. He always responded like a true friend and public-spirited citizen.

General Sarnoff has become an outstanding figure in the field of communications from the time he first became associated with Marconi two score years ago, and he has established a record of patriotic and public service which has endeared him to all of us. He will always have my esteem and affection.

WILLIAM O'DWYER

From the Secretary of War—

I wish to extend my warmest felicitations on your completion of forty years of continuous service in radio. You began as a pioneer in the marvelous development of the new science of wireless communication. It is good to know that you are continuing as a pioneer in the new and apparently almost limitless field of further development of this mysterious force.

During your long service in the practical application of this science to the benefit of humanity you have retained the same youthful vigor and enthusiasm and the same lively imagination that characterized your first service as a young employee of the Marconi Wireless Telegraph Company in 1906.

I would like to join your many friends and admirers in hope that you will long continue to serve the public in the ever expanding field which you have done so much to develop.

ROBERT P. PATTERSON

From the Secretary of the Navy—

Navy joins with your friends and associates in extending best wishes on the occasion commemorating your forty years of service to radio. The story of this service is an inspiration to all. Your varied contributions to industry and the advancement of science have been of lasting benefit to the nation and the welfare of the world. My warm regards and best wishes.

JAMES FORRESTAL

From the American Ambassador to Russia—

Sincere congratulations and affectionate good wishes on your famous anniversary in radio. I still regret that you were not able to take over the job running communications in Germany but I will always be grateful for the magnificent work you did while a member of Supreme Headquarters Staff.

BEDELL SMITH

TOASTMASTER: Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, needs no endorsement from us as the leading physicist of the world. In the best sense, a public citizen, a wise counselor on public affairs and in business, he has dominated a world-wide range of interests from Boston to Bikini, measured in either direction.

DR. COMPTON SPEAKS

Excerpts from address by Dr. Compton:

THE career of the man whom we honor tonight is material for one of those stories which, put together, constitute the epic of America. It is a career which illustrates what fine things can be accomplished when native ability, ambition and character find scope for free enterprise in a land of opportunity. Sometimes in the newspapers of towns or small cities we see a headline "Local Boy Makes Good" and this is always a source of satisfaction, but it is still more of an achievement when one who is not a "local boy" makes good in a new environment. David Sarnoff, like such other men as Michael Pupin and William Knudsen, carved out his career in American as an adopted home and has been a fine example of loyal, helpful, creative citizenship. Dr. Sarnoff, I honor you for what you are, as well as for what you have accomplished.

It is not too much to say that the electron is at the heart of most of the business of the Radio Corporation of America, just as Dr. Sarnoff is at the head of this business. I have no doubt that if the electron had not been discovered for another fifty years, Dr. Sarnoff would have found some other important field for successful achievement and service, but nevertheless the coincidence of Dr. Sarnoff and the electron has been a happy one. . . .

The role of electronics in scientific research and development for military purposes was played in almost every aspect of military operations and the utilization of instrumentalities and weapons of war. . . . The arts of detecting and locating airplanes and submarines, probably the two most critical specialized new features of the past war, are very largely problems in electronics. Navigation systems for aircraft and ships and some of the best devices for directing anti-aircraft fire were of electronic character.

The story of the work of the Microwave Committee [of the National Defense Research Committee], whose special staff was largely concentrated in the Radiation Laboratory of M. I. T. but which operated in the closest and most helpful coordination with the research and engineering departments of the various industrial companies, and with various other educational institutions, and with the procurement and later the operating divisions of the Army and Navy, is one of the finest stories of effective, loyal and unselfish cooperation of a great group in the entire annals of applied science. All who participated in this program deserve recognition and praise, but in view of the special circumstances of this gathering I would now pay special tribute to the personal services rendered by Dr. [Ralph R.] Beal and Loren Jones of the Radio Corporation of America, and the wholehearted cooperation of its laboratories, engineering and production departments, and the unwavering backing by the administrative officers of the organization headed by David Sarnoff.

TOASTMASTER: One of the things that I have valued most in my connection with the Radio Corporation of America has been the opportunity to know and associate with Owen D. Young, whose early interest and affection for our Company has never lessened. One of my opportunities, and, may I add, one of my pleasures as Chairman of the Board of Radio Corporation of America for the last sixteen years, has been from time to time to sound off the praises of my most brilliant junior, David Sarnoff. On this particular occasion, however, Mr. Young's long-time affection and keen personal interest in a protege unmistakably indicate him as the one who should introduce to you the president of the Radio Corporation of America for the final address of the evening.

AN INTRODUCTION BY OWEN D. YOUNG

General Harbord; my dear David, my dear electron. (Laughter) I am thankful to Dr. Compton for relieving me from the responsibility of introducing the electron, because it is a privilege—certainly a privilege pleasing to me—to introduce David.

It is not an onerous task, because so many of you know all the things that he has done—well, you don't know them all. I know some that you don't know; Mrs. Sarnoff knows some that you don't know; I know some that she doesn't. It's a delicate task, therefore, Mrs. Sarnoff, for me to draw the line on what should be said.

When I was in college, Dell Sawyer lived downtown—he was older than I—and it was in the north country, where it's very cold—and he had a way of getting a little interior heat. One day when I went downtown, he said, "Owen, you see that man across the street?"

I said, "Yes; what about him, Dell?"

He said, "I know enough about him to put him in state's prison."

I said, "Why don't you do it?"

He said, "He knows too much about me." (Laughter)

Now if there are some things left unsaid by me tonight about David, it's only because he speaks after me. (Laughter)

I want to say this at least: that in the inevitable march of the generations, one of the most impressive experiences of accumulating years—and I claim to have accumulating years—is in the spring between the generations, at the point of maximum efficiency, which is seldom more than twenty years. Naturally, there must be a long period of preparation by education and apprenticeship before one moves to maximum power. Then he enters as a junior, probably in his forties—David beat it a little bit. One is likely to be a radical, moving away from the reaction of his predecessors; and then in the sixties, having become a reactionary himself, degeneration moves in again.

It's like the old overshot waterwheel—and I have often used this figure—where the water comes in at the top and the buckets move on, and at first, after the water comes in, it hasn't quite so much power, but it moves on until it reaches its maximum leverage. Then the wheel goes on and regretfully those buckets empty. And when the last one empties you go down into oblivion which is known as history.

And so we go through this business of generations, three generations: your junior, the second generation—where you meet your contemporaries and competitors, and then the new juniors come on.

I see none of those seniors of my time around this table. Mr. Nally, I include you and General Harbord as my contemporaries. I have spent several weeks in Paris with you both, and I have reason for that statement. (Laughter)

There are around this table a few of my contemporaries and my competitors; and then there are more of you younger men, one of whom we honor tonight.

You see, David had sensitive ears, and his great introduction to radio was when he translated to the world one of the great tragedies of the sea. He didn't lose his sensitive ears altogether later either. His ears were sensitive to the scientists who were producing real things. And the mountebanks of science, those who spoke loudly and reiterated often, so paralyzed his sensitive ears that he couldn't hear them.

I think he did a little better with those ears in politics; his ears were sensitive to politics,—even though they spoke loudly. And so he came to know most of the important people not only in this country but —as he had to know—most of the important people in politics in the world.

It's a strange thing that he had this vision of the music box way back in 1915. He tried to convince the Radio Corporation about it in 1921. "Why," he said, "you'll see; one in every seven families in this country will some day have a music box, and there will be a business of $75,000,000 a year." Think of that —great vision and practical business—$75,000,000 a year!

And that has been one of his great traits, you know, because I have discovered in most of these organizations that it takes about three men with their feet on the ground to one man with his head in the clouds to go forward and save the company from bankruptcy on the one side and make progress on the other. (Laughter)

David has that rare combination, you know, of permitting his head to be in the clouds and keeping his feet on the ground. In one single package you have those several men whom I am describing.

I don't want to talk about David's contribution to radio—I don't need to here particularly. I'd like to talk about his contribution in at least one other field.

I had the good fortune to have him as an aide in Paris in 1929. Perhaps you have forgotten, so let me remind you that that was the time when David and I "saved the world." (Laughter) There were to be no more wars. Currencies were re-established. The world everywhere was starving for goods. It seemed that the opportunities to lift the living standards of peoples everywhere were the greatest in the history of our recorded civilization.

How could anyone have thought then that in a very few years vast cities would be destroyed, men by the millions would be dead and millions more, though living, would be maimed? How could David and I have dreamed in Paris—think of this!—how could David and I have dreamed in Paris in 1929, that one or more of the men with whom we were then treating would tonight lie sleepless because of his unknown sentence tomorrow?

Even though a great nation with a wounded pride, under a psychopathic leader, ruined our work, I would like now to express again—as I have many times before—my appreciation of the great service which David Sarnoff performed in that trying time.

Then came again a great and another devastating war. Then radio and the vast extensions of its art—as Dr. Compton has told you —were to play a most important part. Then one man of illuminating vision, of hard-headed practicality, a man of courage, was to be called to the service of his country, and then I could no longer call him "David." And so I salute him tonight and introduce him to you as Brigadier General David Sarnoff.

RESPONSE BY GENERAL SARNOFF

Mr. Toastmaster, Honored Guests, Friends and Fellow Workers. I am sure that you can appreciate how overwhelming all this must be to me. It is a unique experience to be alive and to hear your own obituary recited. (Laughter) Who could fail to be moved by the handsome evidence of friendship all around me tonight, by the great honor which you do me by your very presence here, and who could hope to find words that would adequately express the depth of my feeling and of my gratitude to all of you?

To you, General Harbord, let me say that I am, with pride, your junior, and I salute you as my chief not only in the military world, but also in the industrial world. I salute you as my chief and I thank you as my friend.

And to you, Dr. Compton, I am most grateful for the honor that you have done to all of us by your presence here tonight and thank you for the illuminating address which you have given on this little busybody known as the electron.

I don't know whether I would normally have claimed any relationship to the electron, but now that you have set it in such a legitimate frame of paternity, I have no fears of admitting some relationship. I would like to say that of all the relatives I have ever had, the electron was the best. (Laughter) It has supported me quite well for all these forty years, and—what is more—it has remained invisible.

And to you, my friend, Mr. Young, I shall always be "David", I hope. As my mentor and as my teacher in the gentle art of industrial statesmanship, you have marked my report card tonight very generously. But now that you have done it, perhaps I should confess that I haven't yet learned all the lessons you have taught me.

And I would like to pay tribute

JUDGE JOSEPH M. PROSKAUER, OWEN D. YOUNG, GENERAL SARNOFF AND BERNARD M. BARUCH AT A RECEPTION PRECEDING THE DINNER AT THE WALDORF-ASTORIA.

tonight to the representatives here of our Government, the Army, the Navy, the Coast Guard, the Federal Communications Commission and of the scientific agencies of our Government, all of whom have made signal contributions to the radio art and to the radio industry.

This, after all, cannot be purely a tribute to one man, because in this vast art and industry no one man can claim to have contributed very much by himself. And I am particularly happy and proud to see here tonight so many of the great leaders and pioneers of the radio and communications industry. Whether they be competitors or contemporaries, I am glad to number them among my friends, and to pay tribute to them and to their organizations for the very large share they have had in bringing radio to its present great position in world communications. They represent collectively an industry whose record in peace and in war is one of the proudest in American industrial history. (Applause)

My friends, radio is a fascinating but possessive mistress. And so during these forty years I fear I haven't had as much time as I should have liked, to give to my family, my friends and my associates, who have made it possible for me to survive these years. Perhaps tonight you will permit me to say that I recognize that my attention has not been equal to the devotion which I feel for all of them.

Forty years, if spent in a restricted environment, with limited opportunity, in an art that cannot grow, could be a very, very long time. But forty years spent in a country that has demonstrated on more than one occasion the great opportunities it offers, in an art whose possibilities are almost as limitless as space itself, in an environment rich with loyal and competent associates, could be and was, a very, very short time; in fact, so short that I can hardly believe it myself.

There is present in this room tonight one gentleman who had preceded me in this organization by some two or three years and who gave me my first job as his office boy. He is my friend and associate, a vice-president of RCA, George S. DeSousa. May I ask you to rise, George? (Mr. DeSousa rose. Applause) Now you can see by looking at him that he is not an old man.

Forty years ago, radio was so young that even a boy of fifteen soon felt that he was a veteran. As one of the youngsters within whose mind and heart the spark of wireless kindled a great enthusiasm, I must confess that even now as I look ahead I feel very little older, for radio today appears no less filled with opportunity for growth than it was in the early days when dots and dashes were music to a young man's ears. We were only on the threshold in 1906. Great progress has been achieved, but as science measures Time, we have witnessed only the beginning. We are still pioneering in the dawn of the Radio Age.

Forty years from now the instruments of radio which we marvel at today will be museum pieces, along with the coherer, the crystal detector, the headphones and the spark gaps. Long waves fascinated us in 1906; so did the sparks that crashed noisily across the gaps. Now microwaves, akin to light and generated in silence by electron tubes, are leading radio to triumphs in communication undreamed of in the beginning.

The pace of science has been swift and the challenge to the new art has been great. That pace will be swifter and the challenge still greater as the future unfolds. Because the wireless pioneers possessed faith and vision, and because the romance of wireless was so powerful within them, a vast new industry has been built, providing employment for hundreds of thousands of people, while millions enjoy the services that radio brings to them.

In America, radio has grown rapidly as a great public servant—not only because of freedom to speak and freedom to listen but because of the freedom of science to advance. Science must be free. We can permit no restrictions to be placed upon the scientists' right to question, to experiment and to think. Because America has held liberty above all else, distinguished men of science have come here to live, to work and to seek new knowledge. The world has been the benefactor and science has moved forward. In war, science dares the impossible; it must continue to dare the impossible in peace if a fuller life is to permeate society.

Radio has never ceased to stir the imagination; it has continually inspired research. That is why radio is always new. It has met the challenges of two World Wars and of the 20 years of peace that intervened.

Radio has become one of the world's great social forces; it educates, informs and entertains. Distance has been annihilated. All people have been brought within the sound of a single voice. A 9-word message has encircled the earth in 9 seconds! The face of the moon has felt the ping of a radar pulse and echoed it back in two seconds to revive predictions of interplanetary communications.

The evolution of radio is unending. It has produced television, radar and a host of other electronic devices and services. We still can foresee so many changes that those who follow us may wonder how we of this generation were satisfied to talk around the world and not to see at the same time. Our descendants will look back upon the radio services of this era and compare them, as a candle to the electric light, the horse-and-buggy to the automobile, the ocean liner to the stratoliner.

Already the electron tube responds to our sense of touch, sound and sight. We shall learn how to make it respond also to our sense of taste and smell. The tireless workers of radio science will produce a radio-mail system that will be inexpensive, secret and faster than any mail-carrying plane can travel. Portable communication instruments will be developed that will enable an individual to communicate directly and promptly with anyone, anywhere in the world. As we learn more about the secrets of space, we shall immeasurably increase the number of usable frequencies until we are able to assign a separate frequency to an individual as a separate telephone number is assigned to each instrument.

Science is continually at work to produce new discoveries and new engineering developments. But we must bear in mind that our destiny is linked not alone with advances of technology but also with the further development of society. Unfortunately, new forces are being released by science which threaten to bring an abrupt end to all progress unless they are properly controlled and usefully applied. In radio, we have met the challenge of the electron and have harnessed it. Now we must meet the challenge of the atom, which has split open a new era—the Atomic Age!

Only three weeks ago I returned from the grim and unhealed battlegrounds of Europe. There amid misery and still-smouldering ruins, one feels acutely the dread with which mankind nervously contemplates the threat of biological warfare, atomic bombs and guided missiles with war-heads pointed toward death and devastation. Within the past few months "ghost bombs" have been reported flying over Sweden. They are said to emanate from a point 500 miles away. Their course is guided and controlled from a distance. Some observers believe they are self-destroying and during their flight overland their course is automatically changed so they will fall into the sea and leave no clue as to their composition or construction. These pilotless missiles streaking across the European sky and the atomic bombs recently exploded in the South Pacific cast ominous shadows on the horizon of the future.

We have witnessed the mere beginning of push-button warfare controlled by the long-range electronic fingers of radio. Only recently two pilotless Flying Fortresses were flown from Hawaii to California through daylight and darkness, through clear weather and fog, under the radio control of a mother plane. In war, they might have carried bombs or germs. At the Bikini "Operations Crossroads," radio and television controls were much in evidence as indications of what may be expected in a future war.

Let us not be complacent in the thought that we in America are safe from destruction because we escaped invasion in the war just ended. The Atlantic and the Pacific are no more protection to our country today than is the English Channel to the British Isles. Pilotless planes and rockets flying 6,000 miles an hour in the stratosphere can carry explosives, poisons or germs half way around the globe to wipe out entire cities in a deluge of radio-activity, fire, mist, dust, debris and disease.

It is frightening to recall that not a single V-2 rocket aimed at England during World War II was shot down. But even if new techniques could be devised to explode flying bombs in space some of them surely would get through. Only a few would be necessary to ignite and to rip asunder great cities. Furthermore, there could be little protection against atom time-bombs that might be smuggled into a country by saboteurs who would plant them in strategic spots, to explode at the enemy's will by a touch of his distant finger.

What defense can man devise

GENERAL JAMES G. HARBORD, CHAIRMAN OF THE BOARD, CONGRATULATES THE PRESIDENT OF RCA FOLLOWING PRESENTATION OF A WATCH TO GENERAL SARNOFF FROM OFFICIALS OF THE CORPORATION. THE CEREMONY TOOK PLACE ON SEPTEMBER 30, THE 40TH ANNIVERSARY OF GENERAL SARNOFF'S SERVICE TO RADIO.

against an unseen enemy waging war in this way? What defense is there against a lurid streak across the sky—faster than sound, as sinister as death itself? That is the question anxious people ask in every quarter of the globe. I do not pretend to know the answer. On my travels through Europe and in discussions with noted men of science at home and abroad, I have found scant hope that any one has the answer for adequate defense against the new weapons of war that are capable of mass destruction on a world-wide scale. There is only one real defense against war and that is Peace.

Despite the fact that the handiworks of science are at stake, the scientist has little to say on how his discoveries and inventions are to be used. Inherently, he is a man of peace, but the products of his genius are often put to uses far afield from his original thoughts and motives.

If peace is the chosen course, scientists can turn their attention to the development of atomic power for industry and the conquest of disease. We would then hear less of biological warfare and more of new triumphs over diseases that have plagued man across the centuries, destroying him in greater numbers than war itself. The warlike idea that warm ocean currents could be shifted by science to turn fertile lands into deserts might be reversed in peacetime to modify or divert these currents to influence climate so that deserts would become gardens. With the aid of nuclear power plants desert areas might be transformed into habitable and productive regions.

There is even the possibility that one of man's greatest enigmas—the weather, may some day be controlled. One of our noted men of science recently told me that his studies of the problem not only suggest this possibility but that experiments are actually under way that may lead to man's dominion over the elements. For example, man may learn how to deflect air movements with consequent changes in weather and he may discover how to neutralize a storm or detour it from its course.

Automatic radio weather stations in remote places in the polar regions, in deserts, in jungles and on the seas can collect and broadcast weather data. Already radar spots a hurricane, peers into its vortex, plots its movement and photographs it from minute to minute. Radio-controlled and electronically equipped rockets will permit exploration of the upper atmosphere. Within minutes new electronic computing devices can analyze such information on a global basis.

We may yet have rain or sunshine by pressing radio buttons! When that day comes, we shall need a World Weather Bureau in which global forecasting and control will have to be vested. Here is a poser for the isolationist and a poem for the internationalist!

What is the shape of things to come in the next 40 years? The answer is difficult because the yardstick of the past is not always an accurate measure for the future. Most of the predictions of four decades ago fall short of present realities. And predictions that one might make today are likely to miss the mark of 1986. Scientific progress and prophecy both are dependent on the fertility of the imagination, and our imaginations are more limited than we like to admit. Achievement, however, is born and fostered by vision and imagination. Many great inventions have been made by young men endowed with future-mindedness. Although youth lives in the future and age in the past, yet it is not difficult for even the middle-aged of this generation to imagine world-wide television 40 years hence. International broadcasting, undreamed of 40 years ago, has taught us that in a science as universal as radio, reality surpasses prophecy. There will be many events and many discoveries to change radically anything that we foresee. An observation which today may seem trivial may become of utmost significance in the years ahead. Only a few years ago the elusive radio echo seemed a scientific fantasy, yet from it came radar, when wartime events called for it.

Necessity is credited as the mother of invention, largely because events often demand or force changes. The most difficult problems facing mankind are social and political rather than technical. Unfortunately, in the social and political spheres our imaginations cover a rather limited radius.

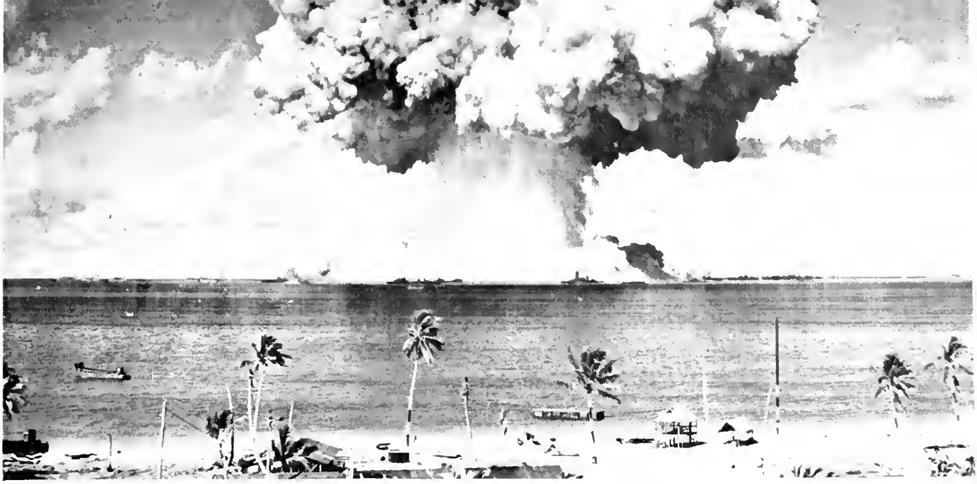
Many men will risk their lives to solve a scientific problem; few will risk their comfort or security to solve a social or political problem. Therefore, the most important problem of all is the selection of courageous, competent and wise leaders. That kind of leadership calls for more than mere exercise of authority; it calls for imagination, initiative, direction and guidance. People everywhere cry for such leadership. Upon it depends the future of democracy, the preservation of our freedom and the solidarity of peace.

But if opportunity is to be turned to good purpose, our country must be strong. The world has little respect for weakness. Often, weakness is associated with fear, and fear is not an attribute of peace and brotherhood. This Nation must be strong morally and physically, not alone for its security but also for the accomplishment of its task in helping to rehabilitate a world suffering from the vicious aftermath of war.

With courage and vision, we must see to it that there is unceasing exploration not only in the physical sciences, but also in the political and social sciences. Only upon these forces can world unity be built and peace be maintained.

Man must learn to control himself as well as the new forces of science which he seeks to control. He must think not only of himself but also of his neighbors. He must recognize the fact that modern science has shrunk the world into one neighborhood. Now more than ever man must be the master of his fate. The frightening weapons within his grasp may yet prove the prime influence that will move him to concentrate on the problems of peace. But to achieve the blessings of peace, man must bring to these problems also his heart and his soul.

Friends, as we look ahead through the vista of science with its tremendous possibilities for progress in peacetime, let us not feel that we are looking beyond the horizon of hope. The outlook is not discouraging, for there is no limit to man's ingenuity and no end to the opportunities for progress.



TELEVISION CAMERAS ON BIKINI ATOLL REGISTERED SCENES SIMILAR TO THIS ONE AS THE SECOND ATOM BOMB LIFTED TEN MILLION TONS OF RADIOACTIVE WATER MORE THAN A MILE HIGH.

ELECTRONICS AT BIKINI

An Eye-Witness Account of the Extensive Use of Radio and Television Equipment During the Atom Bomb Tests

By Dr. Arthur F. Van Dyck

Assistant to Executive Vice President in charge of RCA Laboratories Division

THE atomic bomb tests at Bikini brought together the greatest concentration of radio and electronic marvels ever assembled at one time and place. Although public interest was focused on the bomb explosions, this impressive array of equipment in any other situation would have been front page news.

Only those who were privileged to witness the tests and the execution of the plans under which they were conducted could have any idea of the complexity of the operation, the extent of the scientific measurement work, and the multitudinous uses to which radio and electronics were put. It can be said in truth that the facilities provided by radionics and electronics made possible this important experiment in nucleonics.

Most of the activities, the excitement, the explosions, and their awesome effects, have been adequately described in newspapers, magazines and newsreels, but the extensive provisions and precise execution of the electronics plan received little or no mention in these media.

In test A—the test in which the bomb was exploded above the ocean surface—the 73 target ships carried some 4,000 pieces of electronic equipment. It was one of the many purposes of the tests, to determine the effects of these explosions on standard electronic apparatus at all distances from zero to over one mile. For weeks before the thrilling warning cry, "Bomb Away!" was heard, 350 experts were working on this gear—testing, adjusting, inspecting, recording. These observations alone resulted in 1,000 pages of records, making a volume six inches thick.

Outstanding uses of radio were the transmission from the target ships of signals giving readings of temperature, pressure, etc.; observations of various phenomena by radar; long range control of hundreds of instruments; control of

A TELEVISION RECEIVER IN THIS "MOTHER PLANE" REPRODUCED PICTURES OF THE SCENE AS OBSERVED BY AUTOMATIC TELEVISION CAMERAS CARRIED BY PILOTLESS "DRONES" AS THEY WERE MANEUVERED IN THE BOMB BLAST AREA.

TOWERS SIMILAR TO THE ONE ABOVE SUPPORTED TELEVISION CAMERAS AND TRANSMITTERS ON BIKINI. AT RIGHT: "DRONE" PLANE CARRYING A TELEVISION CAMERA, COMES IN FOR A LANDING. OPERATOR IN FOREGROUND HAS TAKEN OVER CONTROL FROM THE "MOTHER" PLANE IN THE DISTANCE.

planes and boats at a distance, observation and recording of the explosions, and their after-effects by television and associated cameras.

Time signals were sent out by a radio transmitter and picked up by receivers correlated with the devices to be controlled. In this way, camera shutters and numerous measuring devices were activated at certain instants. For example, in order to make a study of the extremely rapid rise in air- and water-pressures during the two tests, it was necessary to run a recording film at the high rate of 800 feet per second. This demanded precise timing which was possible only through the use of radio time signals.

Another important project was the observation by radar of the cloud column which followed the blast. This was carried out by installing radar units at various distances from three miles to 200 miles from the blast. Other radar operators trained their beams on the target area in order to check on the anchored ships before, during and after the explosion. Despite the obscuring cloud that hid the majority of the vessels for many minutes, it was possible, through radar, to note the displacement of the ships and whether they were badly damaged and in a sinking condition.

As the world well knows by this time, it is not possible for humans to live safely within a critical range of intense atomic activity. But radio apparatus could be and was devised to replace human personnel in the danger areas. Scores of highly accurate automatic measuring devices were installed on the target ships, on the ocean surface and beneath the surface. A radio transmitter associated with each metering instrument transmitted the readings automatically to laboratory ships in the observation fleet, where they were received and recorded automatically. This is called telemetering.

Buoys Carried Microphones

One of the most interesting uses of telemetering was the installation of a string of sonobuoys a few hundred feet apart, extending outward in a straight line from the explosion point. Each buoy carried one microphone above water and another under water. Each sonobuoy transmitter worked on a different frequency and the various signals were picked up and recorded on an oscillograph in one of the instrument ships. There were many other applications of telemetering but those just cited illustrate the importance of this technique to the successful conclusion of the bomb tests.

To that section of the public which is not technically minded, the uses of television at Bikini undoubtedly are of major interest.

The Pacific tests involved a situation in which television was ideally suited. It was highly desirable to have a close-up view of what happened in the target area while it was happening, but no human eye could be closer than eight or ten miles with safety, and photographic cameras could reveal nothing until their films were developed. However the television camera could be close to the scene—and was.

On Bikini Island, two RCA cameras were placed on 75-foot towers spaced about a half mile apart and only three miles from the explosion point. In that position, operating unattended, they picked up and broadcast the views that human eyes would have seen had they been on the tropical atoll.

Television receivers were installed on seven ships, two were carried in airplanes and one was placed on Bikini. The viewing screen of the latter was focused on a film camera which was started up by radio control signals just before the explosion. The receivers in the planes and some of those aboard the observation ships were also combined with photographic cameras. On one ship, the camera was a special, highly complex instrument developed by the Naval

Research Laboratory. Using 35 mm film, this camera took pictures from the television screen at one-second intervals, made positive prints of the scenes and projected them on a screen automatically, all within the space of two minutes.

While the television screen view of the explosion admittedly was not as clear as an eye-view from Bikini would have been, it was better than the eye-view from nine miles away where the closest observers were stationed. It was the next best thing to being on Bikini as far as viewing was concerned, and vastly better with consideration for safety. It permitted human eyes to see things as they occurred which, without it, they could not have seen.

I shall never forget the feeling of tension and suspense as I watched the television screen during the second test and saw the water waves approach Bikini. They were first visible as they came out of the mist around the explosion area about a mile away. As they surged on toward the camera, there was some concern as to whether they would be under ten feet high when they arrived, as predicted by the planning scientists, or large enough to swamp the island and drown the cameras. The predictions were accurate. The waves broke on the beach like regular Waikiki rollers and the television cameras continued to survey the lagoon.

Another and completely separate television system was used in connection with the pilotless airplanes which flew over the explosion and through the cloud column. These planes had two television cameras. One was focussed on the plane's instrument panel and the other aimed forward from the plane's nose. "Mother" planes, too, were equipped with television receivers and could therefore see the instruments in the robot planes and the view ahead of them.

One other spectacular use of radio was in guiding crewless planes and boats. Pilotless planes controlled from "mother" planes several miles distant were directly over the lagoon at the time of the explosion. They flew through the mushrooming cloud immediately and picked up samples of the cloud and air. Then they were brought to land safely on islands many miles away and delivered their samples.

Radio Controlled Crewless Boats

Following the explosions, boats without crews were directed into the contaminated area and cruised around among the target ships picking up samples of water for analysis, after which they were guided back to a large "mother" ship.

For many years radio experimenters have controlled model planes and boats over short distances, but it was startling at Bikini to see numerous full-size bomber and fighter planes without a person aboard maneuvering in the sky along with dozens of fully manned planes. The crewless boats were more amusing than startling. They seemed impertinent as they boldly drove their yellow painted selves straight into the center area where human beings would not be able to go for days.

Perhaps the most vital electronic instrument used in the tests was the Geiger Counter, which indicates accurately the intensity of radiations in its neighborhood. The little Geiger electronic boxes had more authority than even Admiral Blandy himself! Whenever their warnings said in effect, "Keep away!", no one disobeyed.

There has been wide public discussion on the question whether the Bikini tests were necessary or desirable. Some of the atomic physicists have stated that they were not. Perhaps the tests were not valuable from an academic, nuclear viewpoint since it had been proved previously that the atomic bomb could be detonated. But from the military, engineering and practical viewpoints, the tests were vitally necessary. Quantitative data were not available and effects of many kinds were not known with anywhere near the exactness which is necessary to intelligent handling of the bomb, either offensively or defensively.

BELOW: SOME OF THE RADIO APPARATUS THROUGH WHICH SCORES OF CAMERAS INSTALLED ON BIKINI AND IN PLANES WERE ACCURATELY CONTROLLED. AT RIGHT, ABOVE: ON THIS TELEVISION SCREEN ABOARD THE USS APPALACHIAN, OBSERVERS WATCHED THE BOMB BLAST. BELOW: TECHNICIANS PREPARE RADIO CONTROLS OF TELEVISION AND STILL CAMERAS ON BIKINI.

DR. H. F. OLSON (LEFT) AND J. PRESTON EXAMINE A DUO-CONE SPEAKER WHICH REPRODUCES THE COMPLETE AUDIBLE RANGE OF SOUND.

Duo-Cone Speaker

NEW UNIT DESIGNED TO MEET DEMAND FOR WIDE-FREQUENCY, LOW-DISTORTION SOUND REPRODUCER.

By Dr. H. F. Olson and J. Preston
RCA Laboratories, Princeton, N. J.

TRUE reproduction of sounds varying in frequency from the lowest note on the standard piano keyboard to the highest tone audible to the average human ear is possible through a double-cone high-fidelity loudspeaker developed by the writer and Mr. John Preston at RCA Laboratories, Princeton, N. J. Work on the new speaker was undertaken primarily to satisfy the demand for a wide-frequency, low-distortion reproducer for use in radio and television monitoring, phonograph and sound motion picture recording, and high quality sound systems.

The new unit consists of a 15-inch low-frequency cone and a two-inch high-frequency cone combined in such a way that the larger cone is a continuation of the smaller one. The low-frequency cone functions in the frequency band from 30 to about 7,000 cycles; its smaller counterpart comes into action at about 500 cycles and continues through the audible range to approximately 15,000 cycles.

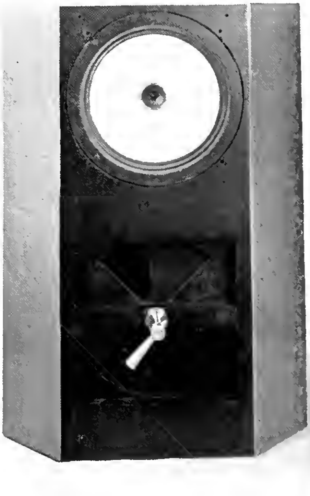
To facilitate the accentuation of low frequency sounds, when desirable, the speaker cabinet has an adjustable port or opening in the front near the base. Sound issuing from this port gives the effect of deepening the "voice" of the loudspeaker.

The directional pattern of a loudspeaker, like that of a searchlight, has a great deal to do with the efficiency of its projection. Directional characteristics of a loudspeaker vary with both the frequency of the reproduced sounds and the angle of the cone. At the low frequencies, where the dimensions of the cone are small in comparison with the wavelengths of the sound, the pattern of radiation is comparatively even over an angle of 180 degrees. When the wavelength and cone dimensions are approximately equal, however, a directional pattern appears, and as the sound increases in pitch, the directional pattern becomes progressively narrower. Since it was intended that the directional characteristics of the new RCA speaker should be practically independent of sound frequencies up to 15,000 cycles, over an angle of at least 90 degrees, it was found necessary to use relatively wide-angle cones, despite the acoustical advantages inherent in narrower cones.

A common source of speaker distortion is the vibrating surface of the cone, particularly in the range between 100 and 1,000 cycles where the maximum power in both speech and music is contained. These seemingly conflicting factors were reconciled by selecting material for the duo-cone that is more than twice as thick as that used in the conventional cone.

The undesirable qualities associated with other two-unit speakers under investigation are interesting in relation to the advantages of the improved type. The simplest design, for instance, consisted of a small cone and a large cone mounted one above the other on the face of a flat baffle. This construction resulted in a poor directional pattern in one part of the frequency band.

Comparative tests of this and other types of two-unit speakers, indicate that the adopted design is superior to the others in such important respects as uniformity of sound output, frequency fidelity, directional characteristics, freedom from distortion, and sensitivity to sharp variations in volume.



DUO-CONE SPEAKER UNIT INSTALLED IN CABINET WITH VARIABLE OPENING NEAR BASE FOR ADJUSTMENT OF LOW FREQUENCY RESPONSE.

A HAND-HELD STYLUS, MOVED ACROSS A LINE OF PRINTED TYPE, CONVERTS LETTERS AND WORDS INTO RECOGNIZABLE SOUNDS BY ELECTRONIC ACTION.

Reading by Sounds

ELECTRONIC AID FOR THE BLIND CONVERTS LETTERS AND WORDS INTO TYPICAL SOUNDS: TESTS HAVE BEEN STARTED.

AN electronic reading aid aimed toward making printed material available to the blind without recourse to Braille or "talking books," has been developed by Dr. V. K. Zworykin and L. E. Flory of RCA Laboratories, Princeton, N. J. The instrument, it is emphasized, will not be commercially available until many more tests with substantial numbers of blind people have been carried out.

Essentially, the device consists of a hand-held stylus which the user moves horizontally across a line of type, letter-by-letter, as a beam of light directed through a narrow slit in the face of the stylus scans the print vertically, 30 times per second, indicating the presence and extent of black portions of each letter by a warbling tone which becomes audible through head phones. Although the letters are scanned individually, tests have shown that a blind person, after practise, improves his reading speed by recognizing the blended sounds of a complete word. Reading speeds in excess of ten words a minute have been attained; the ultimate speed is believed to be in the neighborhood of 60 words a minute.

While the layman would probably find it difficult to understand the composite of tubes, circuits, light sensitive tube and lucite conductors which comprise the reading aid, the means by which letters and words are converted into recognizable sounds can be easily understood.

Scanning Beam Detects Letters

If the stylus slit is placed on a clear space such as exists between letters, the circuit elements are so arranged that no tone is heard in the headphones. But if the scanning beam strikes part of a letter, as for example, the top connecting line between the two legs of the letter n, the user would hear a click of rather high pitch which would be repeated each time the beam crossed the black line. As the stylus is moved to the right it would encounter the vertical portion of the n and the presence of this substantial black area would create a tonal variation ranging from nearly the highest extreme to the lowest. Thus, any letter scanned in this fashion is soon recognized by the user of the reading aid as a definite combination of tones.

At the beginning of his instruction period, the blind subject requires some form of mechanical guide in order that the stylus should follow a line of type with some degree of exactness, but it is believed that a proficient reader will be able to dispense with the guide, since any deviation would be detected instantly by a change in the pitch of the tone.

Work on the reading aid was carried out for the Committee on Sensory Devices of the National Academy of Sciences under the chairmanship of Dr. George W. Corner. Cooperating with Dr. Zworykin and Mr. Flory in the development were the Haskins Laboratories, New York; the Medical Research Institute of the National Naval Medical Center, Bethesda, Md.; and Solomon Lasof, C. J. Young and K. Magnusson of the Laboratories staff.

TELEVISION SERVICE AT U.N. ASSEMBLY

Television service has been provided for the convenience of newspapermen covering sessions of the United Nations General Assembly at Flushing Meadows, according to a joint announcement by officials of Radio Corporation of America and the National Broadcasting Company.

The RCA Victor Division supplied pickup equipment, including the new supersensitive RCA Image Orthicon camera, for transmissions directly from the floor of the Assembly to quarters in the building reserved for the press and overflow audience. RCA television receivers are installed there to accommodate viewers. NBC television cameramen operate the pickup equipment.

TRAFFIC IS HEAVY AT THE TICKET OFFICE OF A DRIVE-IN THEATER ALREADY CROWDED WITH CAR-BORNE PATRONS.

DRIVE-IN MOVIES

New Sound System and In-Car Speakers Increase Popularity of Outdoor Theaters in More Than 200 American Cities.

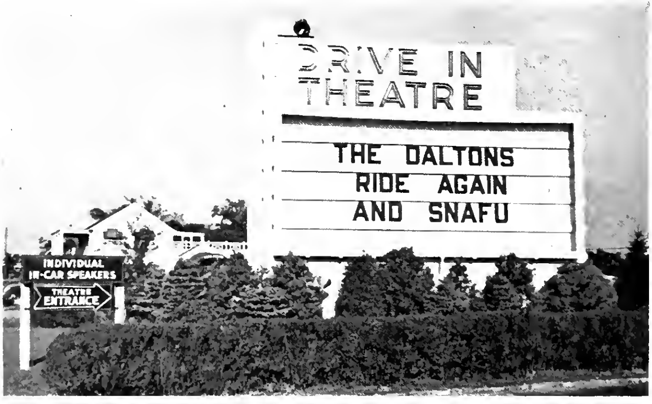
"LET'S go to the movies tonight!" is a common rallying call in this country where millions of families depend on Hollywood for much of their manufactured entertainment. But in numerous cities and towns the evening's objective is not necessarily the gaudy-fronted cinema palace, with its upholstered seats and uniformed ushers. In more than 200 communities the phrase is likely to refer to movies exhibited outdoors and viewed from the free-and-easy comfort of the patrons' own cars. These al fresco attractions are the Drive-in Theaters, a trend in motion picture exhibition which is believed to have started thirteen years ago in an open lot on the outskirts of Camden, N. J.

News of the success of that pioneer theater brought immediate action in the film industry. By 1941, more than 150 similar ventures were in operation and at least 50 others were in the blueprint stage when war halted all non-military construction. Today the movement is under way again and new projects are being reported regularly in the film-trade papers.

A Drive-in Theater consists essentially of an open lot with its surface broken up by a series of semicircular ramps facing a large screen supported on an elevated tower. The front end of each ramp is slanted upwards slightly to provide an unobstructed view of the pictures from each car wherever it may be parked. The screen is larger than normal theater screens in order that the images may be seen without eyestrain from the most distant ramp which may be 200 feet or more away. Some of the larger outdoor theaters use screens more than 50 feet wide.

When the industry was new, and before manufacturers had given it much attention, it was necessary for outdoor theater operators to utilize whatever equipment was available. As a result, some of the installations were undependable, either through inadequate design of apparatus or through the effect of weather on units constantly exposed to heat, cold and dampness. The speaker problem in particular required an early solution.

The first Drive-in Theaters amplified the sound track of the film and distributed it to the parking lot over powerful loudspeakers similar to those used in indoor theaters. The speakers were not designed for such work and constant repairs and replacements were essential. Moreover, it was necessary to operate the speakers at their full capacity in order to deliver sufficient sound to all cars. Not only did the speakers fail under this



IN-CAR SPEAKERS MANUFACTURED BY RCA ARE ONE OF THE ADVERTISED FEATURES AT THIS OUTDOOR THEATER IN UNION CITY, N. J.

heavy loading but when they did work properly, nearby residents objected to the escaping sounds. At this point, RCA engineers started an intensive study of the problems presented by the new industry. After trying out substitutes for the large open-air speakers, including a system of underground speakers placed beneath each car, RCA in 1940 designed the first in-car speaker and power supply system, an innovation which was the forerunner of the tried-and-proved postwar layouts now going into use.

Loud Speakers Hung in Cars

Under that earlier RCA arrangement, a patron driving through the theater entrance gate received a portable speaker unit with extension cord which he plugged into a receptable beside his parking place. The speaker was hung at any convenient place within the car. In this way, the film program could be enjoyed even when the weather made it desirable to close the car windows. Moreover, there was no "leakage" of sounds to annoy the neighborhood.

However, it soon became evident that the constant handling of the speakers by careless customers, necessitated frequent repairs to the units. After a thorough study of this problem, RCA Victor contrived the new weatherproof, foolproof speaker which was announced a short time ago. This speaker is installed permanently on a pedestal beside each car space and is equipped with a coiled cord which allows the speaker to be drawn through a car window and suspended in the most convenient place. The patron adjusts the volume by means of a control on the speaker case.

Drive-in Theaters Using RCA Sound Systems and In-Car Speakers

Name and Location	Parking Capacity (Cars)
Montgomery Drive-In, Montgomery, Ala.	500
Outdoor, Drive-In, Chicago, Ill	1040
Drive-In Theatre, Lima, Ohio	600
Skyline Park-In, Dayton, Ohio	750
Miami Drive-In, Dayton, Ohio	790
Toledo Drive-In, Toledo, Ohio	790
Cuyahoga Drive-In, Parma, Ohio	790
Dort Drive-In, Flint, Mich	1020
Park-In Theatre, Lorain, Ohio	310
New Drive-In, San Antonio, Texas	950
Drive-In Theatre, Houston, Texas	1000
Circular Drive-In, Waco, Texas	550
Waco Drive-In, Waco, Texas	500
Chalk Hill Drive-In, Dallas, Texas	500
Bowie Drive-In, Fort Worth, Texas	400
"81" Drive-In, Wichita, Kansas	600
Drive-In Theatre, Colton, Calif	800
Mohawk Drive-In, Colonie, N. Y	950
Drive-In Theatre, Union City, N. J	1200
Kallet Drive-In, Oneida, N. Y	850
Tri-City Drive-In, Endwell, N Y	600
Open Air Theatre, Beckley, W Va	650
Pittsburgh Drive-in, Pittsburgh, Pa	720
Motor-In, Fresno, Calif.	950
San Jose Drive-In, San Jose, Calif	650

The combined terminal box and speaker receptacle unit has been so designed that a short circuit in the speaker unit or cord can affect no more than the two speakers connected to any one terminal box. This permits all other speakers to continue normal operation. Formerly, a short circuit in even one speaker could put an entire line of speakers out of operation until the trouble could be located and corrected.

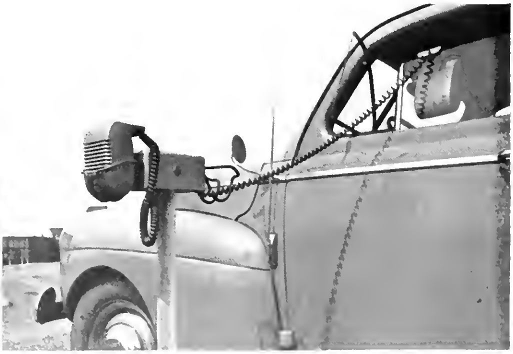
Built to take a lot of hard handling, the new RCA speaker has been tested under extremely adverse conditions and found able to withstand greater variations in temperature and humidity than would ever be encountered in actual operation.

Speaker Units Are Weatherproof

The new type neoprene-covered extension cord is sixteen inches long when retracted and can be stretched to about four and one-half feet with only a slight pull on the speaker unit. If necessary, the cord can be stretched to a maximum of approximately seven times its retracted length, or about nine feet. Since the cord covering is treated with a "sun proofing" wax, it can be exposed to the hot sun over long periods without deterioration.

The new in-car speaker and receptacle are part of a complete new line of drive-in theater equipment offered by the RCA Victor Division. One of the outstanding features of the new sound system is an automatic arrangement for keeping the sound level constant regardless of the number of speakers in use, once the line volume has been adjusted.

LOUD SPEAKERS WHICH CAN BE DRAWN THROUGH CAR WINDOWS ARE SHOWN BELOW ON THEIR PARKING-LOT PEDESTALS. AT RIGHT: AN IN-CAR SPEAKER HAS BEEN LIFTED OFF ITS PEDESTAL AND HOOKED ONTO THE INSIDE OF A CAR WINDOW



MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION WATCH RCA VICTOR TABLE MODEL TELEVISION SETS ROLL OFF A PRODUCTION LINE AT CAMDEN, N. J., AS J. B. ELLIOTT (CENTER) VICE PRESIDENT IN CHARGE OF RCA VICTOR DIVISION'S HOME INSTRUMENT DEPARTMENT, DISPLAYS A 10" PICTURE TUBE. LEFT TO RIGHT: COMMISSIONER PAUL A. WALKER; ACTING CHAIRMAN CHARLES R. DENNY; W. W. WATTS, VICE PRESIDENT IN CHARGE OF THE RCA VICTOR DIVISION ENGINEERING PRODUCTS DEPARTMENT; MR. ELLIOTT, AND COMMISSIONERS E. K. JETT, RAY C. WAKEFIELD AND ROSEL H. HYDE.

NEW TELEVISION RECEIVERS

Four Post-War Models Shown to Distributors at Meeting in New York - - Deliveries Begin in November

FOUR models of post-war television home receivers, designed by RCA Victor engineers, were disclosed for the first time before the company's television set distributors at a meeting held in mid-September at the Hotel Pennsylvania, New York. It was announced at the time that limited quantities of two table models embodying television sight - and - sound channels are expected to be ready for delivery to the public early in November. Console models will be available early in 1947.

The larger of the two table models, shown on the front cover of this issue of RADIO AGE, gives a bright, clear picture $6\frac{1}{2}$ by $8\frac{1}{2}$ inches. It is equipped with the newly developed "Eye Witness Picture Synchronizer" which simplifies picture tuning and minimizes interference from exterior sources. The second table model gives a $4\frac{1}{4}$ by $5\frac{1}{2}$ inch picture.

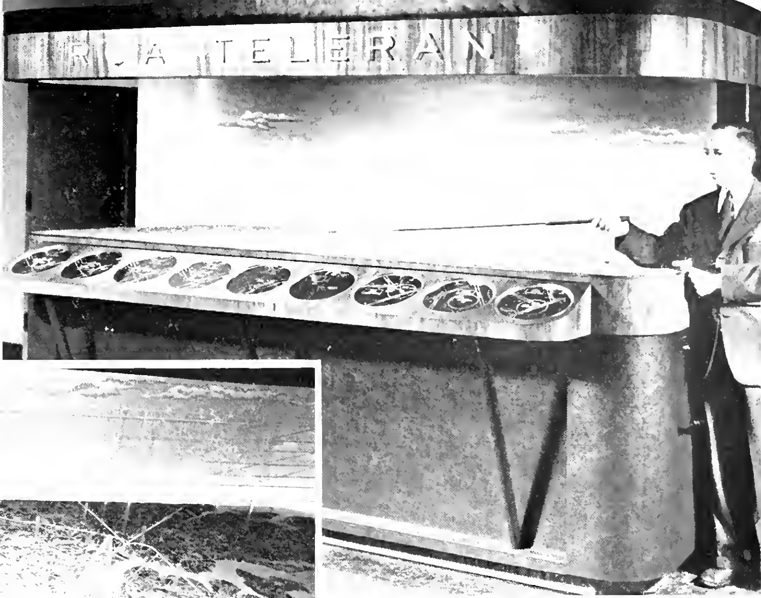
Also shown to the distributors were two console models, one of them a large-screen projection type receiver which provides a picture almost the size of a standard newspaper page. Facilities for the reception of FM (frequency modulation) and standard broadcast programs are included. The other console has a 10-inch direct-view image, and in addition incorporates a Victrola radio-phonograph with automatic record changer, standard broadcast and FM radio reception with push-button tuning and generous storage space for record albums.

In outlining RCA's television set sales plans to the distributors, Joseph B. Elliott, vice president in charge of home instruments, said that a program of antenna installations, conducted by the company's service engineers to assure satisfactory demonstrations in dealer stores, is under way. A similar program, he added, has been planned for the public to provide the most efficient operating performance of each RCA Victor receiver sold. Under this arrangement, factory service engineers will install the receiver and provide antenna, antenna installation and instruction in the operation of the set, followed by a year's service and complete maintenance of the instrument for a reasonable charge.

RCA VICTOR TELEVISION RECEIVER EQUIPPED WITH 7" PICTURE TUBE.

TELERAN COMBINES TELEVISION AND RADAR AS AIR TRAFFIC AID

Teleran — a combination of television and radar — developed by scientists and engineers of Radio Corporation of America in cooperation with the U. S. Army Air Forces, to meet most of the major requirements for safety in the airways, was displayed for the first time on October 10 at the demonstration of radio aids to air navigation in Indianapolis.



LOREN F. JONES, DEVELOPER OF TELERAN, POINTS OUT PRINCIPLES OF THE RCA SYSTEM OF AIR TRAFFIC CONTROL ON A SCALE MODEL WHICH ILLUSTRATES APPROACHES, DEPARTURES AND LANDING OF PLANES

THIS SCALE MODEL OF A TYPICAL AIRPORT AND SURROUNDING TERRAIN SHOWS AIR LANES AND LANDING PATHS USED IN TELERAN. BELOW: DR. D. H. EWING OF RCA VICTOR DIVISION, DEMONSTRATES HOW ESSENTIAL INFORMATION IS PICKED UP BY A TELEVISION CAMERA AND TRANSMITTED TO THE PLANE BY THE TELERAN SYSTEM.

As a comprehensive system of air navigation, traffic control, collision prevention and instrument approach, Teleran has many advantages over existing methods.

Teleran furnishes the pilot and ground controller with accurate and timely information concerning the locations of all aircraft of interest. By its use, the pilot may participate in the traffic problem, and the handling of traffic may be accomplished at a greatly increased rate. Complete monitoring of all operations is provided, and emergency conditions can be readily accommodated.

Teleran permits flexibility in the choice of paths, and allows new airways and temporary courses to be established without the installation of new ground equipment.

Teleran provides a maximum of safety against collision both with terrain obstacles and other aircraft. It likewise provides a flight instrument of great flexibility in convenient form. All heavy and complex equipment is on the ground; the plane carries only a light-weight television receiver.

OPERATORS AT THE DU PAGE PLANT, LOMBARD, ILL., JOIN VINYLITE STRIPS BY ELECTRONIC HEAT-SEALING TO FORM AN AIRTIGHT, WATERTIGHT BALLOON.

Radio Heat Seals Plastics

ELECTRONIC POWER GENERATORS SPEED UP FABRIC SEAMING, PRODUCING BETTER ADHESION.

By Wiley D. Wenger

Electronic Apparatus Section, RCA Victor Division

THE use of high-frequency radio waves to generate heat within thermoplastic materials and join them quickly in strong, airtight seams, is greatly improving manufacturing processes for many consumer products, bringing the benefits of electronic industrial techniques into the average home. Commonly-used products now being fabricated in this way include dress shields, raincoats, bathing caps, shower curtains, baby pants, pelts, tobacco pouches, and other commodities.

Before the age of electronics, heat sealing of thin thermoplastic materials was accomplished in various ways, but electronics revolutionized existing sealing methods by furnishing a source of energy that does not exist as heat until it passes into the plastic material.

The effect of heat on the surface of a thermoplastic is similar to that of a solvent or cement. It prepares the surface to be sealed, so that if pressure is then applied, an intermingling of surface films occurs and a chemical bond is formed. Essentially, the same fundamentals apply to any method for bonding thermoplastic materials. There are disadvantages in using solvents, however, such as the time required for chemical action, the need for extra operations, and the continued effects of solvent penetration.

Successful edge or butt welding of various types of plastics has been accomplished in the past by using a "hot blade" applicator. Immediately after heating the two surfaces, the knife-blade is removed and pressure is applied to the two pieces. If the blade temperature is too high, the plasticizer of the materials is vaporized or burned and no bond results. Conversely, if the blade is too cool, no seal will be made. The speed of the hot-blade operation is restricted by this temperature limit, in addition to the fact that the joint must be cooled uniformly after its formation.

Since the application of heat directly to the interface of a seam, in thin films or sheet stock, is difficult, critical of control, and of limited scope, this system of "hot blade" sealing is impractical for most purposes. The usual method of heat sealing plastic or plastic-coated materials has been the application of heat from the outside by means of hot dies, bars, or rollers. This is satisfactory under certain conditions, but extrusion of the outer surfaces of plastic film results, and the process is slowed down by both the time required for heat conduction into the material and the cooling period.

Radio Heat is Uniform

The need for a sealing device which would not be dependent on heat conduction was quite apparent. Turning to electronics, RCA engineers applied alternating electrical energy of a high frequency to the plastic material to be sealed. This radio energy, it was found, could generate heat uniformly throughout the material and quickly raise the temperature of the plastic to the softening point. Best of all, the electrodes, used to apply the energy, remain cool and conduct heat away from the outer surfaces of the seam. The cold metal electrodes were used to raise the temperature of the plastic to the bonding point, apply the necessary pressure, and cool the outside surfaces. Demonstrations of laboratory devices of this type created a considerable amount of interest among fabricators of thermoplastics, and RCA electronic power generators, designed for this application, were put into production.

Briefly stated, the general advantages of high-frequency heating stem from the fact that heat is generated within the material being treated, instead of being applied from the outside. This internal heat is "born" within the plastic material when it is placed in the path of high-frequency currents flowing between two electrons.

Current Agitates Molecules

Power supplied by the high-frequency generators, with a frequency somewhere in the range of 20- to 30-million cycles per second, sets up a rapidly alternating field between the electrodes, causing agitation of the molecules of the thermoplastic, thus producing intense heat.

The temperature of the interface of the two overlapped edges of the plastic material increases more rapidly than that of the outer surfaces, due to conduction by the cool electrodes.

This so-called "inside-out" heating characteristic of electronic power, as applied to thermoplastics, makes it possible to bond edges of the material into a firm, hermetic seal without causing gumming or other damage to outer surfaces, which would be likely to occur if heat were applied from an outside source.

No matter what the application, all the high-frequency heat sealing machines work on the same basic principle. The electrodes are either flat bars or rollers which apply both the high-frequency potential and the necessary pressure to produce a welded seam in the work material. An experimental model of a 48-inch bar-sealer, which has been developed by the Engineering Products Department of RCA Victor, drew a great deal of interest at the recent plastics show in New York City. Demonstrations of this sealing unit showed that it could produce a uniform 48-inch seam in 4-mil material in a single operation requiring only four seconds. Timing is automatic and the unit is operated simply by pressure of a foot pedal. This device extends the field of application for electronic sealing beyond that served by any former units, since it makes possible the sealing of large areas of thick materials such as belt buckles, shoe straps, and similar articles. The seam may be in either a straight line or any desired configuration. Such consumer items as raincoats and shower curtains are being produced in a minimum of time. The four-foot bar-sealer can also be used to produce a series of short seams in several smaller objects, such as dress shields and tobacco pouches, in one operation.

Resembles Sewing Machine

Heat sealing principles developed by RCA have been incorporated into machines of several different designs. One such device developed by the Singer Manufacturing Company, resembles a conventional sewing machine in appearance and operation. It seals by means of a small bar which moves up and down rapidly. While the bar electrode is up, an intermittent drive wheel pulls the plastic material forward. Each stroke of the bar overlaps the previous one to form a continuous seam.

Another type of applicator, developed by the Union Special Machine Company, employs roller electrodes which apply high-frequency power and pressure and feed the material through at the same time. It has been so designed that if the material varies in thickness as much as from two 4-mil sheets to ten 4-mil sheets, the temperature of the seam will remain constant and the seam will be uniform.

During the war, electronic heat sealing helped in the fabrication of important military requirements such as the solar still, a device which enables sea-wrecked fighters to obtain safe drinking water from the ocean.

Used in War Industries

It should be borne in mind, that electronic seals can be made only in materials that can be heat-sealed.

In fact, electronic sealing is heat sealing, but because the heat is confined and controlled, more uniform seals can be made. The strength of the seal is not weakened by extrusion of hot material around the bars, no solvents are added to the materials to be absorbed by it, and there are no glues present to cause deterioration.

PLASTIC TOYS SUCH AS THIS HUGE BUBBLE ARE MORE DURABLE BECAUSE OF THE STRONGER SEAMS PRODUCED BY RADIO HEAT.

OPERATING PERSONNEL BECOME ACQUAINTED WITH THE MOST ADVANCED COMMUNICATIONS EQUIPMENT IN THIS SCHOOL AT RCA COMMUNICATIONS.

Training for "Pandora"

PERSONNEL ASSIGNED TO OPERATE NEW INTERNATIONAL COMMUNICATIONS PLAN ATTEND SCHOOL TO STUDY SYSTEM

By J. F. Rigby,
Personnel Director,
RCA Communications, Inc.

IN PUTTING into effect the Pandora Plan of fast, low-rate international communications, instituted by RCA Communications, Inc., perhaps the most critical of many requirements has been the need for trained personnel. While the new, advanced equipment now being installed in RCA stations and in the stations of RCA correspondents all over the world, represents the peak in technical design, such apparatus would fall far short of its potential efficiency without the intelligent and sincere interest of operators thoroughly trained for the purpose.

Recognition of this vital requirement led to the expansion of the Company's operating school several months in advance of the first Pandora installations at the Central Radio Office, 66 Broad Street, New York.

Under the direction of the author, a comprehensive curriculum was established, including courses not only in the operation of the tape relay system, but also detailed instructions in the modified administrative and clerical functions which would result from the new method of operation.

A teaching staff of seasoned personnel was assembled from the operating group and from the various clerical departments. Texts were prepared under the supervision of department heads, published and distributed to all personnel. A regular schedule of classes was established, and lectures, based on the texts, were augmented by actual demonstration and operation of the new equipment, several units of which were installed in the school. Fifty-eight students comprise the average class.

A system of records enables the teaching staff to note the progress of each student in all phases of his instruction. Periodic examinations and tests are given. Assistant instructors work with the students during the operating portions of their instruction.

Separate handbooks, written and published at intervals during the early stages of the school's expansion, have been combined and correlated in one omnibus training manual which, in ten chapters, presents a comprehensive and detailed course in the departmental functions of RCA Communications.

Included in the subject matter is a brief history of the company; a resumé of International Regulations; a description of the various types of services and the manner in which they are handled; instructions for the operation of automatic and semi-automatic equipments, and a description of the functions of the Central Radio Office in relation to branch office procedures.

It was found, from the beginning, that instruction was the most effective means of indoctrinating the operating and supervisor personnel with the Company's mission and with the means for its accomplishment.

ACTUAL OPERATION OF EQUIPMENT DESIGNED FOR THE "PANDORA" PLAN IS AN ESSENTIAL PART OF THE INSTRUCTION GIVEN EMPLOYEES AT RCA COMMUNICATIONS, 66 BROAD STREET, NEW YORK.

VIEWS OF NBC STUDIO 3A SHOWING UNEVEN WALL SURFACES WHICH CAN BE ADJUSTED TO CONTROL ECHOES.

Echoes Made to Order

NEW STUDIO DESIGN PERMITS RECORDING ENGINEERS TO CONTROL REVERBERATIONS ACCURATELY

AN echo-control studio recently completed in Radio City, New York, as a joint project of RCA Victor Division and NBC provides recording engineers with flexible facilities to enhance the quality and tonal effects of transcriptions and home-type records. By means of scientifically shaped ceilings and walls, combined with hinged panels and sound absorbing draperies, the echo characteristics of the room may be varied at will. The studio is 50 feet wide, 80 feet long and 18 feet high.

In cutting records, it is desirable to vary the resonance of a studio according to the nature of the subject matter being recorded. This variable is known as the reverberation time period. Expressed in layman's terms, it is the length of time required for sounds of moderate intensity to drop below audibility.

In recording large orchestras for home-type disks, RCA Victor engineers frequently use echo periods as long as 1.8 seconds while NBC technicians specify reverberation time periods as short as .9 seconds. Shifting the wall surfaces and readjusting the draperies, makes it possible for a recording engineer to select any echo period between these two limits with an accuracy of one tenth of a second.

NBC's Engineering Department designed and built the studio under the supervision of O. B. Hanson, NBC vice president and chief engineer, and William A. Clarke, architectural and construction manager. Acoustical analysis and specifications were prepared by John Volkmann of RCA Victor and George M. Nixon of NBC.

LORAN UNIT INSTALLED ABOARD S.S. AMERICA

Installation of a modern marine loran receiver aboard the *S.S. America* was completed at the Newport News Ship Building & Dry Dock Co., Newport News, Va., during the first week of this month. The *America* will be the largest American passenger liner equipped with loran — modern electronic method of long-range navigation.

Radiomarine recently reconditioned for peacetime operation the *America's* radio installation consisting of eight transmitters, nine receivers, a radio direction finder, an automatic distress alarm, and a network of thirteen antennas. When she returns shortly to trans-Atlantic service, the *America* will carry the most powerful and complete American flagship radio station.

Installed aboard the *America* are high frequency, medium frequency and low frequency radiotelegraph transmitters with power outputs of 1000 watts. To withstand the high power generated by these transmitters, Radiomarine has installed a new type of antenna insulator that is found on no other ship afloat. The insulator, built to withstand 12,500 pounds pressure, is 30 inches long and has a 12-inch corona ring.

Another exclusive feature of the insulators is the fact they are equipped with copper rain shields which serve to reduce losses of power at the lead-in. In addition to six of these large new-type insulators, 54 egg insulators are used. The thirteen antennas utilize 1042 feet of wire.

The *America* is being reconditioned for peacetime service by the United States Maritime Commission and will be turned over to the United States Lines as soon as the work is completed.

PYLON ANTENNA FOR FM

NEW SELF-SUPPORTING RADIATOR, ROLLED FROM METAL SHEET, SURPASSES OTHER TYPES IN POWER OUTPUT GAIN

A NEW cylindrical FM antenna, revolutionary in the simplicity of its design and principle, providing higher gain, height-for-height, than all previous types of antennas, has been developed and placed in production by the RCA Engineering Products Department, W. W. Watts, Vice President in charge of the Department, has announced.

Known as the "Pylon" antenna, the new FM radiator is a single-element mechanically-rigid, self-supporting structure. Unlike all previous types of FM antennas, it was pointed out, the new antenna requires no additional means of support or mounting. Arms, loops or circular elements with their attendant mounting and connection problems, are not required. Because of this, Mr. Watts stated, erection of the Pylon is extremely simple. The bottom flanges of the cylinder are bolted to the building, tower, or other supporting structure which provides the necessary elevation and the job is complete.

THE NEW PYLON ANTENNA, A ROLLED-STEEL CYLINDER WITH A LONGITUDINAL SLOT, DELIVERS A HIGHER POWER GAIN THAN ANY OTHER TYPE OF FM ANTENNA.

Where high gain is needed for an FM station, additional sections of the antenna can be stacked on top of each other simply by bolting together the end flanges of adjoining sections. Since radiation of the signal is compressed in the vertical plane, there is a subsequent power increase in that characteristic. Stacking four sections of the Pylon results in a power gain of six. The same type of antenna is good for any power which FM stations are likely to use. It can be used to cover the whole frequency band with no tuning or adjustments required either on the ground or in the air.

Structurally, mechanically, and electrically, the new RCA antenna has been reduced to functional elements. The Pylon is a cylinder each sections of which is approximately 13 feet high and 19 inches in diameter, with a narrow slot cut from top to bottom. There are no dipoles, no loops, no appendages of any kind.

The cylindrical structure itself is the radiator. The feed line is a single transmission line running up the inside of the cylinder, along the slot.

Rolled from Metal Sheet

The cylinder is rolled from a single sheet of metal and weighs approximately 350 pounds. It is capped on each end with a cast base (flange) which gives it great mechanical strength and provides a means of connection to the supporting tower or to additional stacked sections.

One radio frequency feed point per section is all that is required with the Pylon antenna. When two sections are used, they may be joined on the ground, the interconnecting feed line mounted in place and the whole assembly raised as a single unit. When this is done, only one transmission line connection must be made in the air. For a four section radiator, only two connections are required, contrasted to other types of antennas which require as many as ten to fifty connections.

Maintenance is Simplified

Maintenance problems of the Pylon are practically negligible because of the extreme simplicity of the power feed-line arrangement, the small number of end seals and the fact that the feed-lines are enclosed. Provision is made for mounting a standard code airplane beacon on the plate which covers the top section of the antenna. A cable to operate this light may be run either inside or outside the cylinder. Steps provide a means for replacing the light or servicing the lines which can be reached easily through the open slot.

RADIOPHONE SAVES CREW AFTER CRASH

Only four days after radiotelephone equipment had been installed aboard the *B. F. Macomber*, one of the Consolidated Fisheries fleet, the ship's captain, John B. Lowery, used the apparatus to summon aid when his vessel was badly damaged in collision off the Delaware Cape. The *Macomber* was en route from Sea Girt, N. J., to the Fisheries headquarters at Lewes, Del., on the night of July 19 when the merchant ship *Henry B. Brown* collided with her and smashed in her bow.

Captain Lowry, who had witnessed the installation of the telephone set by the Radiomarine Corporation of America on July 15, ordered use of the equipment to notify the U. S. Coast Guard and other craft in the vicinity of the accident. Despite heavy damage to the *Macomber*, the telephone worked perfectly and at 1:20 a.m., the fishing vessel *William Blundon* approached and removed the crew before the doomed ship sank.

FILMS FOR TELEVISION

Once Used Mainly as Stop-gaps in Visual Programming, Motion Pictures Now Have Essential Role in Television Entertainment

By Paul Alley

Television Film Editor, National Broadcasting Co.

MOTION picture films should not be looked upon as a substitute or a stop-gap when building programs for television. Quite the opposite! They are destined to become an important and increasingly valuable segment in the overall show. Current operations support this statement. Approximately 60% of NBC television programs today are on either 16- or 35-millimeter celluloid. Furthermore, there is no indication that this figure will decrease when television moves ahead out of its present preparatory stage into its full stature as a nationwide source of entertainment.

Basically, there should be no argument between "live shows" versus films. Each has its place. It is generally conceded that television's most dramatic role will be in bringing to the screen important events as they happen. But even when television cameras become increasingly mobile and flexible in operation, there will be many events, both spot news stories and news features, to which television cameras cannot go. These events will, of necessity, be covered by motion picture cameras.

This sharing of responsibility is standard practice today. Cameramen working out of the NBC Film Office at 630 Ninth Avenue, New York, are assigned to cover newsworthy events in the metropolitan area. The film thus exposed is rushed back to the laboratory, developed, printed and frequently put on the air the same day. Regularly on Monday and Thursday evenings, these films comprise a substantial portion of the NBC Television Newsreel as presented on WNBT by "Your Esso Reporter."

Whenever time is an important factor in rushing an outstanding story to the television screens, a negative print instead of the usual positive print is run through the film projector. By making certain changes in the transmitting equipment, the negative pictures are made to appear on the receiver screen in their natural, positive form.

Perhaps one of the best instances of this rapid-fire handling of a news events film was the recent spectacular Staten Island pier fire. The New York Fire Department sounded its fifth alarm shortly after 2 o'clock one afternoon. By 3, NBC cameraman Irving Browning was at the scene in a police boat. By 3:30 Harry Tugander and Jack Hartley of NBC Television, in a chartered tug, were filming scenes from another vantage point. It was 6 o'clock before the first reels reached the laboratory. There they were developed and assembled just as photographed. At 9:20, NBC put the films on the air, giving viewers a chance to see the blaze almost as it happened.

Under normal conditions, the processing of films takes much longer. First the editor screens the negatives, tells the film cutter how long he wants the story to run and in what sequence of scenes for best dramatic effect. The cutter lists the scenes and measures the footage. With this information the editor then writes a running commentary to fit the respective scenes. Appropriate background music is selected from a library of recordings and synchronized with the pictures. Finally, when picture, script, music engineers and commentator are ready, the film is projected in rehearsal. At that time, the commentator, sitting in front of a television screen runs through the script as he watches the picture develop, while listening to the music through earphones. This procedure is the same as though the soundtrack were being recorded on the film itself.

Since beginning its regular twice-weekly 10-minute newsreel, NBC has made an enviable record. Staff cameramen in 12 weeks have covered 101 different stories in and around New York City. In addition to these local reels, stories from

PERCHED ATOP A STATION-WAGON, AN NBC TELEVISION FILM CAMERAMAN RECORDS ACTIVITIES AT A MADISON, N. J., DOG SHOW, FOR USE IN A LATER TELECAST ON WNBT.

correspondent news cameramen here and abroad, contributed to NBC's television world film coverage. As an example, films of the Paris Peace Conference, made by cameramen engaged especially for NBC, were shown here for the first time on television within 48 hours of the actual opening of the conference. Pictures of the atom bomb blasts at Bikini were seen by NBC's television audience a full ten days before the story was released to theaters throughout the nation.

Films Provide Atmosphere

Today, the use of motion pictures in augmenting the "live" studio show is also an important phase of the work of the film unit. In addition to having his titles on film, a producer may call for an opening sequence which would quickly establish the locale of the play or live broadcast. At the request of the producer, cameramen are called on to film the exterior of an apartment building, a city street or a neighborhood. At another time the film editor may be asked for "stock" shots of waving wheat, a winter scene, a ship at sea. Even a lion-tamer in the cage with his "cats" was adroitly used by NBC Producer Ernest Colling in bringing realism to a studio show. Scenes of the actual circus were cut back and forth to fit in with action in the studio thus creating the effect of being actually under the "big top."

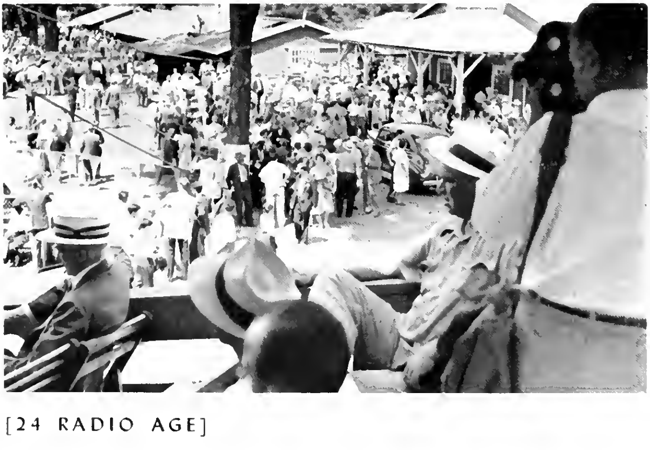
Prepares Short Subjects

In addition to its production of newsreels, NBC's film unit edits, writes and presents short subjects specially prepared for television. However, the greater proportion of films now used including those of feature length, are booked in the same manner as theatre releases. Although many outstanding Hollywood features have been presented on NBC, the major film companies have not as yet released their product for television. But working through independent producers, NBC is able to present an amazingly high standard of motion picture features and short subjects.

In the foregoing paragraphs, references to procedure have been limited to those of WNBT, a station owned and operated by a broadcast network. However, the small independent television station must depend to a similar degree on films and will need a basic film department. It would appear from the results of our experience that such a station, even when drawing on eventual networks for the major part of its video programs, will need at least one 16 mm. sound projector, a cameraman, film editor-cutter and a writer. This investment will not be required for local programs only. When networks come into being, good film footage taken locally but embodying events of national interest will be fed into the network just as broadcast programs today are likely to originate at any network affiliate.

In these days of experimentation, opinions differ as regards television programming. This is to be expected. There are many schools of thought and all of them, undoubtedly, possess some merit. But one fact is fundamental and cannot be refuted. In television, there is no substitute for a good picture, whether that picture originates in a studio, on film or through a skilful combination of both mediums.

AN NBC FILM CAMERAMAN PICKS UP SCENES FROM THE FAIR GROUNDS AT GOSHEN, N. Y., SITE OF THE FAMOUS HAMBLETONIAN RACE.



RCA VICTOR PRESSES BILLIONTH RECORD

The billionth phonograph record to be produced by RCA Victor was pressed in October at the company's Camden plant. It was a double-sided recording of "Stars and Stripes Forever" and "Semper Fidelis," performed by the Boston Symphony Orchestra conducted by Serge Koussevitzky. This achievement in record production, unapproached by any other firm, symbolizes 45 years of leadership in the record and phonograph field.

A billion records, like a billion dollars, is not a quantity that can be easily visualized. For instance, if this output of records were to be stacked, the pile would be 4,000 miles high. Working 24 hours a day, it would require 48,000 years for one person to play the entire collection.

The demand for recorded music has been increasing constantly over the years. In 1901, the Victor Talking Machine Company produced only 250,000 records. By 1921, the annual output had risen to 55 million units. In 1942, RCA Victor was able to report a new all-time high production of 59 million records.

At present, record manufacture is distributed among plants at Camden, Indianapolis and Hollywood while recording is carried out in modern equipped studios at New York, Chicago and Hollywood. In addition, the company operates mobile equipment which makes it possible to record great orchestras at their home headquarters.

Radio Communication and its Import in International Relations

Address by Brig. General David Sarnoff at Princeton University Conference on "Engineering and Human Affairs," October 3, 1946.

It is indeed a great pleasure to participate in this conference as part of the observance of Princeton University's Bicentennial. It is most appropriate that the subject to be discussed at this meeting is "Modern Communications and Its Import" and that it should be discussed at this place. For it was on this campus that Professor Joseph Henry, more than a century ago, erected important milestones in electromagnetism and telegraphy that helped to open the way for radio. The notebooks which he kept show that he "communicated orally" by means of "induction at a distance".

One of his students at Princeton noted that "each spark sent from the electrical machine in the College Hall affects the surrounding electricity through the whole village". The spirit of research exhibited by Professor Henry continues to characterize the work and scholarship of noted scientists and teachers at Princeton University. Indeed, that spirit extends beyond the walls of the University, for here in Princeton are located the RCA Laboratories where research in radio, communications, electronics and related fields are carried on by a staff of renowned scientists and engineers, on a world-wide scale. Today, man is able to "communicate orally" around the earth.

War revealed, in a spectacular way, the vital significance of communications. In a world that is struggling for rehabilitation from the ravages of war, there is no doubt that communications represent an important factor in human affairs and in any formula for peace. All forms of electric communication — telegraph, telephone and radio—now are woven through the pattern of international relations. Of these, radio is the most powerful because of its speed and its ability to reach all nations regardless of barriers, whether oceans, mountains, deserts, frontiers or censorship. It can speak any tongue; it can speak as the voice of freedom or as the voice of dictatorship.

Radio's effectiveness depends not only upon kilowatts and wavelengths but upon the use which man makes of it. The power of radio for good or for evil does not rest within the electron tube but within the minds of men. They determine to what use we put this modern means of communications which encircles the globe and travels with the speed of light. Radio can move even across 240,000 miles of outer space to bring a radar signal back from the moon in less than three seconds! We have crossed the threshold of television domestically and are approaching international television. Thus we see how radio has helped to shrivel the size of the universe; we behold its great power and the challenge which science hurls at mankind.

During the war, radio did a tremendously effective job in linking the Allied armies, fleets and air armadas. The impact of war and its demands upon science revolutionized communications. Today we have at our disposal new electronic devices which make radio an even more powerful force throughout the world. By giving a fair and balanced picture of world relationships and by honest dissemination of facts and news, radio can be used constructively to help achieve a lasting peace.

For long years the portals of the British Broadcasting Company carried the inscription, "Nations Shall

GRADUATE COLLEGE OF PRINCETON UNIVERSITY, MEETING PLACE OF THE UNIVERSITY'S FIRST BI-CENTENNIAL CONFERENCE ON "ENGINEERING AND HUMAN AFFAIRS."

" 'THE VOICE OF U.N.' . . . SHOULD HAVE A WORLD-WIDE RAN 'E AND BE USED FOR BROADCASTING THE PUBLIC PROCEEDINGS OF THE UNITED NATIONS, FOR DISSEMINATING ITS INFORMATION TO LISTENERS EVERYWHERE AND FOR SPREADING KNOWLEDGE AND UNDERSTANDING AMONG THE PEOPLES OF THE WORLD."

Speak Peace Unto Nations". But there came a day when those words over the doorway in London were illuminated by fire while exploding bombs and rockets shattered the surrounding area. Some of the missiles were even guided to the London target by radio. So we see how important it is for man in his efforts to re-establish peace throughout the world, to harness radio as a constructive aid in human affairs. Man's highest motives and hopes, including the slogan, "Nations Shall Speak Peace Unto Nations", will go for naught unless all nations use communications for peace with the same determination that they used it for war.

Today, every country realizes the need for a powerful globe-encircling voice in the post-war world. It is vital for friendship, for trade and for commerce. As part of its contribution, the United States must develop an adequate plan for international broadcasting.

When World War II began, Great Britain was at the forefront in international broadcasting through the use of its Empore system of short wave stations.

Russia, too, had erected within her borders, powerful broadcasting stations. Their programs reach all of Europe and are beamed to the East, to South America, and to other parts of the world.

Germany, before and during the war, operated a most extensive system of world-wide broadcasting. Its programs of propaganda, developed to a point of psychological warfare, were a vital part of its aggressions upon humanity.

By comparison, the international short-wave broadcasting operations of America, before the war, were insignificant. During the war, a number of additional stations were erected and the service substantially expanded. The U. S. Government financed this expansion and controlled all our international broadcasting activities during the emergency.

In the brief period of one year that has elapsed since the war ended, the American position in international broadcasting has already declined sharply. Today, Great Britain continues with her International Broadcasting services reduced little, if any. Russia is actually increasing her services over those of wartime. The United States, in striking contrast, has reduced its international broadcasting services by more than one-half.

The curtailed American services are under the auspices of the State Department and are financed by a temporary grant from Congress.

The questions now facing us are these: How shall the United States continue and expand its vital service of international broadcasting so that the "Voice of America" can be heard throughout the world? Who shall control it? How can it be supported in peacetime? These questions pose new problems for our country and their solution calls for a new approach.

Advertising, from which domestic broadcasting derives its revenue, does not, for various reasons, supply the practical answer for international broadcasting. Such meager revenue as might be derived from this source would be totally inadequate to provide the large sums needed for a public service of world magnitude. Moreover, many questions of foreign policy arise in any plan to finance international broadcasting entirely on the basis of commercial advertising.

Because of the special circumstances surrounding this unusual service and its national and international implications, I believe that private enterprise, as well as Government, would be well advised to recognize that international broadcasting does not belong *exclusively* within either domain.

The cost of doing this job effectively is quite likely to be $20,000,000 a year. This figure is less than the amount spent yearly and individually by the British and the Russians. Indeed, as time goes on, the United States may find it necessary to raise this figure substantially, if we are to match their world coverage.

A Plan for the U. S.

In an effort to stimulate discussion of the problem and to help solve it, I presented on January 9, 1943, to the Secretary of State, a tentative plan, the principal features of which are as follows:

1. That the United States Government and the American broadcasting industry cooperate on a public service basis. Only the Government can make known to the world the Nation's foreign policy, or provide the financial means commensurate with the task. On the other hand, private industry is needed to lend its initiative, ingenuity and experience to make this exposition effective.

2. That a public corporation be organized for this purpose and that it be charged with the responsibility for doing the job. The corporation might be owned jointly by Government and industry.

3. Such a public corporation should derive its legal authority from Congress through enactment of a bill that would define specifically the purposes and scope of the organization, representing, as it would to the rest of the world, "The Voice of America". The organization should be removed as far as possible from political influence and domination. Its Board of Directors should be composed of representatives of the public, of industry, of labor, and of governmental departments most directly concerned with our foreign policy and with other phases of our foreign relations. Such a Board would assure freedom for the presentation of non-partisan views of American life.

4. The Board of Directors shall select the managerial and operating staffs of the organization and be charged with the responsibility for its programs and activities.

5. The corporation would be the agency to establish direct relationships with the other international broadcasting organizations of the world, and would thus provide facilities for inter-change of programs, to be relayed and broadcast through local station tie-ins.

Let me make it clear that my proposals relate solely to international broadcasting. They do not deal at all with the subject of domestic broadcasting, where the same problems do not exist. There is no need and I know of no intention to depart from the American system of domestic broadcasting which, as a private enterprise, has found the way to support itself and to render a finer and freer broadcasting service to the American public than can be found in any other part of the world.

A Plan for the U.N.

In considering the subject of international broadcasting, I wish to stress the fact that if it is to be effective, the principle of Freedom to Listen must be established for all peoples of the world. This is as important as Freedom of Speech and Freedom of the Press. People everywhere must be able to listen without restriction or fear. In the light of present-day world developments, it would seem highly important that the U.N. should be able to reach directly all people of the world so that they in turn may impress their thoughts and desires upon their leaders. In this way, the danger of the people being kept uninformed by their leaders would be overcome.

One effective way to achieve this is for the U.N. to provide an effective world-wide system of broadcasting that can reach all people of the world freely and simultaneously. That system would supplement the plan I have outlined for international broadcasting by the United States.

To further this idea, I submitted to the officers of the United Nations, on April 4, 1946, a two-point plan, as follows:

1. Establish the principle of "Freedom to Listen" for all peoples of the world.

2. Establish an independent international broadcasting system to be known as "The Voice of U.N." This system should be owned and operated by the U.N. It should have a world-wide range and be used for broadcasting the public proceedings of the United Nations, for disseminating its information to listeners everywhere and for spreading knowledge and understanding among the peoples of the World. "The Voice of U.N." should broadcast in the principal languages employed throughout the World. The U.N. should continue to afford to other broadcasters and to the press the privilege of broadcasting and publishing its proceedings and information.

I realize that many practical problems are involved in adopting and executing such a plan, technically, politically and financially and that it will take time to achieve it. The technical problems can be solved by technical experts. The political problems can be solved by the membership of the United Nations. Financially, the problem is certainly not a serious one for the total number of nations comprising the U.N. The cost of erecting such a supplemental broadcasting system would be no greater than the cost of building one modern battleship. The potentialities of such a service for helping to preserve the peace of the world would seem greater than that of any single ship.

These two plans for international broadcasting — one by the United States and one by the United Nations—are based upon the American tradition of freedom. I submit them as a joint "Voice of Peace" that can speak around this planet and be heard by all the people everywhere no matter what their race or creed or political philosophies.

"Man of Science"

General Sarnoff was selected to receive the first "Man of Science" award established by Science Illustrated magazine in recognition of his contributions in building the radio industry and for his vision and imagination in developing research as a keystone of the Radio Corporation of America.

The gold medal and scroll comprising the award were presented to General Sarnoff by Dr. Gerald Wendt, editorial director of the magazine.

HORACE SCHWERIN, ORIGINATOR OF THE SURVEY PLAN, POINTS TO A CURVE SHOWING THE VARYING REACTIONS OF LISTENER-CRITICS THROUGHOUT THE PROGRESS OF A 15-MINUTE PROGRAM.

Critics by Request

GROUPS OF WEAF LISTENERS MEET IN RADIO CITY STUDIO TO SERVE AS JURIES IN NBC PROGRAM RESEARCH PLAN

By Hugh M. Beville, Jr.,
Research Director,
National Broadcasting Co.

PANELS of 300 radio listeners who have accepted invitations to become "critics for a night" are meeting twice weekly in an NBC studio in Radio City to express their opinions on network and WEAF programs. These gatherings provide basic data for the operation of a system devised by Horace Schwerin, well known research expert, to serve as a practical program-building tool for radio producers.

Numerous methods of sampling radio audience reaction have been advanced at various times, but the Schwerin System is being used on an experimental basis by the network because of its flexibility and the speed with which results can be obtained. Not only is this form of testing useful in auditioning whole programs or individual performers. It functions equally well in testing experimental changes in programs, in discovering the need for changes in content and structure, and in revealing faults of timing which should be corrected for maximum audience appreciation. Reports prepared by Schwerin Research Corporation after each test given NBC Program Department complete information on audience attitudes, so that producers may combine this knowledge with their own showmaking experience in effecting needed changes and improvements.

Listeners Invited by Radio

Participants in the tests are recruited by announcements over WEAF inviting the station's listeners to come to Radio City and "tell NBC what you think of its programs." Each listener who responds receives a multiple folded mailing card to fill out and return to NBC. The card bears information which permits NBC and SRC research experts to select a balanced cross section of listeners for each panel. This insures a group containing the desired proportion of men and women from different age, occupation and educational groups.

The test begins with the playing of a transcription of the program to be analyzed. At certain preselected points in the show, numbers are flashed on the screen, and each audience member then checks on his reaction sheet his opinion of the program part to which he has been listening. There are three choices of reaction, the words on the sheet varying, depending on the type of program being tested. In this way, qualitative reactions to the various units that comprise the program, such as the music, the commercials, the vocalists, etc., are obtained. In a half hour show the audience may be asked to check as many as 50 to 60 points.

At the conclusion of each program transcription, the meeting is thrown open for a general discussion. The guests are urged to state their likes and dislikes without restraint. Comments useful to the survey are then put to the audience in the form of specific questions, and all audience members vote on these propositions on another check sheet.

Charts Show Audience Response

When each group has concluded the evening's tests, sheets are collected and the information they contain is transferred to cards for analysis. From these data is compiled a profile chart, the ups and downs of which depict the shifting in audience reaction from beginning to end of the program. This profile is then presented as part of the report to program producers, to be used by them as an aid in better programming. By relating the reactions obtained on the check sheets with each respondent's personal data (secured from a detailed questionnaire filled out at the start of each session), it is possible to study the relative appeal of any program to men and women of different age groups and living standards. A large number of other breakdowns is possible.

CROWDS AT THE IOWA STATE FAIR WATCH ONE OF THE TELEVISION SHOWS STAGED BY RCA VICTOR AND STATION KRNT, DES MOINES.

TELEVISION GOES TO THE FAIR

Thousands of Visitors to Annual Exposition at Des Moines, Iowa, Watch Daily Video Programs on Twelve RCA Receivers

THOSE sure - fire, time - tested main attractions of country fairs—the Midway, the races and the live-stock show—met the stiffest competition of their history last August when RCA sent twelve television receivers to the Iowa State Fair at Des Moines to show mid-westerners what they may expect to see in their own homes in a few years.

For nine days, RCA personnel under the direction of Richard Hooper, Shows and Exhibition Manager, working in cooperation with Paul Mowrey and Harvey Marlowe of the American Broadcasting Company, and Chuck Miller, program director of Des Moines station KRNT, an ABC affiliate, put on a total of 35 hours of programming, an average of 18 television periods a day. Typical country fair features predominated in the entertainment but many of KNRT's regular programs were televised at the Fair studio and fed to the receivers. All television programming was directed by Joseph A. Jenkins of the RCA Victor exhibition staff.

The television stage, control rooms and viewing positions were set up in a huge tent accommodating more than 800 persons, 300 of whom were seated in front of the stage. Two of the receivers were located in a lounge at the rear of the tent and eight others were placed in shaded booths on both sides of the tent entrance. Fair officials estimated that at least 50% of the record breaking attendance of nearly half a million guests visited the telvision demonstration, the first to be given in Iowa. So great was the interest shown that a much larger tent would have been needed to accommodate the crowds seeking entrance.

Receivers Connected by Cable

The major remote pickup was in the grand-stand area where programs of harness racing, automobile races and stage acts were televised. A 500-foot coaxial cable connected the cameras with the group of receivers.

As expected, programs with a rural appeal drew hearty applause from visitors to the Fair. Each afternoon the International Harvester Company sponsored a special program which became one of the day's highlights. One of these features was a demonstration of animal disease control by spraying, with a loudly protesting pig as the subject. Another was an exhibition of pure bred calves, staged by youngsters from a nearby 4-H Club. And farmers and city folks alike watched the television screens with amusement as a cow was led onto the stage to take the leading role in an actual demonstration of a modern milking machine.

The sound portions of a majority of the television programs were broadcast simultaneously over KNRT, which not only helped to promote television through references made by the actors and speakers, but attracted additional visitors to the television tent on the fair grounds.

AN RCA TELEVISION CAMERA FOCUSES ON THE THRILLING FINISH OF A SULKY RACE AT THE IOWA STATE FAIR.

ANNIVERSARY IN SOUND

RCA Joins with Warner Brothers in Celebrating 20 Years of Development in Recording Sound for Films

By M. C. Batsel,
Chief Engineer,
Engineering Products Dept.,
Radio Corporation of America.

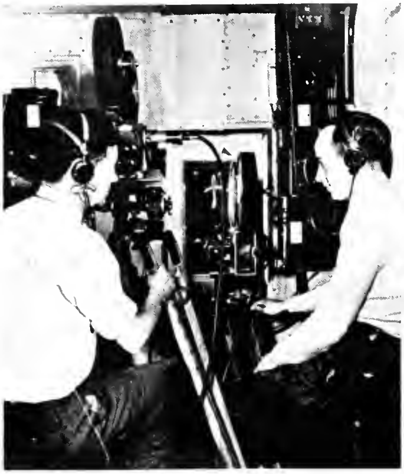
WHEN Warner Brothers, in 1926, were looking around the country for a manufacturer equipped to produce sound-on-disk recordings for the first talking pictures, their search brought them to Camden, N. J., plant of the Victor Talking Machine Company, predecessor of the RCA Victor Division. There they found engineers, acoustics experts and manufacturing facilities ready to go to work on the numerous problems that accompanied the revolutionary change in motion picture production.

In the 20 years that followed, RCA assumed the lead in the development of equipment and techniques, and contributed to the art a number of advances which have been honored in special awards by the Academy of Motion Picture Arts and Sciences.

Any history of a new industry should include mention of its birthplace. In the case of sound motion pictures, the industry's "log cabin" was an abandoned church in Camden. There, where the congregation of Trinity Baptist once worshipped, the first experiments in combining sound and film were carried out. Because of its location in a neighborhood that was rapidly losing its residential character to encroaching industrial plants, the property was sold to Victor for use as a warehouse. A little later, Victor engineers discovered by accident that the building had acoustical properties which made it an ideal recording studio. Soon all recording activities were concentrated in the "church." There, up to the advent of sound pictures, came a constant procession of the world's greatest personalities in the concert and operatic world to have their art etched on phonograph disks. Enrico Caruso, Jean de Reszke, Ignace Jan Paderewski, Emma Ames, Galli-Curci, Ernestine Schumann-Heink and many others visited the studio to record their vocal and instrumental talents for the ages.

Camden is Production Center

As the making of sound disks for talking pictures grew in importance, phonograph recording activities were transferred to New York and the Camden studio became the principal production center for the new industry. It did not take long for Victor engineers to discover that the demands of film producers presented problems that they had never faced in making recordings for the home. Not only was there a lack of suitable equipment but the necessity for what are known today as "sound effects" tested the ingenuity of the recording pioneers. Carbon Klieg lights that sputtered with strange noises that found their way into the disks; "masked" and hidden microphones that muffled voices, and microphone booms that had a fiendish way of collapsing noisily during the final minutes of a scene were only a few



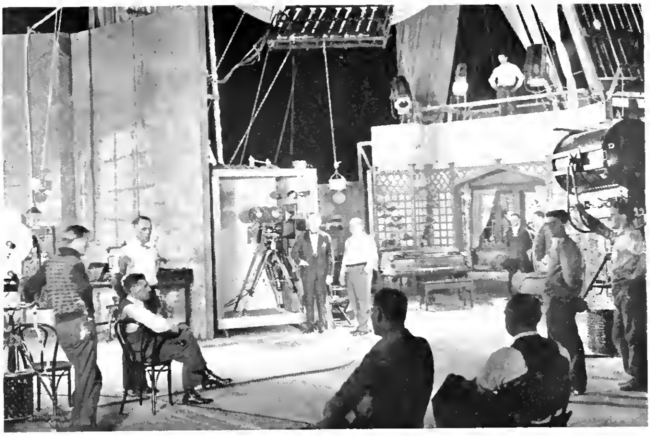
IN THE EARLY DAYS OF "TALKIES", CAMERAS WERE SO NOISY THAT THEY WERE ENCLOSED IN SOUND-PROOFED CABINETS, SHOWN BELOW AT RIGHT, IN A 1927 VITAPHONE STUDIO. THE CRAMPED QUARTERS OF A CAMERA BOOTH OF THAT ERA ARE PICTURED AT THE LEFT.

of the difficulties that made the job complex and oftentimes discouraging.

For the most part, the church studio was used for matching sound to the films which had been shipped in from the West Coast but during its existence, more than 24 films-with-sound were "shot" there. At such times the place resembled a combination of a railway terminal at rush-time and a machinery plant under full production.

Grass Grown to Order

Frequently, the proceedings taxed to the extreme the ability of the RCA Victor staff. Once while shooting scenes for an Hawaiian picture, it was necessary to have real grass in the foreground of the set. How the staff solved that one will be the envy of many suburbanites! Workmen merely spread good Jersey soil over a 20-foot square space in the studio, sowed grass seed and sprinkled it with water. They turned hot Klieg lights on the acreage and left them burning. In no time at all — the records say 24 hours — enough grass had sprouted for the picture-making to proceed. It was winter and the green plot within was in strange contrast to the snowdrifts on the studio door-step.



TYPICAL MOTION PICTURE STAGE OF THE MIDDLE TWENTIES SHOWING CAMERA CABINET AND AN EARLY TYPE CONDENSER MICROPHONE SUSPENDED ON A CORD OVER THE SCENE TO BE FILMED.

RCA Achievements in Sound which have been honored by awards of the Academy of Motion Picture Arts and Sciences.

1931—Velocity microphone.

1931—Noise reduction recording equipment.

1932—High-fidelity recording and reproducing system.

1936—Ultra-violet light recording system.

1936—Non-slip printer.

1936—Rotary stabilizer soundhead.

1937—High frequency method of determining optimum photographic processing conditions for variable width sound tracks.

1941—Uni-directional microphone.

1941—Recording of sound in Disney film "Fantasia."

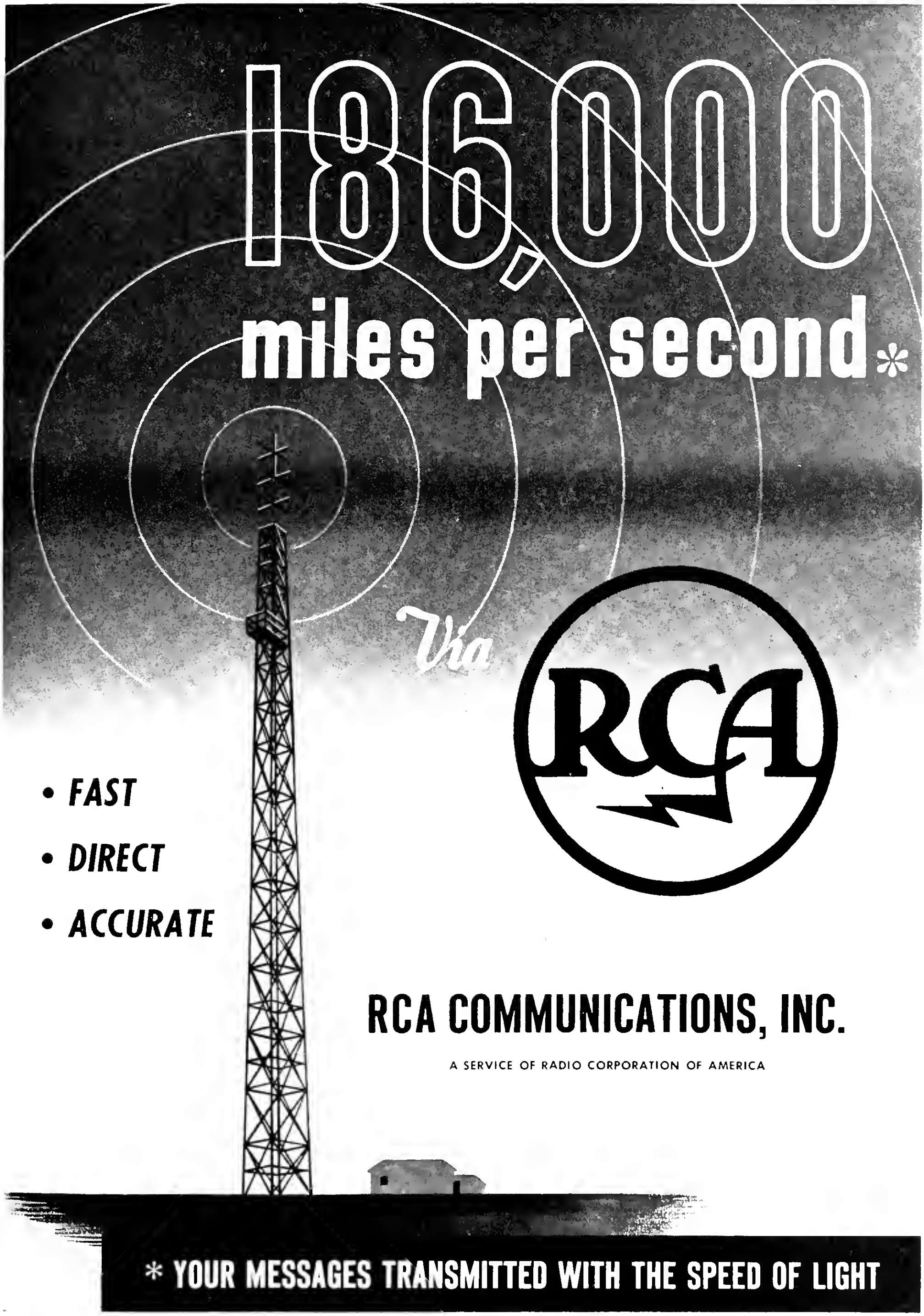
1945—Sound recording in "Bells of St. Mary's."

Hiding "Mikes" a Problem

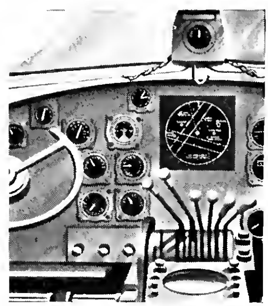
Recording engineers who are still working for RCA Victor recall other difficulties encountered in the early days of recording for sound pictures. One of the principal problems was effective "masking" or hiding of microphones when pictures were being produced. The mikes used in those days were big, heavy, and unwieldy. They were taped on the backs of pillars used as stage props, suspended by pulleys from the ceiling, hidden in the bases of potted plants, and generally scattered over the scenes. Because of their unfavorable locations, the objects used to "mask" the mike would often block the voice pick-up. For example, when a mike was taped behind a pillar or back of a chair in a scene, that "prop" would often act as a barrier to good voice pick-up. The result would be a recording that was muffled and hard to understand.

The boom microphone, suspended overhead and built on a dolly that could be wheeled into the most advantageous position, solved most of this "mike" trouble. But the evolution of the boom mike was not without incident. The first models were suspended on one end of an elevated cross-bar and counterbalanced on the other end by a series of weights, much like those used on old-time grocery scales, but much heavier. Occasionally, in the excitement of picture making, "grips" would move the mikes too quickly and the weights would fall clattering to the floor, ruining the recording.

In view of this long association with the motion picture industry, it was only natural that RCA Victor Division should have joined with Warner Brothers on August 6 in marking the 20th anniversary of the production of the first film with synchronized sound, for RCA, perhaps to a greater extent than any other company with the exception of the film makers themselves, is responsible for the development of the sound motion picture film industry from the years of its earliest struggles to the notable achievements in equipment and techniques which produce today's high-fidelity sound recordings.


186,000
miles per second*
Via
RCA
• FAST
• DIRECT
• ACCURATE
RCA COMMUNICATIONS, INC.
A SERVICE OF RADIO CORPORATION OF AMERICA
* YOUR MESSAGES TRANSMITTED WITH THE SPEED OF LIGHT

Teleran pictures—air traffic control by radar plus television.



Instrument Panel of the Future. The Teleran indicator, mounted in a cockpit, simplifies the pilot's job by showing his position relative to the airport and to other planes in the vicinity. It promises to become one of the most useful developments in the history of aviation.

It's a television "information please" between airplane and airport—with the pilot's questions given split-second answers on a television screen mounted in the cockpit.

Teleran (a contraction of *TELE*vision—*R*adar *A*ir *N*avigation) collects all of the necessary information on the ground by radar, and then instantly transmits a television picture of the assembled data to the pilot aloft in the airplane.

On his receiver the pilot sees a picture showing the position of his airplane and the position of all other aircraft near his altitude, superimposed upon a terrain map complete with route markings, weather conditions and unmistakable visual instructions. The complex problem of air traffic control is well handled by Teleran.

Teleran—another achievement of RCA—is being developed with Army Air Forces co-operation by RCA Laboratories and RCA Victor, endless sources of history-making developments in radio and electronics. They are also your assurance that *any* product bearing the RCA or RCA Victor monogram, is one of the finest instruments of its kind science has yet achieved.

• • •

Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 2:00 P. M., Eastern Standard Time, over the NBC Network.

RADIO CORPORATION of AMERICA

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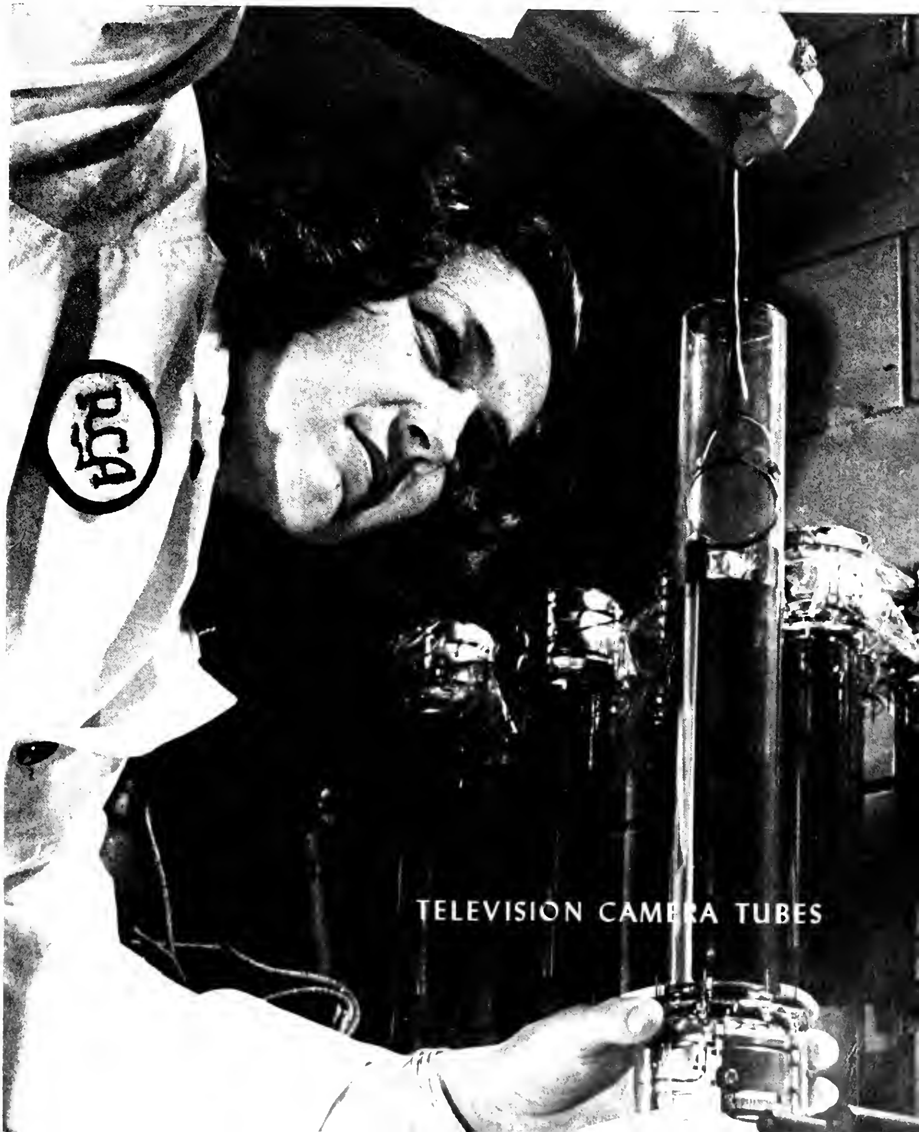

ANUARY


restoration of DIRECT
RADIO-TELEGRAPH COMMUNICATIONS
with the LIBERATED COUNTRIES
of the world, via . . .
RCA
No. 11
NETHERLANDS EAST INDIES
SUMATRA
BORNEO
CELEBES
NEW GUINEA
JAVA
BALI
RCA COMMUNICATIONS INC.
A SERVICE OF RADIO CORPORATION OF AMERICA
No. 6 PHILIPPINES · No. 7 CZECHOSLOVAKIA · No. 8 BULGARIA · 9 SIAM

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

COVER

n an operation which requires dexterity and patience, Edna Burkhart, an mployee at the RCA tube lant, Lancaster, Pa., assembles an image orthicon elevision camera tube.

Services of RCA are:

RCA Laboratories Division

RCA Victor Division

RCA Communications, Inc.

marine Corporation of America

nal Broadcasting Company, Inc.

RCA Institutes, Inc.

RCA Service Company, Inc.

RCA International Division

VOLUME 6 NUMBER 2 JANUARY 1947

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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*

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DAVID SARNOFF, PRESIDENT OF RADIO CORPORATION OF AMERICA, HOLDS THE SILVER PLAQUE AWARDED HIM BY RADIO AND APPLIANCE JOURNAL AS "RADIO'S MAN OF THE YEAR—1946"—"IN RECOGNITION OF HIS GREAT SERVICE TO THE RADIO AND TELEVISION INDUSTRY IN DEVELOPING PUBLIC AWARENESS OF ITS OUTSTANDING WARTIME ACHIEVEMENTS AND PEACETIME POSSIBILITIES," AND AS A "TOKEN OF THE ENTIRE INDUSTRY'S RESPECT AND ESTEEM."

Radio in 1946-47

PEACE AND PRODUCTION SEEN AS KEYS TO PROGRESS AND PROSPERITY—RECENT ACHIEVEMENTS CLEAR WAY FOR SIGNIFICANT ADVANCES IN TELEVISION

By Brig. General David Sarnoff,
President,
Radio Corporation of America.

PROGRESS and prosperity in 1947 depend upon greater international cooperation for world peace and accelerated industrial production. In the achievement of these objectives, it is imperative that a free flow of information prevails throughout the world. It is also vital that scientific research be expanded to create new products, services and processes that continually will lead to full employment and rising standards of living.

The uncertainties, largely related to shortages of raw materials and other industrial deterrents, which cloud the horizon of the New Year, must be cleared without delay to avoid economic paralysis. If industrial unrest is ended and the flow of basic components is increased, 1947 holds promise of being America's first major television year, for science has equipped that great new industry to move forward as a service to the public. Furthermore, trade estimates indicate a large replacement market for radio sets and radio tubes which were in service throughout the war. In addition, a potential market for radio-phonographs and television receivers exists in the 7 to 10 million new homes which may be built during the next ten years.

Television in 1947 can make big strides in taking its place alongside the older arts, and in many instances visual communication can give them new and modern import. Although the television camera already has scanned national political conventions and presidential candidates, it will be ready to play its first big role in the 1948 campaign. That year will be to television what 1924 was to broadcasting, when Coolidge, Davis, Dawes, Cox, Bryan and other orators picked up the microphone for the first time in a national campaign and marveled at its ability to reach the people. Political techniques were vastly changed in that era of the headphones and gooseneck loudspeaker horns. Similarly, in 1947, television will be studied as a new factor in politics as plans are laid for the '48 campaign of radio sound and sight. In 1948, it may be expected that in the United States there will be several hundred thousand television equipped homes.

Increased activity among the broadcasters in television programming during 1946 revealed that the showmen are prepared to present an interesting variety of entertainment, newsreels and sports events. Their technique in the operation of new cameras has attested that they are on the mark and ready to go! They now have mobile camera-equipped television trucks to relay on-the-scene programs by short-waves to the main transmitters. New York is the television capital of the world—the center of this great new medium of entertainment, which will expand through networking across the country from city to city and from state to state —and finally nation-wide.

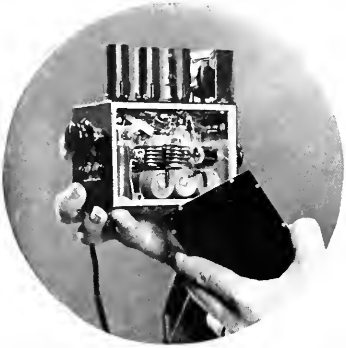
All-Electronic Color Television

On October 30, the men of science at RCA Laboratories demonstrated for the first time in history, clear, flickerless, all-electronic color television. And it was accomplished without the outmoded rotating disc or any other moving part. It was done all-electronically by means of electron tubes and electron beams "painting" pictures in natural colors. The pictures were viewed on a 15 x 20-inch screen.

The realization of this universal system of television, which transmits and receives both color and black-and-white pictures with equal quality, is as far-reaching as was the creation of an all-electronic television system which supplanted the mechanical discs used in black-and-white television when it first began. The realization of all-electronic color is as significant in television as electronic recording over mechanical recording of phonograph records, or the present color movies over the early mechanical color on the screen.

By this new advance in television, *simultaneous* color transmission, instead of *sequential* transmission,

NEW MOBILE TELEVISION "STUDIOS ON WHEELS" CARRY CAMERAS AND MICROWAVE EQUIPMENT FOR PICKING UP AND TRANSMITTING NEWS, SPORTS AND OTHER OUTDOOR EVENTS.



DEVELOPMENT MODEL OF INEXPENSIVE RADIO FREQUENCY CONVERTER WHICH ENABLES BLACK-AND-WHITE TELEVISION RECEIVERS TO REPRODUCE COLOR PROGRAMS IN MONOCHROME.

color by color, is achieved. Thus, our scientists enabled RCA, the creator of all-electronic black-and-white television, also to create all-electronic color television which has been the dream of radio scientists from the beginning.

The new RCA electronic color television system, which contributes to the television leadership of our country, will be available to the entire radio industry. The initial demonstration firmly established the basic principle; it will be followed in 1947 by the transmission and reception of color pictures in motion, then outdoor scenes and finally, in 1948, electronic color television on large-size theatre screens.

At the same time that RCA demonstrated all-electronic color television, it announced a simple, inexpensive and easily installed radio frequency converter which will enable black-and-white television receivers—even those of 1939 vintage —to receive in monochrome the programs of color stations when in the future they take to the air on ultra-high frequencies.

Thus, the problem of obsolescence in television has vanished. The public may enjoy the thrills of television, while scientists and engineers are exploring the high frequencies, building apparatus to study their behavior, field testing new instruments and laying the groundwork for commercial standards and practical color television service. This is a big task. Our engineers estimate that it will require about four years to bring any system of color television to the present status of black-and-white all-electronic television.

Sensitized by wartime research and development, television's electronic eye now rivals the human eye in what it is able to see. Performance of the RCA Image Orthicon television camera during 1946 greatly advanced the art and proved that television no longer needs brilliant lighting; it can see whatever the eye can see in twilight, moonlight, candlelight, and even go a step further and see in "black light", or infra-red to which the human eye does not respond.

Radio, which gave a world-wide voice to Peace and Freedom, now gives to them the added advantages of vision through space. With the scientific revelations of 1946 as the foundation, more and more people, more and more nations will extend their radio sight in 1947 and in the years to come. Those who witnessed the dawn of all-electronic color television beheld triumphant colors of progress — a rainbow of promise that eventually will arch over a world-wide horizon.

Radio-Electronic Triumphs

While television portrays the expansive pictures of baseball, football, prizefights and panoramas, the electron microscope — another triumph of radio science—continues to peer deeper into the unseen world of the infinitesimal. In 1946, at RCA Laboratories, this powerful aid to man's eye carried his vision into the submicroscopic domain, where tiny cells grow, where bacteria and the virus dwell, no longer hidden from view.

Thus, man through science in 1946 greatly extended the range of his vision. The same radio science, which by the miracle of radar flashed a signal to the moon and echoed it back across 240,000 miles in two seconds, also caters to the eye and promises great new services for people everywhere — new services in entertainment and education; new services in the war against disease; new services in international understanding.

There are countless and unbounded frontiers of radio research extending into the upper atmosphere and far beyond the orbit of the moon. As radio penetrates the secrets of outer space, it will bring back new knowledge that will open many undiscovered frontiers for other branches of science. The scientists of this planet, who are only beginning to reach upward in their conquest of Nature, continually will be challenged anew.

Nuclear Energy in Space?

Those who have been working scientifically with atomic energy have been looking underneath the ground for metals such as uranium and other materials which are employed to release the power contained within the atom. Yet, who among the scientists would be willing to say that there may not be more nuclear energy between the heavens and the earth than is within the earth? Will a way be found to release the nuclear energy of hydrogen, nitrogen, helium or other gases that may be in space? When we seek atomic energy that may be released from cosmic rays, we may find that there are greater treasures in the emptiness of space than in the solid earth.

Electronics has become a vivifying force in American life. This science has a magic touch that not only creates new instrumentalities, but brings old devices and services up-to-date. Electronics has, for example, made the phonograph in combination with radio more popular than ever. Yet there was a day in the Twenties that the cry went up that radio was broadcasting the requiem of the talking machine; that the newspaper was imperiled by newscasting, and the theatre by radio entertainment. All have survived and have grown; they supplement each other and have gained new popularity in their spheres of influence. In 1946, RCA Victor turned out its billionth phonograph disc, and 1947 promises to quicken the pace on the way toward the second billion.

The modern magic of electronics goes far afield of the home. By radar, ships are navigating fog-hidden channels and rivers, as if in the clear sunlight. Aviation too is offered new safeties through radio and radar, and by Teleran—the new

RCA radar-television system of air navigation and traffic control.

The world-wide communication services operated by RCA were mechanized and speeded in 1946, enabling significant reductions in traffic rates to many points. Circuits cut off from enemy countries and invaded lands during the war were restored, and RCA Communications, Inc. now operates direct radio circuits to more than 51 foreign countries. Similarly, radiophotos take wing across the hemispheres to a longer list of cities.

Broadcasting and television now are supplemented by the service of FM, or frequency modulation. RCA approached the end of the year with facilities in readiness to produce tens of thousands of FM receivers and combination AM-FM sets, that is, FM plus standard broadcast reception.

Broadcasting, which won the rapt attention of anxious listeners throughout the world in wartime, finds people no less anxious for news, forums and entertainment in peacetime. Ears, which for six years were tuned to theatres of war now are turned to the microphones that put UN on the air, listening in hope that the voice of Peace will grow ever stronger in every language. Those who heard the atomic blast at Bikini echo around the earth by radio, and later saw televised films of "Operation Crossroads", may well have hoped that it was radio's final portrayal of war.

When man thinks of television, he thinks of it as an instrument of peace, although it can be used in war. When he thinks of atomic energy, he thinks of it in terms of war. This reaction must change—he must relate the atom to its vast possibilities for good in peacetime as he does television.

Science is at man's command! He can use radio and radar to guide rockets and bombs loaded with atomic warheads; he can equip these winged missiles and robot planes with television eyes focused on great cities as targets of destruction. Or he can use radio, radar, television and atomic energy for peacetime pursuits in commerce, industry and home-life that will contribute greatly to "One World" in which people everywhere may live together in understanding, happiness and friendship.

Man's fate, his destiny and that of civilization are in his hand which grips the clutch of science and in his fingertips which rest on the push-buttons that give War or Peace the right of way on the international highways. If he ignores Peace and presses for War, he will never regain control; he may never have a second chance again!

Should he press for war he would not survive to behold the beauty of the world that can be unfolded on the television screen. A third World War would shatter the picture; the drama of civilization would end in tragedy. But this cataclysmic finale need not occur if man will turn his mind, his heart and his soul toward Peace and the use of science for the benefit of civilization. That, it seems to me, is the lesson which 1946—the first postwar year—has taught. Thus, science in 1947 and in the years to come can play an all-powerful part in the everlasting attainment of "Peace on Earth, Good Will Toward Men."

BELOW: J. W. MURRAY, VICE PRESIDENT IN CHARGE OF THE VICTOR RECORD DEPARTMENT, EXHIBITS THE BILLIONTH PHONOGRAPH DISK PRODUCED BY RCA VICTOR. RIGHT: 1947 MODEL COMBINATION VICTROLA RADIO-PHONOGRAPH WHICH EMBODIES ADVANCED DEVELOPMENTS IN SOUND REPRODUCTION.

All-Electronic Color Television

RCA DEMONSTRATES FLICKERLESS, ALL-ELECTRONIC COLOR TELEVISION SYSTEM, WITHOUT ROTATING DISCS OR OTHER MOVING PARTS— CONVERTER DEVICE SOLVES PROBLEM OF OBSOLESCENCE ENABLING BLACK-AND-WHITE TELEVISION RECEIVERS TO SEE COLOR PICTURES IN MONOCHROME

ELECTRONIC color television pictures, produced by all-electronic means, were demonstrated publicly for the first time on October 30, 1946, by Radio Corporation of America at RCA Laboratories, Princeton, N. J.

The demonstration, revealing a revolutionary development in radio science, proved that flickerless, all-electronic color television is practical without rotating discs or other moving parts.

This new system, the engineers explained, is a complete departure from mechanical color, shown in various forms since 1925. In announcing this important advance, RCA officials pointed out that the time period estimated by their engineers in December, 1945, when they said five years would be required to bring any color system to the present status of black-and-white television, still holds.

It was further disclosed that a simple, inexpensive radio-frequency converter makes it possible to introduce this all-electronic color television system without causing obsolescence of black-and-white television receivers.

A new color slide television camera, developed by RCA and used in the demonstration, produces signals from 35 mm. Kodachrome slides. Transmission of the pictures on the slide is achieved in natural colors when a light beam from a kinescope is focused through the slide and separated into component colors by a system of mirrors and photo-electric cells.

Each of the three transmitted images—red, blue and green—is of the same number of lines, that is, 525; also the same horizontal scanning rate and the same picture repetition rate of 30 pictures a second as in present commercial television broadcasting.

The receiving set is equipped with three 3-inch kinescopes, which separately receive the signals representing red, blue and green. This trio of kinescopes is called a Trinoscope. From it the three color images are optically projected into a brilliant composite picture which appears on a 15 x 20-inch screen in natural color, free from any flicker, color fringes or break-up of color.

By this new advance in television, *simultaneous* color transmission, instead of *sequential* transmission, color by color, is achieved.

Obsolescence Problem Solved

Since the electrical characteristics and all of the standards of the green image — including the synchronizing pulses—are identical to those of the present black-and-white standards, any broadcasts from color stations using the electronic simultaneous system can be received clearly on black-and-white receivers by the addition of the easily installed radio-frequency converter. No modifications whatever are required inside the set.

This converter will enable present-day television sets to receive color programs and reproduce them in black-and-white, even when transmitted on ultra-high frequencies. Thus, existing receivers will not be made obsolete by the introduction of color at some future date. On the contrary, their usefulness will be extended. For example, if a football game is broadcast by a color transmitter, the owner of a black-and-white receiver can see it in black-and-white. Even one of the first television sets introduced by RCA at the time of the World's Fair in 1939 can be adapted to tune-in the electronic color pictures in black-and-white.

Likewise, it will be possible for electronic color television sets to receive the broadcasts of black-and-white stations. Furthermore, when electronic color television is established as a broadcasting service, the black-and-white receivers will be able to reproduce the color broadcasts in monochrome. Engineers explained that this cannot be done with any known system of mechanical color.

Officials of RCA pointed out that a station owner can begin with a black-and-white broadcast service. He may operate a monochrome transmitter on low frequencies and also an electronic color transmitter on ultra-high frequencies using the signal of the color camera to operate both transmitters. With such a dual arrangement, the problem of obsolescence for the broadcaster as well as the viewer is reduced to a minimum. In fact, the broadcaster would thereby be able to render service in both black-and-white and color from the same station.

Brigadier General David Sarnoff, President of Radio Corporation of America, in commenting upon the development said:

"The realization of this universal system of television, which transmits and receives both color and black-and-white pictures with equal quality, is as far-reaching as was the creation of an all-electronic television system which supplanted the mechanical discs used in black-and-white television when it first began. The realization of all-electronic color is as significant in television as electronic recording was over mechanical recording on phonograph records, or the present color movies over the early mechanical color on the screen.

"It is with great pride and satisfaction that I congratulate the men who have created all-electronic color television in our Laboratories," said General Sarnoff. "They have enabled RCA, the creator of all-electronic black-and-white television, also to create all-electronic color television which has been the dream of radio scientists from the beginning.

"The new RCA electronic color television system will be available to the entire radio industry. The development is so important in contributing to television leadership for our country that we have decided to demonstrate it publicly as apparatus becomes available for each successive step. We begin with the current demonstration in which still pictures are used, but which sufficiently establishes the basic principle; it will be followed by the transmission and reception of color pictures in motion, then outdoor scenes and finally electronic color television on large-size theatre screens."

Dr. C. B. Jolliffe, Executive Vice President in Charge of the RCA Laboratories Division, declared that this development in television, which establishes an all-electronic system of color transmission and reception, takes the issue of color television out of the range of controversy. All-electronic television, he said, is far superior to any mechanical system of color with its rotating discs and other well-known limitations.

"The problem is no longer how to transmit and receive color pictures by an all-electronic method, because the basic principles have now been solved," said Dr. Jolliffe. "The problem that still challenges is how to operate television broadcasting as a steady and regular service to the public on the higher frequencies, whether in black-or-white or in color. To open the high-frequency spectrum and to make it commercially useful will require propagation studies under broadcasting conditions, development of new circuits, new tubes and new cameras, all of which must be field-tested before commercial standards can be recommended by the industry for approval by the Federal Communications Commission.

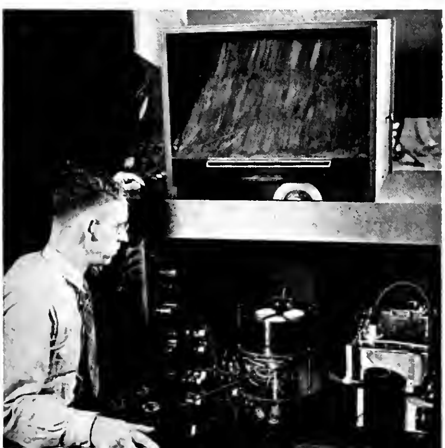
"Although we have solved the all-electronic color television problem, it will require a number of years to establish color television as a service to the public," said Dr. Jolliffe. "What we have done today is to demonstrate the realization of the principle of simultaneous electronic color television. The apparatus used in the demonstration is purely experimental as developed in the Laboratories. It is not commercial equipment, but it reveals that the American people will be assured of the finest color television instruments in the future as they now have in all-electronic black-and-white television.

"Let me emphasize that the most important fact to remember in regard to color television is that any commercial system, whether it be mechanical or electronic, depends upon the ultra-high frequency spectrum in which the necessary band width for color exists. No matter how far the development of the principle and the apparatus has gone forward, there must yet be complete exploration and tests in the field of the behavior and limitations of ultra-high frequencies. We expect to complete our development of electronic color television apparatus before the ultra-high frequency spectrum is made ready for its use in a commercial way.

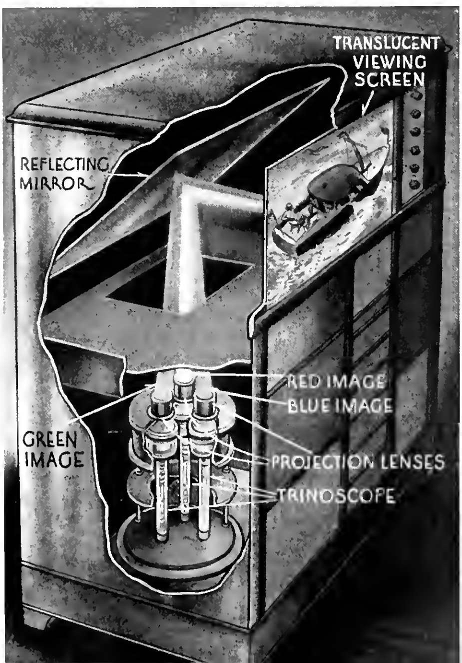
"This demonstration, therefore, does not change the time period estimated by us in December, 1945, that it would require five years to bring a color system to the present position of black-and-white television.

"We will move along rapidly in this development, but no matter how many years pass before the ultra-high frequency spectrum is harnessed for commercial color

REAR VIEW OF RCA ALL-ELECTRONIC COLOR TELEVISION RECEIVER SHOWING THE TRINOSCOPE, COMPRISING THREE CATHODE-RAY TUBES WHICH PROJECT RED, BLUE AND GREEN IMAGES ON THE MIRROR AND VIEWING SCREEN ABOVE.



DRAWING OF RCA ALL-ELECTRONIC COLOR TELEVISION RECEIVER SHOWING HOW IMAGES ON THE THREE KINESCOPES OF THE TRINOSCOPE ARE PROJECTED ONTO A MIRROR AND THEN TO THE VIEWING SCREEN WHERE THEY BLEND TO REPRODUCE THE ORIGINAL SCENE IN ITS NATURAL COLOR



television service, no one need fear that the black-and-white television set of today is destined for quick obsolescence. The inexpensive converter takes care of that problem. In the meantime, the development of both black-and-white and color television will continue to advance, and eventually will increase the service to the public.

"We have demonstrated a principle that now enables us to go forward with a timetable which is not based on a scientific theory but on the required engineering of equipment," said Dr. Jolliffe. "The system already has been perfected to a point where we now could show motion picture films or outdoor scenes in electronic color, except that we have not had the time necessary to build the essential equipment."

Dr. Jolliffe disclosed that the RCA timetable for future demonstrations of color television is divided into five stages, the first of which featured still pictures televised from color slides on a large screen 15 x 20 inches. There is no flicker. Blending of three colors—red, blue and green — is achieved simultaneously to produce a perfectly natural picture.

The remaining stages in the timetable of laboratory demonstrations of electronic color television were outlined as follows:

Motion picture films within 3 months.

Live-action studio scenes by the middle of 1947.

Outdoor action scenes by the latter part of 1947.

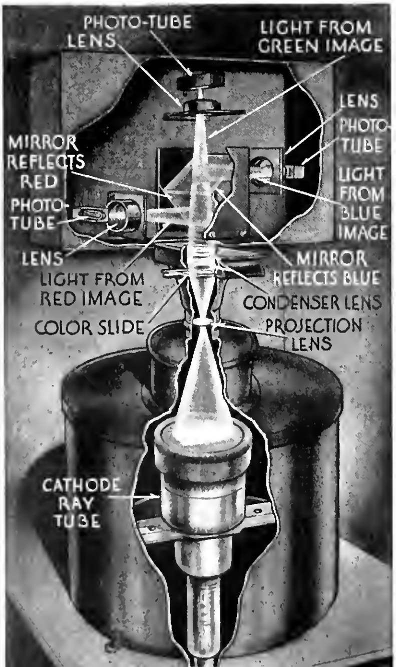
Large-screen theatre-size pictures in 1948.

"RCA scientists and engineers have a complete plan for this schedule and our laboratory tests reveal that this is practicable," added Dr. Jolliffe. "We need only time to produce the necessary equipment such as cameras and tubes, so that a demonstration can be made in approximately one year, that will include all five stages at the same time, that is, the complete range of universal all-electronic color television—in motion, indoors and outdoors."

In conclusion, Dr. Jolliffe stated that success in achieving all-electronic color television is the result of team - play among the scientists and research men in RCA Laboratories. He described their achievement as "a coordinated and concentrated attack by scientists, which writes a new chapter in television and industrial research." He said that as a result, color television has moved into the modern Electronic Era and will take its place ultimately alongside the RCA all-electronic black-and-white television system, which is presently bringing news, entertainment and championship sports events to observers in New York, Philadelphia and along the Atlantic seaboard as far south as Washington, D. C.

"As a broadcaster, I am delighted with the news that an all-electronic color television system has been achieved at RCA Laboratories," said Niles Trammell, President of the National Broadcasting Company. "We are mindful, as the scientists at the Laboratories have pointed out, that new apparatus must be built and field-tested before color television can be brought to the home in a state of practicability to serve the public. In this task our engineers with their practical knowledge of broadcasting, will cooperate in every way with the scientists. We will include the new RCA electronic color system in our plans to establish nation-wide television, for this practical color system can be fitted into an expanding service."

AT THE ALL-ELECTRONIC COLOR CAMERA, THE LIGHT BEAM FROM A CATHODE-RAY TUBE IS PROJECTED UPWARD THROUGH A KODACHROME SLIDE AND THROUGH A SERIES OF COLOR FILTERS WHICH SEPARATE RESPECTIVELY THE RED, BLUE AND GREEN PORTIONS OF THE IMAGE. EACH COLOR IS THEN REFLECTED INTO PHOTOCELLS WHICH CHANGE THE LIGHT VALUES INTO ELECTRICAL SIGNALS FOR TRANSMISSION TO THE RECEIVER.



RAY D. KELL OF RCA LABORATORIES ADJUSTS THE ALL-ELECTRONIC COLOR CAMERA. THE CYLINDRICAL UNIT HOUSES THE SCANNING KINESCOPE. MIRRORS AND PHOTOCELLS WHICH CONVERT COLOR INTO ELECTRICAL SIGNALS ARE IN THE UPPER CABINET.

Status of Color Television

DR. C. B. JOLLIFFE, RAY D. KELL AND GEORGE L. BEERS TESTIFY AT FCC HEARING ON COLOR TELEVISION

The Federal Communications Commission held hearings in Washington during the week of December 9 relative to Color Television. Following are news digests covering the testimony of Dr. C. B. Jolliffe and Ray D. Kell of RCA Laboratories, and George L. Beers of RCA Victor Division.

PREMATURE attempts to introduce color television on a commercial basis might deprive the American public of all television service now and for some time to come, Dr. C. B. Jolliffe, Executive Vice President of Radio Corporation of America in Charge of RCA Laboratories Division, told the Federal Communications Commission at the hearings held in Washington during the week of December 9. Because of this possibility, Dr. Jolliffe requested that the Commission deny a petition of the Columbia Broadcasting System for establishment of standards for color television and authorization for commercial operation in the higher radio frequencies.

"Further developments and improvements in television must and will be made," Dr. Jolliffe declared. "One of these developments will be a color television system which can become an integral part of the present monochrome (black-and-white) television service. RCA has developed the basic elements of an electronic simultaneous color television system which can be introduced, when it is ready in the future, without obsoleting the present excellent electronic monochrome system.

"Much work remains to be done before a determination can be made as to the proper standards for a system of color television which ultimately should be adopted. To adopt standards and authorize commercialization of any system of color television now will probably result in *no television* rather than in *improved television*."

Dr. Jolliffe made it clear, however, that RCA has definite plans for the future of television and its service to the public. He announced:

"Research and development must be pushed with vigor. We propose to carry on with our research and development work in monochrome and color with all the resources at our command, regardless of the status of operations, manufacture, or adoption or non-adoption of standards. We will not cease in our efforts to improve service to the public."

From the beginning of television development, the addition of color has been a laboratory matter, Dr. Jolliffe pointed out, and added: "It still is in the laboratory stage and will continue to be for at least a few years to come. Publicizing work on color television which misleads the public into believing that it is ready for commercialization is the greatest disservice that can be done to television. It has retarded the progress of monochrome television and if continued will deprive the public of the very excellent service which it deserves."

Public Has Been Confused

Declaring that RCA and the National Broadcasting Company, in common with "most of the radio industry," desire to see television increase its service and contribution to the public and industrial welfare, Dr. Jolliffe asserted bluntly that "public thought about television has been confused during the last few years by statements made by some members of the industry" to the effect that existing television service is limited, or would become obsolete because of the imminence of color television.

"It has been argued," he said, "that the introduction of monochrome television should not be attempted because if it were, the later introduction of color would make all prior monochrome apparatus and service obsolete and worthless. Such allegations have caused unnecessary fears, uncertainties, and delays in the introduction of television. The allegations were, and are, groundless and fallacious. Had these statements been designed deliberately to sabotage all television, they could not have been more effective."

The history of all large production developments in this country, Dr. Jolliffe said, has shown that once a development has achieved commercial stature, engineering skill sees to it that whenever improvements arrive they are integrated into the basic structure without destroying it or damaging it. Improvements which can be added to an existing system without disruption, he added, will be found more readily and applied more easily if the standards of the initial system are sound and correct.

Dr. Jolliffe told the FCC that the RCA system of electronic simultaneous color television proves the soundness of this principle, in that it can be added to the basically sound monochrome system without any disruption to the latter. He emphasized that disclosure of the RCA color system was made at this time, not for the purpose of requesting adoption of standards for its operation, but rather to point out its compatability with the monochrome system and its freedom from "fundamental defects and limitations" of the so-called sequential color television system for which approval of the FCC for commercial operation is asked.

"We have today a well developed monochrome television service," declared Dr. Jolliffe. "All of the equipment — transmitting and receiving— has been engineered to a point where it is capable of excellent reproduction in the home of the best in current events, sports, drama and education. We urge the Commission to give its full support to this proven service and continue to encourage its fullest use for the benefit of the public.

"No steps should be taken under the guise of bringing color television to the public if, instead of advancing the art of television, they confuse the public, the broadcaster and the equipment manufacturer and result in depriving the public of any television service now and for some time to come."

Dr. Jolliffe recalled that present commercial television standards and frequency allocations were established by the FCC after extensive and careful study on its part and upon recommendations of the Radio Technical Planning Board, set up at the suggestion of the Commission and representing the entire radio industry. These standards were agreed upon as adequate and proper for post-war television, and are the basis for current production of television equipment and broadcasting plans, Dr. Jolliffe stated, and added:

"Since the close of the war, many companies, including RCA and NBC, have been working energetically to develop commercial operation on the basis of the standards adopted. This has included the production of commercial equipment, as well as expansion of station operations. Both transmitting and receiving equipment have been designed, tested, and produced in quantity.

"Many difficulties have been overcome and the manufacture and distribution of apparatus are now under way. Much time, effort and money have been spent for engineering, design, production planning and installation of manufacturing equipment to produce transmitters, studio and field equipment, and receivers.

"The present situation in television is exciting. The post-war expansion of commercial television broadcasting service and the first post-war sales of receivers have had an enthusiastic reception by the public."

Dr. Jolliffe pointed out that television stations are giving regular program service in New York, Philadelphia, Washington, Schenectady, Chicago and Los Angeles, and said that several other stations have been authorized by the FCC, with still others pending action of the Commission. He reviewed the past year of television service to the public, which included world's championship prize fights, football and baseball classics and a wide variety of important public events and dramatic and educational features.

AT THE FCC HEARINGS ON COLOR TELEVISION: DR. C. B. JOLLIFFE (RIGHT), EXECUTIVE VICE PRESIDENT IN CHARGE OF RCA LABORATORIES; E. W. ENGSTROM (CENTER), VICE PRESIDENT IN CHARGE OF RESEARCH, AND RAY D. KELL, IN CHARGE OF TELEVISION SYSTEMS RESEARCH AT THE LABORATORIES.

"These are only a few of the examples of the service that television is now giving," Dr. Jolliffe said. "From the universally enthusiastic response that followed these programs we know that the public is eager for television."

In work yet to be done in the studies of color television are such items as development of new circuits, development of new tubes and cameras, and the field-testing of component instruments and the complete system, said Dr. Jolliffe, concluding:

"In these matters, there are no problems the solutions of which are doubtful. They are all straight-forward engineering development items without uncertainty as to successful result. But it will take time to do the job adequately and obtain satisfactory results. When they have been solved, and a thoroughly practical color television system and all its apparatus elements have been designed and proven by adequate tests, the time will have arrived for approval of commercial standards."

Kell Outlines Advantages of Simultaneous System

Success of the Radio Corporation of America in developing a simultaneous, all-electronic color television system, completely modern in design, less costly to produce, and superior in at least seven respects to any color system as yet disclosed, was reported by Ray D. Kell, of RCA Laboratories Division, Princeton, N. J., at the FCC hearings.

Mr. Kell, who is a recognized authority on television research and development, appeared before the FCC as a representative of RCA and the National Broadcasting Company to present facts which he contended made it inadvisable for the Commission to take affirmative action at this time on the CBS petition.

Comparing the RCA simultaneous color television system with the so-called sequential transmitting one color after another) method proposed by CBS in its petition, Mr. Kell summarized the advantages of the RCA system, as follows:

It is compatible with the present commercial (black-and-white) television to the extent of complete interchangeability and consequent avoidance of obsolescence of one by the other.

Less band width is required than in the sequential system.

It is completely free from flicker.

There is no color fringing — that is to say, no fuzziness or unfaithfulness of color around the edges of fast moving objects being televised.

There is no color break-up. In other words, reproduction of primary colors is achieved in all portion of the image simultaneously.

There is greater color fidelity in the pictures.

It makes possible greater picture brightness for comparable size of pictures.

It affords greater flexibility for network operation. This is due chiefly to its basic compatibility with the present black-and-white system which employs modern coaxial cables or radio relays with success far beyond-the-horizon transmission.

Most of the early work in color television, Mr. Kell said, utilized the sequential method because of equipment limitations which made it impossible at the time to obtain satisfactory results by the simultaneous method.

"During the last few years," he continued, "improvements in television circuits and devices were developed which made it appear that the simultaneous method might now be attempted with success. Experiments were made by RCA using the improved devices and techniques. The result was the development of the simultaneous all-electronic system which RCA recently demonstrated at Princeton.

"Work on this simultaneous system using modern tubes and techniques has been carried to a point where all the basic factors have been studied, and the ultimate success of the system seems assured. From the work we have done, we are convinced that the simultaneous system is basically superior to the sequential system of color transmission."

Mr. Kell called attention of the FCC to the compatibility of the new simultaneous method with present television transmission, a characteristic which he described as "having far-reaching effect on the development of the commercial television service."

"It completely solves the problem of obsolescence of monochrome receivers which would be created with the introduction of a sequential color system," he declared. "It likewise greatly reduces the problem of obsolescence for the television broadcaster.

"Because the three primary color pictures are transmitted at the same time in the simultaneous system, each of the three primary color pictures can have the same number of lines per picture, the same number of fields per second, and the same other standards identical to those of the present monochrome system.

"If they are so chosen, the present monochrome and the simultaneous color systems are identical in all basic respects except that the color system transmits three independent monochrome signals at one time. The three signals are kept separate by radio frequency discrimination.

"This condition results in the enormously important fact that with only the addition of a radio frequency converter and without any alterations a present monochrome receiver will receive the programs transmitted by the simultaneous color method (reproducing them in black-and-white).

In contrast to this, Mr. Kell stated, there is no way to provide a converter for, or reasonable way to alter, present monochrome receivers and future receivers built with present basic design so that such receivers can properly receive programs transmitted by the sequential system. He said the modification of a monochrome receiver, to enable it to receive a sequential color signal as a monochrome picture, requires major redesigning of the receiver.

Introduction of a sequential color television system, as advocated by the Columbia Broadcasting System, would represent a serious problem to television broadcasters, Mr. Kell asserted, and explained: "In the sequential system, the broadcaster must decide whether he will erect a station for the color audience, for the monochrome audience, or, of course, two separate stations for the two separate audiences. There is no common ground on which monochrome and sequential color can operate, and this is a serious economic handicap to broadcasters, as well as a restriction to the number of programs available to each audience."

Mr. Kell reiterated at this point that, on the other hand, the RCA simultaneous color system could be introduced with standards that would permit complete interchangeability of service of color in the upper television channels and black-and-white transmissions on the present commercial frequencies, as well as on the upper channels.

In concluding his testimony, Mr. Kell estimated that the work necessary, including field testing and industry consideration of color television, would require a minimum of four to five years, and cautioned the FCC: "Until this has been done, standards for color television cannot logically be adopted."

Beers Reveals Schedule of Television Production

Television home receivers having a retail value of approximately $65,000,000 are scheduled to be manufactured by the RCA Victor Division of the Radio Corporation of America during the coming year, George L. Beers, Assistant Director of Engineering of the RCA Victor Division, reported to the Federal Communications Commission.

"As of December 1," Mr. Beers said, "the RCA Victor Division has produced 2,950 home television receivers. It is expected that the total 1946 production will be 8,000 instruments. Our 1947 production schedule calls for 25,000 receivers in the first quarter, 25,000 in the second quarter, 50,000 in the third quarter, and 60,000 in the fourth quarter, or a total 1947 production of 160,000 instruments. These receivers will have a retail value of approximately $65,000,000."

It should be borne in mind, Mr. Beers added, that these production

(Continued on page 27)

ROTATING RADAR ANTENNA AS MOUNTED ON A TOWER ABOVE THE SHIP'S WHEELHOUSE.

SHIP RADAR TESTED

New Equipment Designed by Radiomarine Proves Its Value in First Practical Try-out on Great Lakes Ore Carrier

By C. J. Pannill
President
Radiomarine Corp. of America

WITHIN two months after its installation on a Great Lakes ship, a 3-centimeter shipboard radar designed by Radiomarine Corporation of America to meet the exacting needs of merchant marine navigation had played the leading role in two practical demonstrations of radar's peacetime value. On one occasion radar made it possible for a ship to move at normal speed through heavy weather which had caused all other craft to anchor and await the lifting of the fog. A few weeks later, during a severe blizzard, the same radar scope revealed an imminent collision between two vessels in the distance in time to notify the pilots of their danger.

The new Radiomarine model CR-101 radar was installed early in October aboard the Pittsburgh Steamship Company's modern ore carrier *A. H. Ferbert*. Tests were carried on for the next two months during the vessel's regularly scheduled six-day round-trip voyages between Conneaut, Ohio, and Two Harbors, Minn. Operated daily by the ship's personnel, the new radar proved capable on its first test cruise of detecting buoys and other small objects at ranges as short as 80 yards. The ship's captain soon found that with the aid of the radar he could locate and plot positions of rain squalls and also detect ship and buoy targets both in and beyond the squalls. When navigating through narrow channels, it has been found possible consistently to distinguish on the radar indicator the contours of shorelines on both sides, even when the vessel is only 250 feet from the shore.

The radar antenna, which is only 12 feet above the pilot house, transmits a beam only 1.6 degrees in width. This narrow, high frequency beam hugs the surface of the water and picks up buoys and other small objects, not only at short ranges but at distances twice as great as those afforded by lower frequency wartime radars. Land masses as far distant as 50 miles have been clearly identified on the radar indicator.

This radar produces luminous, map-like images of exceptional clarity on a 12-inch indicator scope. A unique feature is the provision for instantaneous switching from "relative bearing" to "true bearing" presentation on the scope. In relative bearing presentation, the scope picture is oriented with respect to the ship's bow, so that the area ahead of the vessel appears at the top of the image. This form of presentation is used for navigation through rivers and narrow channels. In true bearing presentation, the picture is oriented with respect to true north, to facilitate checking against navigational charts.

Several Dramatic Instances

Several dramatic instances have occurred to illustrate the effectiveness of this electronic aid to navigation. In mid-October it enabled the 614-foot *Ferbert* to negotiate the winding channel of the 22-mile St. Mary's River, which connects Lakes Superior and Huron, through a pea-soup fog which immobilized 60 other vessels for more than 14 hours. Approaching the southern entrance to the St. Mary's channel about 5 a.m., at the height of the fog, Captain Frank Davenport of the *Ferbert* observed on the indicator scope of his radar that the shores of the river were lined with fog-bound ships at anchor. Relying entirely upon the radar picture, he was reported able to see the positions of other ships as precisely as in normal weather. None of the other ships was able to proceed until after the fog lifted. The *Ferbert* not only saved more than eight hours by not waiting for the fog to lift, but gained additional time by passing through the Soo locks ahead of the 60 other vessels. The following day, the Detroit District Office of the War Department Corps of Engineers reported that the *Ferbert's* comparatively rapid progress through the hazardous channel had alarmed other shipmasters who did not know that the vessel was guided by radar.

On one of the *Ferbert's* last voyages before traffic on the Great Lakes was suspended for the winter, this Radiomarine radar played a vital role in the prevention of a near tragedy. This happened during a blinding snowstorm on Lake Superior, just before dawn on November 28. The *Ferbert* was running eastward toward Sault Ste. Marie, about 12 miles above the northernmost tip of the upper Michigan peninsula. First Mate Tom Hermansen was watching the radar image when he observed that the luminous "pips" representing two other ships were rapidly converging from opposite direction—racing toward a head-on collision. Realizing that lookouts on neither vessel could see the other ship in the snowstorm, Hermansen immediately contacted the two ships by radio, warned them of their danger, and directed each on a change of course which averted the collision. The two vessels were the *SS J. H. Sheadle* and the *SS Sascatu*, and it was reported later that the officers of both vessels had been unaware of their danger until they were warned by Hermansen.

CAPT. FRANK DAVENPORT (LEFT) OF THE STEAMER A. H. FERBERT WATCHES AS C. E. MOORE OF RADIOMARINE EXPLAINS THE OPERATION OF SHIPBOARD RADAR, HOUSED IN CABINET WITH BLACK SUNSHADE OVER SCOPE.

As this storm continued after dawn, the *Ferbert* with her radar was reported to be the only vessel able to navigate with certainty, and her officers repeatedly received radio calls from other ships requesting information on their position in relation to other shipping and the shore. This performance of the three-centimeter radar in the snowstorm was significant evidence of the suitability of the ultra-high-frequency equipment for use in merchant marine navigation.

The installation of the Radiomarine radar aboard the *Ferbert* was sponsored by the Lake Carriers' Association, which is testing a variety of merchant marine radars to determine the type best suited for Great Lakes navigation. Three more of the model CR-101 radars have also been sold to the United States Maritime Commission for service in international trade. They will be installed on the freighters *Heredia*, *Parsimia*, and *Metapan*, which are now under construction for the Maritime Commission at the yards of the Newport News Ship Building and Dry Dock Company at Newport News, Va.

Engineering Group Formed to Develop Teleran

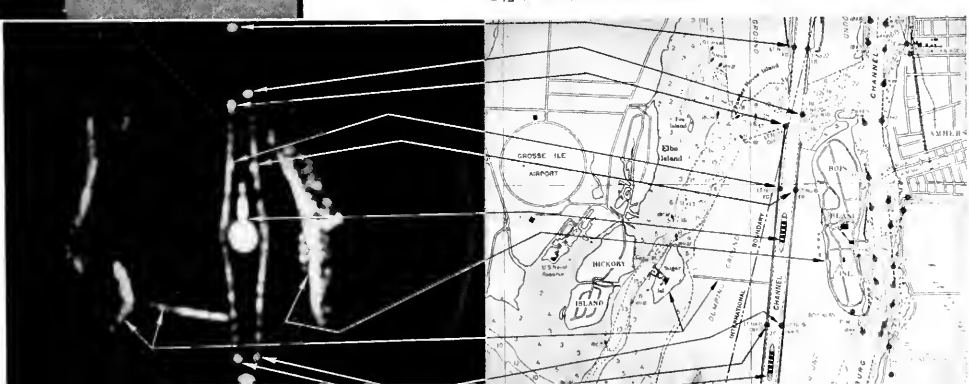
Formation of a large engineering group to develop Teleran, the revolutionary new air navigation system which combines television with radar, has been announced by W. W. Watts, Vice President in charge of the RCA Engineering Products Department.

The new group is headed by Dr. Douglas Ewing, who, as Chief Teleran Engineer, brings to RCA his years of experience as assistant Director of M.I.T.'s Radiation Laboratory.

Other leaders in the Teleran development program are P. J. Herbst at Camden, and Dr. Irving Wolff at Princeton. Mr. Herbst has conducted air traffic control studies at the RCA Laboratories, with which he was formerly associated, and Dr. Wolff is internationally famous for his pioneering in radar.

Plans for the general development of Teleran are being coordinated by Loren F. Jones, Manager of Research and Development Projects and proposer of the original idea of this system of air navigation and traffic control.

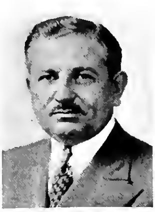
BELOW: ARROWS LEADING FROM ACTUAL RADAR PICTURE TO OFFICIAL NAVIGATION CHART SHOW HOW LANDMARKS CAN BE EASILY AND ACCURATELY IDENTIFIED BY PILOT OF RADAR-EQUIPPED SHIP. THESE SCENES COVER A 1½ MILE SECTION OF THE DETROIT RIVER.



TODAY THE ALBUM SHOWN BELOW SELLS FOR LESS THAN THE SINGLE RECORD COST 40 YEARS AGO.

MODERN DISTRIBUTION

New Methods of Moving Goods From Factory to User are Complicated and Expensive but Because of Them the Public Gets More for Less Money



By Frank M. Folsom,

Executive Vice President in Charge of RCA Victor Division, Camden, N. J.

Of late years, many of us have been putting more and more thought into a phase of business activity which appears to need reform. This phase is a highly complicated process, involving a large number of loosely associated activities, and it goes under the name of "distribution." It represents a great deal more than the mere physical transportation of goods from one place to another. It includes everything that happens to a product between the time it is produced and the time it is owned by the ultimate consumer. It includes advertising and sales promotion and display and shipping and packaging and warehousing and wholesaling and retailing. And it costs money.

Many of us have been wondering if it costs too much money.

Since 1870 the trend of distribution costs has been upward. In 1939 the 20th Century Fund made a study and found that 59 cents out of every consumer dollar went for distribution. And it's still going up.

That sounds high. It sounds like waste. It sounds wrong to pay more to distribute a product than to make it in the first place. At first glance it looks as though we ought to change the system so as to eliminate some of these costs.

Should we eliminate the wholesaler, or the retailer, or both? Should we strike out advertising and promotion? Before we take any rash steps, let us remember the danger. Let us be sure what the effects will be, and whether they are what we want.

The business of RCA Victor consists of a variety of product lines. They are all basically electronic, yet their uses, and the types of customers to whom they appeal, differ widely. Separate distribution systems are therefore necessary. These distribution systems vary from a relatively small list of 35 distributors for aviation radio products, to 600 distributors for radio tubes — who in turn service between 30,000 and 35,000 retail outlets. In between come the specialized distributors and dealers for Home Instruments, Records, Replacement Parts, Sound Equipment, 16mm. Sound Film Projectors, and many others.

Let's examine that largest group —the tube distributors and dealers. Where are these thousands of outlets, and what part do they play in distribution? Suppose a tube burns out in your radio or Victrola radio-phonograph. If you want to take the time, you can run down to the local store, buy a new tube, and replace it yourself. But the average person's knowledge of radio doesn't go much beyond changing tubes, so if that burnt-out tube is not the sole difficulty, but merely an indication that the set needs a general checking over then you're in trouble. You have to rely, as millions do on a radio service man.

Serviceman's Role Important

The service man tests all the tubes and other parts that may be the source of trouble. If he's a good service man he uses modern testing and analyzing equipment, and we know that's good because we make it. Then he advises you of the difficulty, and makes the necessary repairs. In this role he performs the same function as your automobile service shop. While he sells parts and tubes, this is only part of his job. The real value to you is the service he renders.

Now suppose we were to eliminate this multitude of small outlets and sell all radio tubes direct—say through factory controlled outlets.

Obviously there would be far fewer such outlets than there are radio tube dealers today. Would the inconvenience and delay be worth the few pennies you would undoubtedly save on each item? Obtaining replacement tubes would, in many cases, become a matter of days rather than hours. And suppose, after you got the tubes, the set still did not work?

Customer Service is Cornerstone

Some of you may think my selection of radio tubes, as an illustration, is too technical. Being technical, they naturally require service the customer cannot render. I wonder if you would say the same thing of RCA Victor records. That's a very aesthetic product. Yet service to the customer is, once again, the cornerstone on which our distribution system of 52 distributors and 10,000 retail record outlets is built.

In normal times there may be from eight to ten thousand selections in the RCA Victor Record Catalog. Servicing and stocking ten thousand stores is a complex operation. Yet it is the only way we know of that satisfies the needs and desires of record buyers. Very few record customers are willing to part with their money without first hearing the selection played. A vast majority prefer to buy records as they buy books—by walking into a store, examining the records in stock, playing them, and making their selections accordingly. Remove the thousands of local record outlets and you remove this privilege. Remove this privilege and you remove much of the pleasure in buying—and listening—to records!

Not that our system of record distribution has stood still. It is an evolution that has taken place over many years. It's present efficiency is due to many factors. Included among these is the strategic location of our three record pressing plants in the East, Middle West and Far West, for quick shipment to any one of 58 distribution centers. Also included are the initiation of many merchandising plans for the elimination of excess distribution costs. Our people have pioneered the "self-selection" method, whereby more customers get faster service from fewer record clerks.

Such measures, coupled with constant laboratory research, improved production methods and an active merchandising program have resulted in an improved product at lower cost. In 1903 a 10-inch Victor record, recorded on only one side, sold for $5.00. Today, a standard 12-inch Red Seal record, recorded on both sides, costs $1.00—a far better record both musically and technically.

Millions Employed in Service

Much discussion was occasioned by the statement of the Secretary of Commerce two or three years ago, of the need for 60 million jobs to support our postwar economy. Of these 60 million jobs, 12 million or 20% were in the service industries—the retailers, wholesalers and other service organizations (excluding Government) which our society re-

(Continued on page 27)

IN 1924, THIS RADIOLA SUPER VIII WAS CONSIDERED A GOOD VALUE AT $425, COMPLETE WITH BATTERIES.

IN 1947, APPROXIMATELY THE SAME SUM PURCHASES THE ATTRACTIVE CONSOLE SHOWN BELOW, WHICH TUNES THE STANDARD BROADCAST BAND AND TWO SHORT-WAVE BANDS, AND IN ADDITION PROVIDES AN AUTOMATIC RECORD CHANGER AND GENEROUS STORAGE SPACE FOR RECORDS.

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CHECKING KINESCOPE PICTURE TUBES DURING A 500-HOUR CONTINUOUS TEST.

RACKS OF KINESCOP

MAKING FINAL TESTS ON 10-INCH KINESCOPES USING A SPECIAL CHART AS A REFERENCE STANDARD.

LEFT: OPERATOR THREADS LEAD-IN WIRES INTO SOCKET BASE OF A KINESCOPE. AFTER AIR HAS BEEN EXHAUSTED.

BELOW: OPERATORS PREPARE THE FLUORESCENT SOLUTION WHICH IS PLACED IN KINESCOPES TO FORM THE PICTURE SCREEN.

BELOW: NON-REFLECTING CARBON COATING IS APPLIED TO INTERIOR OF TUBE BY LONG-HANDLED BRUSH TO KEEP STRAY ELECTRONS FROM THE PICTURE SCREEN.

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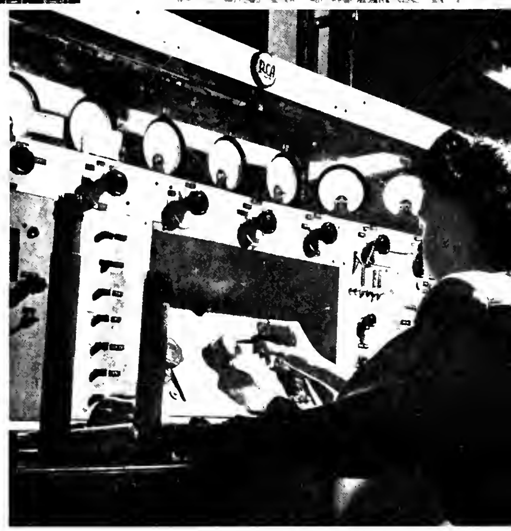
AN OPERATOR POURS FLUORESCENT SOLUTION INTO A GROUP OF 7-INCH CATHODE RAY TUBES.

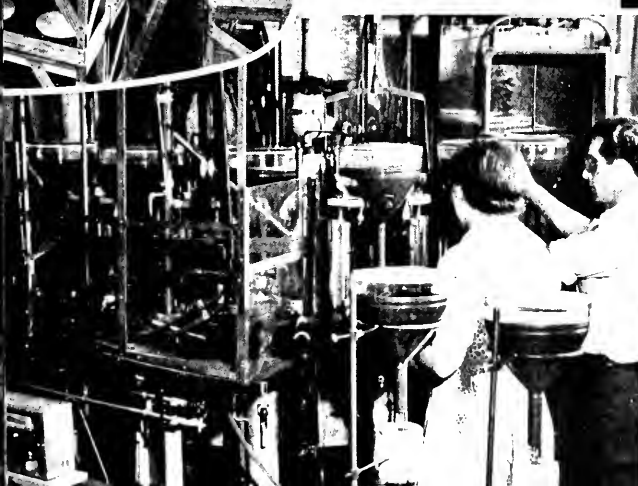
CATHODE RAY "GUN" IS ADDED TO THE IMAGE ORTHICON CAMERA TUBE.

RIGHT: FINAL CHECK ON SMALL CATHODE RAY TUBES USED IN SERVICING RADIO AND ELECTRONIC EQUIPMENT.

BELOW: AT THIS AUTOMATIC EXHAUST MACHINE, THE AIR IS COMPLETELY REMOVED FROM KINESCOPE BEFORE "TIPPING OFF" OR SEALING THE STEM.



BELOW: USING THE INTENSE FLAME OF GAS BURNERS, THE GLASS FACE IS SEALED TO THE BACK OF A CAMERA TUBE.



ADVERTISING IN THE PUBLIC INTEREST

New Products Established and Buying Habits Changed Rapidly Through the Skilfull Use of Radio and Other Advertising Media

By Niles Trammell
President,
National Broadcasting Company, Inc.

BEFORE the days of modern advertising it took many years to establish new products or change the public's buying habits. Seventy years elapsed before the power loom had eliminated the hand loom. The Bessemer process of steel-making had to overcome thirty years of stubborn opposition before it was generally adopted. Even McCormick's reaper needed almost a generation before it became fully accepted.

But how long did it take for the modern radio to catch on?—or refrigerators?—or frozen foods?—or nylon stockings? And almost within a matter of months, the non-refillable fountain pen has become an accepted commonplace in the United States.

In no other country in the world do these things happen! Why? Because we have found the key which never fails to unlock the resourcefulness and ingenuity of the American economy—*advertising.*

If you doubt the creative function of advertising, consider the humble orange. Until California orange juice was advertised, people had considered the orange a delicacy to be put in the Christmas stocking.

Thirty-five years ago the president of a transcontinental railroad asked his advertising agent to help stimulate freight shipments out of California by promoting the Eastern use of the products of the then infant California orange industry. Arrangements were made for the shipment of large quantities of oranges by freight. An advertising fund was subscribed by the railroad to run a test in Iowa. What was the result?

California oranges and orange juice were advertised successfully. Orange juice became a breakfast staple throughout America. A soda fountain reamer for fresh orange juice was invented. Soda fountains started serving orange juice and ended by serving breakfasts, and then three meals a day. Orange drinks and drink stands began to appear everywhere and served light meals. A roadside industry appeared on our highways.

Experiments were conducted which discovered vitamins and other beneficial ingredients present in fresh orange juice. This led to the advertising of competitor's tomato and other fruit juices. The dairy industry, to protect their market, started research and found new vitamins in their product. They irradiated milk and found calcium content. The bakers took the ball from there and made better bread enriched with vitamins. An entire science of vitamin therapy developed.

Can anyone question that the health and well-being of the consuming public benefited from this campaign, to say nothing of the prosperity of the orange growers, the refrigerated express-car makers, the railroads, the drug-stores, drink stands, dairy-men, bakers, advertising media and all the workers, suppliers and producers of accessories who benefited from the development of these industries?

Advertising Establishes Markets

Similar case histories of the creation, by means of advertising, of new desires, new tastes, new and beneficial habits of living, can be told by the hundred. Advertising has established markets — where none existed before—for packaged coffee, candy, dentifrices, shaving preparations, cigarettes, cosmetics of all kinds, condensed or dehydrated or frozen food products, washing compounds, paper towels, napkins, and handkerchiefs, gelatine desserts, floor wax and other products too numerous to mention. They are as commonplace in low-income as in high-income households. Services such as electric lighting and refrigeration, oil heating, telephone, banking, insurance, hotels and resorts, theatres, and transportation by rail, bus, water and air have been enormously expanded through advertising.

Without advertising, how many children and grown-ups would be eating prepared breakfast foods? How many people would have learned to use a mouth-wash? How many would have opened a personal checking account at the bank? Or taken out an annuity insurance policy? Or learned to lubricate their cars properly, and to protect them from freezing? Or made regular visits to the dentist?

There may be some who will claim that all these things might be possible in a communist economy. I, for one, do not believe so. I do not believe they could have happened without the stimulus of advertising in our competitive economy.

Bulwark of Free Press and Radio

There is another significant aspect of advertising which is sometimes overlooked. Advertising, the right arm of distribution, deserves equal recognition as the right arm of a free press and free radio.

In the case of the vast majority of newspapers and magazines, advertising makes all the difference between progress and poverty, between editorial freedom and slavery, between printing news that has been *sought* out and news that has been *handed* out.

The accurate, detailed reporting by American news services and radio correspondents of events as they occur all over the globe, and the rapid, nationwide dissemination of news, are such a regular feature of our daily life that they are simply taken for granted by the public. These tremendous news facilities and services are largely made possible by advertising.

In the United States, all radio programs — whether called "commercial" and sponsored directly, or called "sustaining" and sponsored by the broadcaster—are made possible by advertising.

In other countries, where the radio system is a state monopoly, the listener has to pay for his listening. In America, he gets more news, information and entertainment than anywhere else, and is thanked for his listening.

Under a state-controlled system of broadcasting, the opportunity always exists to make radio the mouthpiece of dictatorship. State control of radio in prewar Germany was the precondition of the poisonous, one-sided propaganda of Hitler and Goebbels.

In the United States, radio advertising not only pays for the performances on the air, but the sharp competition between our many stations, networks and advertisers is responsible for the best and most reliable news information and the highest artistic performance. This is all the more important since the radio reaches by far the largest audience of any communications medium.

A Favorite Target

Among those who do not care to listen to the radio, it has become the fashion to jeer at radio commercials and some of the programs sponsored by advertisers. Soap advertising is a favorite target. In this connection I am reminded of an old European proverb that "the culture of a nation is determined by its use of soap"—and that the United States, with six percent of the world's population, uses one-third of the world's soap supply.

Broadcasters are mindful of the fact that the sponsors of serial dramas pioneered in the daytime use of radio. They helped broadcasters build a new daytime service; and in doing so, they brought pleasure and relief from drudgery to millions of American housewives. Criticism of these program pioneers overlooks their contribution both to the American system of broadcasting and to the American housewife.

Story-telling is one of the oldest of the arts. The popularity of the serial drama represents a basic emotional response to a human-interest story. Such stories have a rightful place in a well-balanced program schedule.

Then there is the criticism that there is too much advertising on the air. Since American broadcasting is entirely supported by advertising and the press not entirely so, it might be natural to expect that advertising messages would occupy a larger proportion of radio program time than they occupy in the white space of newspapers or magazines. The reverse of this is true.

In the case of the great majority of successful newspapers and magazines, 50% or more of their total space is occupied by advertisements. In the case of a network with which I am familiar, only 6.8% of the network's total program time is devoted to commercial announcements. In other words, out of the 1080 minutes this network is on the air each day in the week, the commercials take an average of only 74 minutes.

This difference is due to the nature of the two kinds of media. It does not imply that one deserves more praise than the other. There are certain limitations imposed upon radio advertising by the special characteristics of the broadcasting medium. It is obvious, however, that broadcasting is not so heavily burdened with advertising as some critics make it out to be.

Our basic standard must always be "Truth in Advertising." Good salesmanship is not enough. It must be truthful salesmanship—truthful not only in what it says but also in what it implies. This maintenance of truth is a responsibility which must be shared, not only by the advertiser who pays the bill, and by the advertising agency which prepares the copy, but also by the broadcaster who accepts and transmits the message to the public.

We broadcasters, who are the stewards of radio's service to the public, must be vigilant in preserving its good name and reputation. No one station, no one network, can fulfill this responsibility alone. It must be fulfilled by the entire broadcasting industry, united in the conviction that the only kind of advertising which serves the best interests of broadcaster and sponsor is that which serves the best interests of the public.

To be effective, the commercial message should be as welcome a guest in the home as the program itself. If as much brains and experience and creative ability are put into the advertising message as are put into the radio entertainment, both advertiser and public would benefit.

The content of the advertising message, its length, its placement, and its blending into the rest of the program, require extensive research and the best efforts of all who are interested in making broadcast advertising more effective.

NEW RECORD PLANT AT CANONSBURG, PA.

A new phonograph record manufacturing plant which will greatly increase the capacity of the RCA Victor Record Department is to be established at Canonsburg, Pa., it was revealed recently with the announcement that the RCA Victor Division of the Radio Corporation of America, has leased one of the buildings of the War Assets Authority's multiple-tenancy project near Pittsburgh.

The building contains 115,000 square feet of manufacturing space, which will be devoted exclusively to record production, supplementing existing facilities in the company's record manufacturing plants at Camden, Indianapolis, and Hollywood. J. W. Murray, Vice President in charge of the RCA Victor Record Department, declared that the company plans to begin immediately the installation of the most modern facilities, which will make the Canonsburg plant the country's model plant for record manufacturing.

TELETYPE TAPES CONTAINING RADIO-TELEGRAPH MESSAGES FROM FOREIGN POINTS ARE FED INTO THESE MACHINES WHICH AUTOMATICALLY TRANSMIT THE MESSAGES OVER LAND LINES TO THEIR DESTINATIONS IN THIS COUNTRY.

RADIOTELEGRAPH TRAFFIC DOUBLED

Record Message Volume and Opening of New Foreign Circuits Revealed by RCA Communications, Inc.

INTERNATIONAL radiotelegraph traffic in 1946 increased 100 per cent over the last pre-war year of 1940, Thompson H. Mitchell, Executive Vice President of RCA Communications, Inc., revealed early in January in a business report disclosing the opening by RCA of additional direct circuits between the United States and foreign trade centers and the improvement of service here and abroad.

The new or reestablished direct circuits, which bring the RCA Communications total to 66, connect this country with Poland, Yugoslavia, Gambia, Korea, French-Indo China, the Dutch East Indies, Tangiers, and Nanking and Kunming, China. In addition, RCA opened radiophoto circuits with Vienna and Bombay, for a total of twelve operating with points outside the United States, and established radio broadcasting program service with five additional countries, for a total of thirty.

Mr. Mitchell reported that commercial traffic handled by the Company in 1946 represented an increase of 43 per cent over that of 1945. The peak was reached during the Christmas holidays, he said, when the volume surged more than 56 per cent over traffic in the same period last year.

New Equipment Developed

"To make possible the handling of this record volume of traffic," Mr. Mitchell said, "RCA has pioneered in the application of wartime advances in radiotelegraphy, and at the same time our engineers have developed new types of equipment which are now proving their value in actual service.

"I have long held the conviction that if electrical record communications systems are to survive other forms of competition without the aid of government subsidy, the industry providing this service will have to move greater volumes of traffic more expeditiously and at less cost to the public. It must, if it is to remain healthy, at the same time earn greater returns for its workers and its owners. This can only be achieved through ingenuity and technological improvements, which have, during the past year, been initiated by RCA at considerable cost."

Mr. Mitchell said that the increased volume of traffic had been reflected in the pay envelopes of employees by a boost of 30.8 per cent in hourly income, and the number of employees was up 24 per cent over the 1945 figure.

Printer tie-lines for direct service to customers in New York were installed in increasing numbers during the year, he disclosed, and four new branch offices were opened—one at 12 East Eighty-sixth Street, Manhattan; another at 162 Pierrepont Street, Brooklyn, and one each at the Lake Success and Flushing headquarters of the United Nations. The Company has installed a complete new operations center in Washington, D. C. with added facilities for the collection and delivery of international messages.

Mr. Mitchell reported that in 1946 RCA Communications, in addition to taking steps toward mechanization of its vast world-wide circuits through application of war-tested advances and new innovations in radiotelegraphy, made progress in improving service by instituting a comprehensive training program for its employees.

The special training courses cover virtually all phases of communications, including radio operation with high speed Morse, operation of printers and the handling of service correspondence. Instructors have developed their own text-books, Mr. Mitchell revealed, and some of these, which have been sent to foreign communications centers, have received high praise. The training program is so efficient that the usual period of one year for the courses has been reduced materially.

Public is Benefited

The modernization program of RCA has brought about considerable benefit to the public, Mr. Mitchell said, recalling that early in 1946 reductions in international telegraph rates proposed by the Company were approved by the Federal Communications Commission. These new tariff schedules cut rates between the United States and practically all points on the globe. They were described at the time as one of the most significant moves in the interest of the public ever made in the field of international communications.

At the Bermuda Conference of 1945, Mr. Mitchell recounted, it was agreed by British and United States delegates that a ceiling price of thirty cents per full-rate word, or ten cents per night-letter word, should apply from all parts of the United States to all places within the British Empire. The action later taken by RCA provided for extension of this principle to all messages going from the United States to any part of the world, including more than eighty additional countries, territories and islands to which the rates formerly ranged from thirty-three cents to one dollar and fifteen cents per ordinary word. Press rates were coincidentally reduced to six and one-half cents, or less, per word to all foreign points.

This meant, in effect, that to all points of the world where telegraph charges were formerly in excess of thirty cents a word, such rates now are reduced to a uniform basis of not more than thirty cents, with charges of fifteen cents a word for deferred service and ten cents a word for radio-night letters.

"Technological developments made by RCA Communications were largely responsible for our ability to extend in this manner the principles advanced by the American delegation to the Bermuda Conference", said Mr. Mitchell.

The new tariff schedules of RCA also provide for uniform rates from all points within the United States to any given foreign destination—that is, a person anywhere in the United States can send a message to Europe and beyond at the same rate charged in New York; as to transpacific messages, the rates will be the same as from San Francisco.

"These reductions may be expected to save millions of dollars each year in telegraph tolls to the American public," Mr. Mitchell said. "Under this plan, no other country in the world enjoys service or rates comparable to those which are available from the United States, where, unlike most other countries, communications service is conducted under private ownership."

More Installations Under Way

Mr. Mitchell disclosed that progress is being made in the program initiated last spring for the expansion of the RCA radiophoto network into a world-wide transmission service. In addition to the new radiophoto stations in Vienna, and Bombay, installations are to be made in Santiago, Chile, Rio de Janeiro, Mexico City, Manila, Honolulu, Tokyo, Shanghai and Seoul, Korea.

It was pointed out that while the principal volume of traffic over the RCA radiophoto circuits consisted, during the war, in handling newspictures of world events and personalities, the expanded service is winning favor with commercial organizations and other interests desiring speedy transmission of photos, charts and documents of urgency. For instance, branch offices of commercial firms are able to send radiophotos of their monthly balance sheets to main offices in this country, and the service likewise enables banks to transmit radiofacsimiles of checks or other monetary documents from one distant point to another for rapid confirmation of signatures and authenticity.

By means of the RCA radio program transmission service, Mr. Mitchell pointed out, programs and events of interest to the public are brought to this country for rebroadcast over American networks. In addition to the five new circuits which tie-in Lisbon, San Juan, Shanghai, Belgrade and Seoul, Korea, the RCA service has made it possible for transmissions directly from the Byrd Expedition, now in the vicinity of Little America on its way to the South Polar regions.

TAPES PASSING THROUGH THIS "PACKAGE SET" AT THE CENTRAL RADIO OFFICE MAY CARRY RADIOTELEGRAPH MESSAGES ARRIVING IN NEW YORK FROM MOSCOW OR ON THEIR WAY TO THE RUSSIAN CAPITAL.

Food Research Aided

ELECTRON MICROSCOPE FINDS ANSWERS TO PROBLEMS THAT HAVE BAFFLED FOOD TECHNOLOGISTS FOR YEARS

USE of an electronic "super eye" in a modern research program designed to improve taste, texture and appearance of many familiar food products has been disclosed by scientists of the General Foods Corporation and the Radio Corporation of America. The program is under way at General Foods Central Research Laboratories, Hoboken, N. J., first major scientific center of the American food industry to employ an RCA electron microscope.

This electronic device, which is nearly one hundred times more powerful than the most efficient light microscope formerly used in such research, is finding answers to problems that have baffled food technologists for years, according to Thomas M. Rector, Vice President in Charge of Research at General Foods.

"Fundamentally," Mr. Rector said, "food processing consists of exerting physical and chemical changes on natural foods as they come from the farm, and the important thing for a food technologist to know is exactly what he is doing to food by processing. The electron microscope enables him to find out this information, whereas in the past he was limited as to what he could see.

"We expect this 20th century 'super eye' of RCA to aid us immensely in our endeavor to improve food products sold under our trademarks. It already has demonstrated that it will have an important bearing on the improvement of chocolate by disclosing the manner in which ingredients are blended together and manipulated in processing.

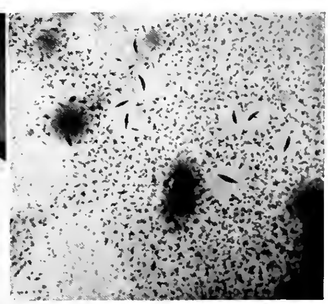
"For instance, Baker's Chocolate, one of the oldest brands in the field, has for years had an especially tempting flavor for which our food research scientists have not been entirely able to account. They have known, however, that the 'feel' of a candy bar, as it melts in the mouth, has a lot to do with the flavor. A rough, grainy texture will suggest a poor flavor. All of this is related to the size and shape of the tiny particles which are visible for the first time through electron microscopy."

Mr. Rector went on to explain that chocolate processing has been developed largely by a "rule-of-the-thumb" method, with little actually known about the reason for the results. He said the electron microscope promises to answer this question of "why" by ascertaining the relationship of the various particles to each other. One of the most important relationships, he said, is the "wedding" of particles with the cocoa butter.

"General Foods research scientists," Mr. Rector said, "are carefully studying these relationships with the electron microscope and they expect, in the end, an improvement in quality, texture, flavor and color."

It was explained that most simple food is made up of hundreds of compounds, many of which are still unknown. When these compounds are present in a complicated cell structure, it is often impossible to ascertain how the cell structures are related to each other. Through the aid of the electron microscope most food molecules become visible, enabling food scientists to study molecular structures, step by step in food processing. This, in the opinion of authorities at General Foods' Laboratories, is expected to open the way for far-reaching knowledge in food processing.

FOUR STEPS IN THE ANALYSIS OF A CHOCOLATE SAMPLE BY ELECTRON MICROSCOPE. AFTER CHIPPING THE CHOCOLATE (LEFT), THE SPECIMEN IS PLACED IN THE VIEWING CHAMBER OF THE ELECTRON MICROSCOPE (BELOW AT LEFT), THEN THE CONTROLS ARE ADJUSTED FOR DESIRED MAGNIFICATION UNTIL THE IMAGE APPEARS AS SHOWN AT THE EXTREME RIGHT.



MEXICO CITY'S NEW 60,000-SEAT BOWL, SCENE OF THE FIRST BULL-FIGHT TELECAST ARRANGED BY RCA.

RICHARD HOOPER, RCA VICTOR PROMOTION MANAGER, EXPLAINS MAGIC O IMAGE ORTHICON TO A GROUP OF GAILY COSTUMED MATADORS.

Bull-Fights Televised

LATIN AMERICANS ENTHUSIASTIC OVER DEMONSTRATIONS STAGED BY RCA BEFORE 30,000 GUESTS IN MEXICO CITY

THE first successful telecast of a bull-fight, staged by RCA in Mexico City last October as a feature of the First Inter-American Broadcast Congress, created an interest in the new art which already has spread far "south of the border" to Cuba, Puerto Rico, Brazil, Argentina and Chile.

According to Meade Brunet, Managing Director of RCA International Division, broadcasting officials from the Central and South American nations who witnessed the convincing television demonstration are now considering the establishment of regular television program service in their respective countries.

The bull-fights were televised at the Plaza Mexico, new 60,000 seat arena in the Mexican capital, and the program was transmitted by microwave radio relay to the Hotel del Prado, six miles away, where 7,500 spectator viewed the event on the screens of RCA Victor television receivers.

During the five-day demonstration period, fashion shows sponsored by a local department store, and other subjects also were presented to an aggregate audience of over 30,000 persons. One television receiver installed in a window of the sponsoring store drew crowds which were televised by a camera set up on a balcony across the street. By this arrangement, the watchers were able to see themselves on the screens. To carry out the Mexican assignment, RCA not only shipped eight carloads of equipment to that country but found it necessary to send a hurry call to Camden for a special television relay link. An engineer loaded the 700 pounds of apparatus on a passenger plane and accompanied it to Mexico City.

Portable Units Prove Adaptable

Technical aspects of the bullfight pickup emphasized the adaptability of the new portable field equipment. For this television premiere of Mexico's number one sport, the RCA group placed the Image Orthicon Camera under the judges box at the bullring, facing the gate through which the animals charge into the arena. A spot was found for the monitoring unit farther up the side of the stadium bowl and the portable microwave radio relay parabola was installed near the rim of the bowl in order to give clear, unobstructed line-of-sight transmission to a similar receiving reflector atop the roof of the Prado.

Because of the high sensitivity of the Image Orthicon, no special arena lighting was needed. By using a telescopic lens of 15-inch focus, it was possible to pick up the thrilling action even when it took place 100 yards from the camera. So clear and sharp were the pictures that spectators around the battery of receivers could see the gleam of the matador's sword and the braid on his jacket.

None of the usual sound effects of a great sports event was absent. Paco Malgesto, ace bullfight announcer of Radio Mil, narrated the "blood and sand" epic from his position just behind the Image Orthicon where he could fit his description to match the scene as he saw it through the camera view finder. And out of the loudspeakers of the receivers came the trumpet calls, the traditional music at the death of the bulls and the surging roars of the stadium spectators. Enthusiastically reported Mr. Brunet, "We felt as though we were right down there in the bullring with our feet in the sand."

The Mexico City episode proved the box-office potentialities of television. Delegates to the Broadcast Congress clamored to pay their pesos for tickets that would admit them to the space set aside in the lobby of the hotel for the bank of television receivers. At one time, the pressure of the crowds become so great that police were called to empty the viewing space so that the overflow crowds could be accommodated. Proceeds from the sale of these tickets went to the education fund of the Mexican government.

PLACARDS, TICKETS AND NEWSPAPER ADVERTISEMENTS WERE WIDELY USED TO CALL ATTENTION TO THE LOUIS-CONN FIGHT TELECAST.

TELEVISION PROMOTION

Public Interest in Feature Telecasts is Created Through Use of Many Forms of Advertising

By Charlotte F. Stern
Manager, Television Promotion
National Broadcasting Co.

FOR several weeks before Joe Louis and Billy Conn stepped into the ring at Yankee Stadium, every television set owner along the eastern seaboard knew that the 1946 Battle of the Heavyweights was to be televised by NBC television station WNBT. It was impossible for them to escape this knowledge if their sets were in operation. Night after night announcers recalled the fact in the intervals between program features. And yet, adequate as this procedure seemed at the time those who direct the promotion plans of the National Broadcasting Company, were not satisfied with the coverage.

At NBC, television promotion is designed to "sell". It "sells" television generally but NBC's variety in particular. But whether it appears as paid advertising in newspapers and magazines, as displays in store windows and on counters, or is sent in various forms through the mail, the underlying objective of all NBC television promotion is to get people excited about this great new broadcasting service, to arouse an interest in television that will reflect itself in the mass purchase of television receivers. Obviously, this is as much to our advantage as broadcasters, as it is to the interest of those who manufacture and merchandise sets.

At NBC it is a simple matter to advise television set owners of programs available on WNBT. Post-card announcements dropped in the mails reach the bulk of television set owners within the broadcasting area of the Empire State Building transmitter. With interest in the fight itself as high as it was, there is no doubt but that one such announcement would have sufficed to cause every television set in operation to be tuned to Channel 4 the evening of June 19th. A dozen or so announcements on WNBT during the week prior to the fight telecast would have secured the attention of that part of the audience, if any, unreached by the mailing list. The announcement in the daily press of the fact that the fight was to be televised, by itself would have assured SRO signs at every receiver which could pick up the fight.

Yet NBC invested more hard cash to promote its television coverage of this fight than had ever been spent to announce any single event in television history. Why? Because we are convinced that it is the *programs* that will cause people to buy television sets.

That is why all NBC promotion has emphasized television programs actually on the air, concentrating on those features which highlight any month's schedule. It may be an outstanding sports event (the Army-Navy game); a superlative studio production (Cavalcade of America); a spectacular news event (the Jap Surrender) or an important advance in television programming made possible by technical developments (the opening of New York - Washington network facilities).

Primarily, such program announcements are of direct concern only to set owners, representing at most some 7,000 families in this area. Yet large space advertising is purchased regularly in several metropolitan dailies to announce NBC television programs to an estimated newspaper readership of millions.

To buy so much "waste" circulation is normally contrary to all the rules of good advertising practice.

It is justified in this instance because it is felt such advertising serves some very real purposes. It identifies NBC and television in a manner which tends to make the words synonymous in the public mind. It is laying the groundwork for what we hope will build into an NBC viewing habit by establishing the already evident superiority of NBC television programs.

As a subject for program promotion, the Louis-Conn fight telecast was opportunity thundering at the door. Here was our chance to sell television, with our readership guaranteed by the tremendous public interest in the fight. Ringside seats cost $100. You couldn't buy a television set at any price. But if you had a television receiver or could get close to one—well, as one reporter described it, you had a seat that was "better than ringside." And NBC's television broadcast was an exclusive.

To the best of our promotion ability we prepared to capitalize the universal interest in the fight, to convert it to interest in television.

To do so, we utilized every promotional device that came to hand and mind: Space advertising, direct mail, displays, radio and television spot announcements, demonstrations, stunts, etc.

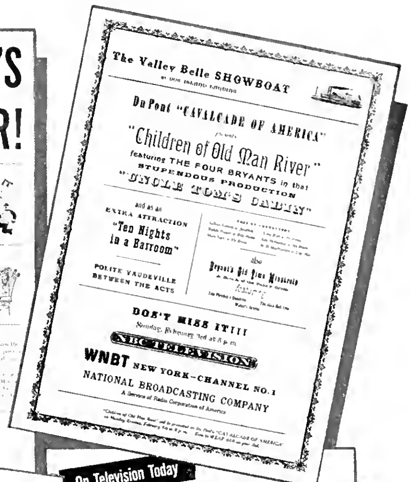
Thousand-line newspaper advertisements in New York and Philadelphia papers informed millions of readers that the Big Fight could be seen on television. An additional full page advertisement inserted in the Official Fight Program sold at the Stadium advised thousands: "This Fight is Being Televised"—and would be seen by other thousands as far removed from the scene as Schenectady, New York and Washington, D. C.

In several thousand store windows in and around New York city, colorful fight posters shouted the news at passersby.

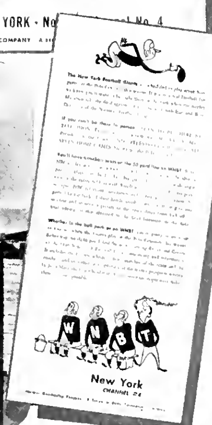
Ten thousand facsimile tickets delivered by mail, gave televiewers and their friends "ringside" seats, courtesy of NBC Television.

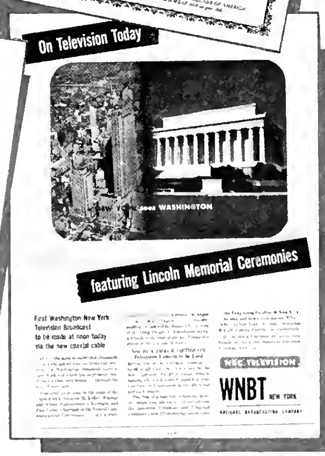
There is little doubt that more people were "sold" on television that June 19th night than had been converted in the seven years of broadcasting that preceded it. The next morning's press made that plain, as did the enthusiastic remarks appended to the questionnaires returned by television audiences. As promotion men, we must be forgiven if we allow ourselves to think that what we did to put over a program also helped make people want television sets.

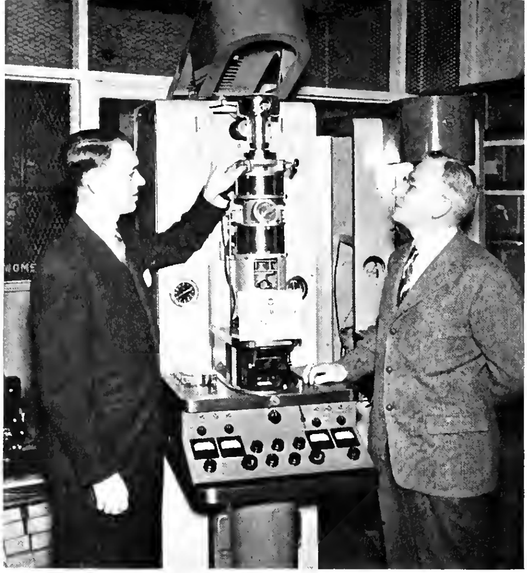
BY MAIL TO RECEIVER OWNERS AND THROUGH POSTERS NBC INFORMS THE PUBLIC OF FORTHCOMING TELECASTS.



NEWSPAPER AND MAGAZINE ILLUSTRATIONS CALL ATTENTION TO OUTSTANDING PROGRAM FEATURES AND TO THE RECEIVERS THAT MAKE POSSIBLE THEIR ENJOYMENT.







T. A. SMITH OF RCA VICTOR ENGINEERING PRODUCTS DEPARTMENT EXPLAINS DETAILS OF THE 200TH ELECTRON MICROSCOPE TO DR. P. E. KLOPSTEG OF NORTHWESTERN UNIVERSITY.

200th Electron Microscope

Instrument installed at Northwestern University Embodies Numerous Advances Made Through Electronics Research Since 1940

A MILESTONE in the application of electronics to scientific research was reached on December 9 when the 200th RCA electron microscope was completed at RCA Victor's Camden plant and turned over, with appropriate ceremonies, to a representative of Northwestern University.

Only a few days earlier, at the annual convention of the Electron Microscope Society of America, Dr. James Hillier of RCA Laboratories, a co-inventor of the microscope, reported on RCA's latest achievements in electron microscopy. Recent improvements, Dr. Hillier said, have made possible magnifications up to 200,000 diameters. Of greater importance, this order of magnification can now be achieved "relatively frequently", and magnifications of 100,000 diameters can be achieved in more than fifty per cent of the exposures on suitable specimens.

W. W. Watts, Vice President in charge of the RCA Engineering Products Department, presided at the ceremonies in Camden when the 200th microscope was formally delivered. Dr. P. E. Klopsteg, Director of Research at the Technological Institute of Northwestern, accepted the instrument in behalf of the University. The presentation was made on the factory floor, where workers had just completed the final adjustments and tests.

The first commercial RCA electron microscope was started in 1940 and took nearly a year to complete. The first seven microscopes were produced on a model shop basis, but mass production was achieved to a limited extent after the War Production Board, recognizing the instrument's importance as a tool of war industries, assigned it a high priority and placed it on strict allocation. However, since each microscope consists of nearly 10,000 separately manufactured parts, involving extremely close tolerances, the scale of production has been limited.

Using a beam of electrons in place of light to make possible useful magnifications of invisible particles of matter far beyond the range of the optical microscope, Mr. Watts said, the electron microscope is an increasingly vital tool of modern science, industry, and education. It enables scientists and engineers to peer deep into the submicroscopic mysteries of metals, chemicals, foods and drugs, disease-causing organisms, and other substances, and study details of structure and reactions never before observed. It can magnify a single tuberculosis germ to the size of a saucer, a human hair to the breadth of a giant redwood tree, or a blood corpuscle to the dimensions of a sofa pillow. It has enabled scientists to see for the first time the viruses which cause influenza and infantile paralysis.

Mr. Watts pointed out that many important advances in electron microscope design have been made since the completion of the first instrument six years ago. These have simplified its operation, reduced the time required for various processes, and increased its utility in numerous ways.

"The history of this symbolic 200th unit is just beginning," Mr. Watts said, "but with it, we know, the great research and educational institution receiving it will explore new mysteries of nature and open new scientific frontiers for the benefit of humanity."

RCA Dividends Declared

At the conclusion of a meeting of the Board of Directors of the Radio Corporation of America held in New York December 6, 1946, Brigadier General David Sarnoff, President of RCA, announced the following dividends had been declared:

On the outstanding shares of First Preferred stock, 87½ cents per share, for the period from October 1, 1946, to December 31, 1946, payable in cash on January 2, 1947, to holders of record of such stock at the close of business December 16, 1946.

On the outstanding shares of Common Stock, 20 cents per share, payable in cash on January 29, 1947, to holders of record of such stock at the close of business December 20, 1946.

Modern Distribution

(Continued from page 15)

quires. If we eliminate or reduce substantially the accumulation of small businesses which our distribution represents, and other industries do likewise, what becomes of our 60 million goal? In other words, any severe dislocation in one phase of our industrial system, may have far more drastic repercussions in another phase.

Now I would like to take you back in the history of RCA Victor and remind you of some facts that you may have forgotten with the passing of time.

In 1924, when radio was already well on the road to glory, the best radio in the RCA line was the Radiola Super VIII. For its day, this was a good radio. Enough families purchased this model to put seven Radiola Super VIII's in every city and village in the country with a population over 2,500. The list price was $425—without batteries. At the beginning of 1941, the latest year of full-scale production, one of RCA's most popular radios was Model 1-X. This little set, compared with the Radiola Super VIII, had a better tone, higher fidelity, less noise, simpler tuning, greater reliability, and longer life. It had a built-in antenna, and instead of bothering with batteries you simply plugged it into a light socket. The consumer bought it for $9.95. In the same year, 1941, for $115 the consumer could buy the finest straight radio produced by RCA Victor.

It looks as though something was happening in those 17 years besides rising distribution costs!

Again, let us go back, this time to the year 1928. In that year you could buy an Electrola (which was a Victrola with modern electronic amplification) for anywhere from $250 to $650 depending on the model. For a combination Electrola and radio, you paid from $322.50 for the cheapest to $1,150 for the finest. And for the sum of $1,550, you could buy a combination Electrola and radio with an automatic record-changer.

In 1941, a Victrola radio-phonograph with automatic record-changer was available at $60; and for $495 the consumer bought the finest model in the RCA Victor line. Electrically and acoustically, both models far surpassed the best of the old Electrolas.

While distribution costs were rising, it had become possible for every home in America to have the latest in home entertainment!

Once more, let us look at the early 1920's. In 1923, one commonly used type of electron tube cost the consumer $9. Today you can buy an RCA Tube that does the same job better—for 80 cents.

How do we account for all of these price reductions? How is it possible to have made such gains in product performance while at the same time the cost to the consumer grew less and less?

It is certainly no secret. I have drawn these examples from the history of RCA Victor simply because I am more familiar with that business than with others. The story of a steady technical advance accompanied by a decline in consumer price is by no means peculiar to RCA Victor. The same story appears again and again throughout our industrial scheme. It is the story of modern American industry.

Reduced to a simple pattern, here is what happened: (1) In order to sell at lower prices, it was necessary to produce and distribute more merchandise. (2) In order to produce and distribute more merchandise, it was necessary to provide and maintain the machinery and organization for large-scale production and mass distribution. (3) In order to support the output and justify the scope of such a system, it was necessary to build and maintain a mass market that demanded that output. (4) In order to build and maintain a mass market, it was necessary to emphasize advertising, sales promotion and merchandising.

Status of Color Television

(Continued from page 11)

figures are dependent upon the availability of materials and economic conditions which may influence the demand for receivers.

"As evidence of our faith in the excellent entertainment service which present black-and-white television receivers will render," declared Mr. Beers, "orders have already been placed on our manufacturing departments for 90,000 receivers which will have a total retail value of approximately $36,000,000. The television receiver testing equipment and facilities which have already been installed represent an investment of over $600,000. Additional facilities are now being provided which will bring the testing facilities investment to over a million dollars.

"At the end of 1947 our television receiver production facilities will support an annual production of 300,000 instruments.

"With respect to television transmitting equipment," Mr. Beers continued, "we now have in the process of manufacture over *six million dollars* worth of monochrome equipment. Included are 40 transmitters and antenna systems, 150 image orthicon cameras, 205 monitors, 50 film projectors and cameras, 75 synchronizing generators and numerous other items.

"The expenditure necessary to prepare for this manufacturing program totalled more than one and three quarter million dollars. This includes manufacturing and testing facilities, construction of models, design engineering and drafting."

Mr. Beers said that on the basis of engineering estimates, it is believed that the major elements of color television transmitting equipment will cost from 40 percent to 100 percent more than the corresponding black-and-white units. He stated that a color television receiver comparable in performance to black-and-white receivers being sold today would be approximately double in cost.

Television, Films and the Human Eye

RESEARCH REVEALS THAT THE TELEVISION IMAGE ORTHICON TUBE AND THE EYE ARE EQUALLY SENSITIVE, FAR SURPASSING FASTEST PHOTOGRAPHIC FILM IN RESPONSE TO LIGHT

By Dr. Albert Rose
RCA Laboratories,
Princeton, N. J.

A MOVIE patron steps from the bright outdoors into the dim interior of a theater. Some moments elapse before his eyes become sufficiently adapted to the dark to guide him to a seat. The seat he chooses is circumscribed—within limits. He cannot, for example, approach within arm's length of the screen with the intent of determining whether the heroine wears 60- or 80-mesh sheer hose, for by design the seats stop thirty or more feet short of the screen.

The viewer of a home television receiver is not subject to the same limitations. The aim, at least, is that he may view his picture with enough light in the room to see comfortably. There is, moreover, no barrier to prevent him from taking his seat where he can exhaust the last particle of picture detail.

Both these considerations, i.e., picture brightness and viewing distance, determine the technical standards that a picture must meet in order to be judged satisfactory by the eye. Both are more severe for a television picture than for a motion picture.

Because the judgment of picture quality is made by the eye, it is highly desirable to be able to specify the performance of the eye quantitatively and in such terms or units as will allow ready comparison with the performance of motion picture film or a television system.

The problem of choosing a performance scale that can be applied with equal validity to motion picture film, the eye and television pick-up tubes is considerably simplified by the fact that all three devices are subject ultimately to the same limitations. These limitations are set by the statistical fluctuations in the absorption of light. The fluctuations can give rise to graininess in films, to "noise" in a television picture and to limited half-tone discrimination in the eye. They also permit a unified approach to performance evaluations — an approach whose technical economy can readily be appreciated since only a single number, corresponding to the light efficiency, is needed to specify the performance range of a well designed picture pick-up device. And this statement holds equally for the eye, photographic film and pick-up tubes.

Here, in brief, are a few of the conclusions to which the above unified approach leads.

More Sensitive Than Film

The sensitivity of the image orthicon and the human eye are approximately equal and each is about ten times as sensitive as photographic film. The comparison pictures in the accompanying photograph, when properly interpreted, support the factor of ten betweeen

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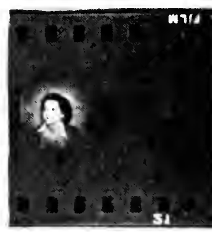

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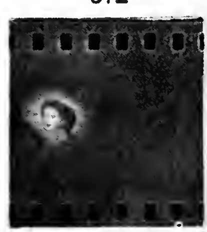

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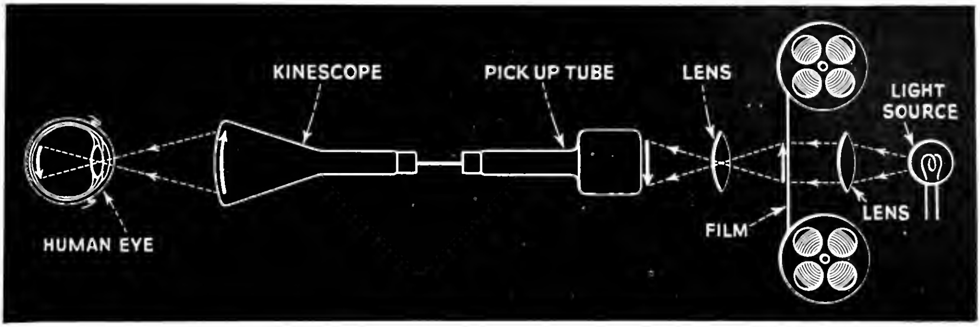
THESE FOUR PHOTOGRAPHS SHOW THE INCREASED EFFICIENCY OF THE IMAGE ORTHICON OVER THE MOST SENSITIVE FILM UNDER NORMAL AND LOW LIGHTING CONDITIONS. PICTURE ON LEFT SIDE OF EACH FILM SQUARE SHOWS THE IMAGE AS PICKED UP BY IMAGE ORTHICON AND PHOTOGRAPHED DIRECT FROM KINESCOPE. PICTURE ON RIGHT OF EACH SQUARE IS THE IMAGE AS RECORDED BY CAMERA. ONLY WHEN LIGHT WAS MAXIMUM WAS FILM ABLE TO RECORD AN IMAGE ALTHOUGH IMAGE ORTHICON TUBE WAS SUCCESSFUL WHEN ILLUMINATION WAS REDUCED 99 PERCENT. FIGURES UNDER EACH SQUARE INDICATE RELATIVE INTENSITY OF LIGHT.



ESSENTIAL PARTS OF A TELEVISION SYSTEM WHEN A FILMED SCENE IS TO BE TRANSMITTED AND REPRODUCED.

image orthicon and film sensitivity. At two foot-lamberts, both pickup tube and film can record pictures. At lower scene brightnesses, only the pictures transmitted by the image orthicon are present. The fact that motion pictures are viewed at less than one-tenth the brightness at which the original camera recorded them is in support of the increased sensitivity of the eye over film.

The discrimination of the eye (for half-tones and resolution) is enhanced when looking at brighter pictures. This means that both television pictures and motion pictures must improve their quality hand in hand with their brightness. Because television pictures, in order to be viewed in moderately lighted surroundings, are likely to be brighter than motion pictures, the quality of the television picture should exceeed that of the motion picture. This burden of improved quality is passed on mostly to the television pick-up tube, in that improved quality needs more illumination in the original scene or, preferably, more sensitivity in the pick-up tube. A particularly interesting problem arises when the original scene to be picked up is not as bright as the picture reproduced on the kinescope. For this picture to be judged satisfactory, the pick-up tube performance must exceed the performance of the eye in the same proportion as the kinescope brightness exceeds that of the original scene.

Much confusion has been generated by comparing the "limiting resolution" of motion pictures with the number of lines of a television picture. The conclusion has usually been that a motion picture is two or three times, as the case may be, better than a television picture because the limiting resolution of film is 1,000 to 1,500 lines and the number of lines in a television picture is only 500. This conclusion is at least misleading. The limiting resolution of a picture is not as important in the eye's judgment as is the response, or signal-to-noise ratio, for 500 lines and below. A more valid comparison of television and motion pictures, based on signal-to-noise ratios, places the capabilities of a 500-line television picture close to the resolution of present 35 millimeter motion pictures.

Major Problem in Film Industry

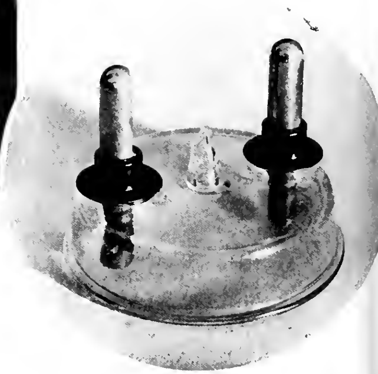
The evaluation of the graininess of motion pictures has been a major problem in the film industry as evidenced by the many technical papers on this subject throughout the last quarter century. The television art is faced with the same problem in the evaluation of noise in television pictures. Only very recently has there been an appreciation that the complete treatment of this problem requires a knowledge of the properties of the eye as thorough as the knowledge of the properties of the motion picture or television picture. It is of considerable help that the eye appears to be limited by fluctuation phenomena in much the same way as film or television pick-up tubes.

One might expect, if the eye is limited by fluctuation phenomena, to be able to "see noise"—that is, "visual noise"—similar to the noise in a television picture or graininess in a motion picture. The writer is convinced that such visual noise is readily observable at very low levels of scene brightness, around 1/10,000 foot-lamberts. A white surface then seems to take on a fluctuating grainy appearance.

Other conclusions have resulted from the treatment of the eye in the same terms as pick-up tubes and film. For example, the large range of dark adaptation (the ability of the eye to re-adjust itself to see scenes 10,000 times below normal brightness levels) can be interpreted as arising from a "gain control" mechanism in series with the retina and brain and not unlike the volume control knob on a television receiver. Further, existing data on the eye suggest that the gain control operates selectively more on blue light than on red light.

The accurate comparison of the performance of film and pick-up tubes with the performance of the eye cannot but enhance one's admiration for the nicety of design that has gone into the human eye by chance selection. At the same time, one has firm grounds for expecting even to surpass the performance of the eye by deliberate design of pick-up devices.

HEAT IS APPLIED TO JUNCTION OF GLASS AND METAL AS ONE STEP IN MAKING A VACUUM-TIGHT SEAL. BELOW: A COMPLETED SEAL BETWEEN TWO METAL TERMINALS AND A GLASS SUPPORT.



SEALING GLASS TO METAL

New Process Forms Vacuum-Tight Junction of Steel and Glass in Manufacture of Metal Vacuum Tubes

DESPITE general accepted theory and practice that in a glass-to-metal, vacuum-tight seal, the expansion of the glass due to heat must match the expansion of the metal when subjected to the same temperature, the RCA Victor Division at Harrison, N. J., has developed a vacuum-tight, compression seal in which the steel expands nearly twice as much as the glass for each degree rise in temperature. This development, which was started in 1941, was accelerated by the war-shortage of chromium alloy initially used for metal-to-glass seals in metal tubes. More than twenty million metal tubes embodying the seal have now been produced. Tubes made in this way have met the acid test of performance in all kinds of equipment including that built to rigorous requirements of Army, Air Force and Navy.

Tons of Vital Metal Saved

The chrome-iron alloy originally used in tube assemblies contained 25 to 30 per cent chromium. If the chromium saved by the use of this new seal had been employed in armor plate, it could have made 1,300,000 pounds of plate having 2 per cent chromium content. In addition to the saving in chromium, a critical wartime material, the new method saved approximately 80 per cent in material cost alone.

The new seal employs commercial grades of low-carbon steel and soft lead glass. Since the new seal was readily adapted to regular seal-making equipment and actually simplified preparatory operations, its development did not interfere with the intensified production required for war needs.

Procedure Changed Slightly

The new seal is made essentially in the same manner as the seal using the chrome-iron alloy; however, several minor but very important changes are necessary. Since steel will oxidize at a lower temperature than chrome-iron, and since the oxide of steel becomes thicker at higher temperatures than that of chrome-iron, the steel must be kept as cool as possible during the operation of "puddling" or softening of the glass. After the glass is formed, a somewhat higher temperature than that used for chrome-iron is required to dissolve the iron oxide into the glass in order to produce a vacuum-tight seal. If a thick layer of oxide is left between the metal and glass, the seal will not be vacuum tight because a thick layer of oxide is porous and brittle. After the seal is made, the glass is annealed to a slightly lower residual strain than is employed with chrome-iron seals.

Although the steel used is a commercial grade, certain essential qualities must be present. One is an inherently fine-grain size which must remain fine-grain after the seal is made. This quality prevents excessive or non-uniform creep which would relieve the compressive stress on the glass at the bond and cause cracks to develop in the glass at the seal.

Another essential quality of the steel is a proper surface for good bonding with the glass. The surface also must be chemically and physically free from any foreign matter because the nature of the surface determines the nature and adherence of the oxide. Finally, proper stress relationship in the finished seal must be obtained.

This type of seal is an excellent, low-cost substitute for the glass, chrome-iron type of compression seal which provides the proper compression strains. However, it is not satisfactory for seals where the metal is enclosed in glass, because steel expands faster than soft lead glass and, therefore, would shrink away from the glass on cooling instead of shrinking tighter around the glass as in the compression-type of seal.

The Pocket Ear

PYGMY RADIO RECEIVER CONVEYS CUES FROM TELEVISION PROGRAM PRODUCER TO STAGE DIRECTOR

EVER since the first ambitious program was staged in a television studio, the trailing loops of wire that carry telephoned cues from the program producer in the control room to the stage director on the floor have been an occupational hazard. These cables, lying here and there in innocent coils were wont to spring to life without warning and tangle with cameras, microphone booms and studio scenery. Like rubber-covered fiends, they were extraordinarily skillful in trapping a careless thespian or technician with a taut bowline around his ankles, while the director, finding his lifeline snagged beyond help, expressed himself mutely but effectively by movement of lips and manual gestures.

Such episodes no longer take place in NBC's television studios. For out of the network's engineering laboratory has come the "Pocket Ear" to replace the telephone headset equipment formely used for communication within the studio. In development for some time, the device has been given a thorough tryout at WNBT and has been called successful.

The Pocket Ear is a vest-pocket sized radio using small batteries and even smaller tubes. It weighs only one pound complete and measures $6\frac{1}{2}$ by $3\frac{1}{2}$ by 1 inch. The spoken instructions are conveyed from the little receiver to the user's ears through a flexible vinylite tube 1/16" in diameter terminating in a small rubber ear-plug which can be worn for long periods without becoming uncomfortable. This tube, small as it is, also contains a hair-like wire which acts as the antenna.

Signals reach the tiny receiver from a high frequency transmitter installed in the studio ceiling. Although the transmitted power is less than 1/10th of a watt, it is sufficient to give clear reception in any part of a large studio yet is too weak to cause interference beyond the studio walls.

The first model tested retained the standard telephones on the ears but used a vertical antenna rod and tuning attachment which gave the wearer a "man from Mars" appearance.

Since the latest models have been available, the "Pocket Ear" has greatly improved the conditions under which the stage director works. No longer are his movements limited by connecting cables. Wherever he moves on the stage, he is able to cue the actors, cameramen and other crew members and direct sound effects while maintaining continuous contact with the program director in the control room.

THE WIRE LEADING FROM COMPACT RECEIVER TO EAR IS ALSO THE ANTENNA WHICH PICKS UP THE SIGNALS FROM A TRANSMITTER IN THE STUDIO CEILING.

Recording Studio on Wheels

NEW SOUND FILM UNIT CONTAINS ALL FEATURES REQUIRED IN FIELD OPERATION OF MAJOR COMPANIES

The first complete mobile recording unit to be developed especially for 16 mm. sound film recording has been designed and custom-built by the RCA Film Recording Department in Hollywood for the Coronet Instructional Film Company, of Glenview, Illinois.

The unit consists of a complete film and disc recording channel installed in a custom-built body mounted on a $1\frac{1}{2}$ ton truck chassis. The recording channel has all the features necessary for the normal operations of major studios.

The optical system of the standard RCA Film Recorder installed in the mobile unit was specially modified to permit recording of direct positive as well as negative variable area sound track.

For "location" recording, the channel can be operated entirely by batteries which have sufficient capacity for approximately 20 hours of operation.

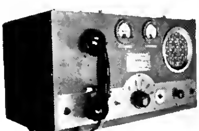
The front compartment of this "recording studio on wheels" contains the disc and film recording machines, film loading cabinet, power supply batteries, and a number of storage compartments. The amplifier, power control panel, selenium-type charging unit, dynamotor and filter are located in a bulkhead which runs crosswise of the truck. The rear compartment contains two large cable reels, lamp batteries, and a cable storage compartment.

Three large doors in the rear of the truck provide easy access to all storage space and equipment, while the rear side of the power panel and amplifier racks are equally accessible through hinged doors, immediately behind the amplifier and power panels.

If it's RADIOMARINE ...it's dependable

MODEL ET-8028

10 watts. 4 channels, 2-way radiotelephone. Remote control with standard telephone hand-set and built-in loudspeaker. Operates from 6 or 12 volt battery supply system.

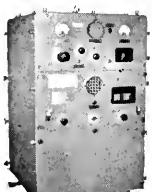


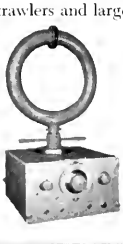
MODEL ET-8027

25 watts. 6 channel, 2-way radiotelephone. Operates from 12, 32, or 110 volt D.C. supply system. Designed for small coastwise vessels, tugs, trawlers and pleasure craft.

MODEL ET-8012-D

75 watts. 10 channel, 2-way radiotelephone. Remote control unit may be installed in any convenient location aboard. Operates from 32 or 110 volt D. C. power supply. Designed for ocean-going vessels, river and Great Lakes ships, tugs, trawlers and large pleasure craft.





MODEL AR-8702-A

Radio direction finder, highly sensitive and selective, easily installed in a location of greatest convenience. Loop may be mounted inside or outside, as required.

There's more than a quarter of a century's proven dependability in back of Radiomarine equipment. That's the reason you will find so much more marine radio equipment, made by Radiomarine, aboard large merchant ships, fishing vessels and pleasure craft.

Leading ship operators and boat owners know that quality pays off in the long run. *Dependability . . . longer life . . . simplicity of operation . . .* and *lower maintenance costs* are characteristic essential requirements for all radio and electronic equipment made by Radiomarine.

To boat owners, this means added safety, freedom from worry, savings in time and money and greater boating pleasure.

Take a tip from thousands of satisfied owners. Install a Radiomarine direction finder and radiotelephone aboard your boat.

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RCA

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A SERVICE OF RADIO CORPORATION OF AMERICA

Arturo Toscanini directs 16 concerts in this, his tenth season with the NBC Symphony Orchestra

For the past ten years . . . or ever since that memorable Christmas night when Toscanini first conducted the NBC Symphony Orchestra . . . millions of listeners have heard, over the NBC Network, many outstanding musical performances under his inspired baton and those of other world-famous conductors.

The NBC Symphony Orchestra, under this distinguished leadership, has enriched the lives of millions. The first full symphony created and maintained for radio broadcasting, it has brought its gifts of fine music performed with the fire of inspiration to all listeners. For it is one of the privileges of American radio to make great music accessible to millions.

This season, Toscanini will conduct sixteen concerts while Fritz Reiner and Eugene Szenkar will be guest conductors in concerts not sponsored directly, but made possible by revenue NBC receives from its advertisers.

NBC is proud to provide, not only its facilities, but also the orchestra itself—the NBC Symphony Orchestra, every Sunday, 5:00 to 6:00 PM (EST).

AMERICA'S NO. 1 NETWORK

NBC

A Service of Radio Corporation of America

. . . the National Broadcasting Company

Television camera, receiving tube, all-electronic receiver and radio relay equipment —are the result of pioneering and research at RCA Laboratories.

From the scene of action—to your own living room—these RCA developments based upon research at RCA Laboratories mean *television at its finest:*

RCA Image Orthicon Camera sees whatever the human eye sees, even in the light of a match! Sports events on cloudy days or in twilight do not fade because this super-sensitive camera eliminates the need for strong lighting.

RCA Mirror-backed Kinescope—searchlight brilliance for home television. All the lifelike realism and detail caught by the RCA Image Orthicon Camera is reproduced by this new receiving tube that loses none of the original brilliance.

RCA Victor Television Receiver—with the new RCA exclusive "Eye Witness" feature that "locks" the picture, keeps it bright, clear—as steady as a picture on the wall.

RCA Radio Relay equipment enables television stations to broadcast events taking place far from the studio, and eventually may link television networks. In television, as in radio, Victrola* radio-phonographs, records, or tubes, if it bears the name RCA or RCA Victor, it is one of the finest instruments of its kind science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 2:00 P. M., Eastern Time, over NBC. *"Victrola" T. M. Reg. U. S. Pat. O.

RCA VICTOR table model television receiver with the exclusive "Eye Witness Picture Synchronizer" that assures you *brighter, clearer, steadier* pictures. It is now available in some areas—see your local RCA Victor dealer.

RADIO CORPORATION of AMERICA

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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*

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SCIENCE AT NEW ALTITUDES

Inventions Open New Vistas and Widen Man's Communication Range Beyond the Surface of Our Planet, Brig. General Sarnoff Tells Scientists at Cincinnati Meeting.

Address delivered by Brigadier General David Sarnoff, President, Radio Corporation of America, at Cincinnati Technical and Scientific Societies Council, Cincinnati, Ohio, February 11, 1947.

TODAY is the 100th Anniversary of the birth of Thomas A. Edison. It is a special privilege and a great pleasure to be with you on this day for it was Ohio that gave Edison to the world.

It is particularly fitting that the Cincinnati Technical and Scientific Societies Council should observe the great inventor's birth. With his Centennial as a keynote, this day in Ohio history inspires us to look ahead and to survey the great forces of science which mankind now commands as a result of pioneering instituted by Edison.

Exploration and discovery are woven through the pattern of Ohio's history. First the Indian tribes explored and inhabited its fertile expanse. Later—in the 17th Century—came the first French and English traders. As smoke signals and footrunners were their only "lines of contact", they were lost to the world as far as communication was concerned.

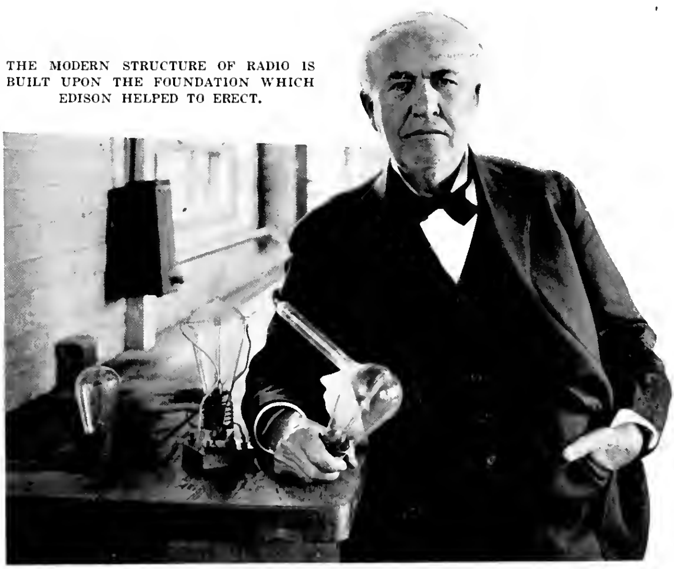
In our own times wireless had not been in existence long, before Ohio cities felt the beat of electromagnetic pulses in earphones at Cleveland, Toledo and Ashtabula, as ships on Lake Erie first began to spark their invisible messages to the shore.

With the advent of broadcasting, Ohio quickly took to the air. It became an important center of radio as the unseen waves carried words and music over the neighboring communities of Kentucky, West Virginia, Pennsylvania and Indiana. Cincinnati, with its powerful transmitter radiated the name and fame of Ohio to nationwide listeners. Today there are 37 broadcasting stations in Ohio, and 33 of them are linked in coast-to-coast networks.

Ohio is called the mother of Presidents. In Canton, McKinley introduced "front porch campaigning" in 1896, but his voice could not carry beyond his lawn. At that time there was no broadcasting. Now from any porch or portico, the presidential candidate can address the entire electorate. Before many years pass the entire country will see him by television.

President William Howard Taft, a native son of Ohio, approved and signed the Communications Act of 1912, the first law to recognize the importance of radio communication in the United States.

Ohio was the first State from which a Republican National Convention was broadcast. That was in 1924 when Calvin Coolidge was nominated at Cleveland. The wonder of that day was that twelve States, as far west as Kansas City, were linked into a network! President Warren G. Harding, the first Chief Executive to broadcast while in office, was born in Ohio. So we see that the history of radio, in its service to the Nation and its people, is not only linked with this State through science, but also through its social and political life. All these have had an important influence on the growth of America.



THE MODERN STRUCTURE OF RADIO IS BUILT UPON THE FOUNDATION WHICH EDISON HELPED TO ERECT.

DURING THE WAR, SCIENCE REACHED SKYWARD AND A MIRACULOUS INVENTION CALLED RADAR SAVED ENGLAND IN THE BLITZ.

As a boy in the little town of Milan, Edison must have been imbued with the spirit of the pioneer which Ohio engendered as trails were blazed westward. Imagination, dynamically related to a persistent soul, never discouraged by defeat, comprised the sinew of his fame. Every disappointment, every failure of an experiment was a new challenge to his curiosity, a new spur to his determination to succeed. He triumphed through creative thought and left the world a rich inheritance of knowledge. His tireless efforts and his creative genius now shine out across the earth. It was electricity, harnessed by this native son of Ohio, that made this State a shrine of science through the electrification of communications, agriculture and industry. Edison created new industries and new employment for millions of people. He lighted and enlightened the world.

The modern structure of radio is built upon the foundations which Edison helped to erect. His discovery in 1875 of mysterious sparks that diffused or spread in all directions, he called "etheric force." His discovery in 1883 of elusive electrons at play within the incandescent lamp led to the development of the electron tube detectors, amplifiers, and oscillators. History records that phenomenon as "the Edison Effect."

Edison's storage battery, his dynamos, motors, microphones and the phonograph all became vital parts of radio. Now the motion picture, which he made an accomplished fact in 1889, is finding a new and widespread medium of expression in television.

Telegraphy Without Wires

So close was Edison to the invention of wireless, that in 1885 he took out a patent on "telegraphy without wires." He called his system "grasshopper telegraph", but he said he was "too busy with other things" to devote more time to complete the invention of wireless. It remained for a young man in Italy to do that. When Marconi received the first transatlantic signal in 1901, Edison remarked that he would like to meet "the young man who had the monumental audacity to attempt and succeed in jumping an electric wave across the Atlantic!"

So staggering is the list of Edison's inventions, and so practical is their usefulness, that he is recorded in history not only as the "lamplighter", but as "the supreme inventive genius of the industrial age." The applications of his inventions to peacetime pursuits reveal the tremendous potentialities of science for the benefit of mankind. For science lifts man's burdens, saves his time, adds to the comforts and the pleasures of his life.

Mankind Looks Upward

Edison left us fifteen years ago. Those who have followed him in science have travelled close to trails which he blazed. Within the past decade, they have succeeded in meeting the demands of global war. As a result, science emerged from the war as a powerful force that created new instrumentalities and promised many others for use in peacetime, if man would only direct his thoughts to peace instead of war, and his scientific research to higher elevations.

Spiritually, mankind has always looked upward for guidance and eternal truths. It is not strange therefore that the physical sciences should strive also to explore the higher altitudes in the search for scientific truths.

During the war, science reached skyward and a miraculous invention called radar saved England in the blitz, guided bombers to their targets, doomed the U-boat, and aimed the big guns of battleships to fire with deadly accuracy, even in the dark.

Aside from radar, post-war dictionaries have many new words that spring from radio and electronics, such as sonar, shoran, teleran and the proximity fuse. None of these inventions would have surprised the wizard of the Electrical Age, who himself unleashed incredible forces to startle the world, and then coined new words to explain them. The end of his life marked the end of an era.

Through his genius he helped to establish the era to follow—the Electronic Age.

Edison's life was a drama of the lone inventor, toiling alone, often in meager circumstances. Today, science has the benefits of organized, industrial research affording inventors every facility, cooperation and comfort, for work and for study. Without it, World War II might have been lost. Industrial research conducted by private enterprise is a bulwark of the United States; it promotes victory in war and assures progress in peace. It is a safeguard of civilization.

New Frontiers of Science

All nations now are eager to cultivate science and never were scientists in greater demand. Never has there been greater willingness to follow the onward and upward march of the exploring scientist; for only through adventurous thinkers can the search for new knowledge succeed. Without this knowledge, the world would stagnate as a pool without an inlet; neither would there be an outlet for its progress.

We who are veterans in radio, as well as those in other fields of scientific endeavor, are continually encouraged by the fact that there are as many new frontiers of research as there were one hundred or a thousand years ago. The crossing of a frontier in science always leads to another. Each discovery, each invention spearheads a new and undreamed of advance. Today, through radio and electronics, scientists are finding encouragement to believe that some day they may be able to detour storms, to dissipate clouds and fog, to produce rain and snow, and thus measurably to control the weather.

Let us scan the horizon of 1947 and compare it with that which the Edison pioneers beheld as they pushed forward across the old frontiers of the Mechanical Age.

Edison's conquest was largely confined to wires, mechanical and electrical machines. Today the frontiers of that science spread above and throughout the universe, far into unfathomed space—into that vast invisible fabric which separates the heavens and the earth. The sky is a canopy over untapped reservoirs of new knowledge. Man's thoughts have been given wing; he is challenged to explore the stratosphere and the ionosphere with the same imagination and persistence with which he has won scientific conquests on the earth and on the sea.

Scientists, especially mathematicians, for centuries have been enchanted by the immensities of time and space; by gravitation, by the propagation of light, the theory of relativity, by electromagnetic radiation and radioactivity. But laymen have looked into the heavens and referred to "the emptiness of space." They have described the vacuum tube as "a glass bottle full of nothing." Now, thanks to science, we know that space is not empty, and that a vacuum tube is far from being filled with "nothing."

Radio and electronics have given space and the vacuum a new meaning. Scientists are learning how to snap the switch that will bring them the sounds and pictures of the universe. They are challenged by science to keep their eyes on the stars. Both astronomers and radio scientists scan the blue dome of the world. In the glow of the sunrise and the sunset there is far more than is visible to the eye. Both of these colorful panoramas are criss-crossed with intelligence, vibrant with human thoughts and emotions carried by radio, by cosmic rays and by other unseen wonders of Nature. The sun rises and sets with spectacular brilliance, yet it is a drama enacted as quietly as if performed with an electron tube which also merely seems to glow! But within it there may be a voice from Melbourne, news from London, or music from Paris. Turn on a television cathode-ray tube, and its face lights up with a picture of the United Nations meeting in New York, or the 80th Congress opening in Washington, or the Army-Navy football game in Philadelphia. No longer is the electron tube full of nothing!

New tools of science are opening man's eyes in the realm of the invisible. But we need not see to be convinced that science is a vivid reality beyond the range of human sight and hearing. Science works in no such narrow spectrum. We perceive evidence of this in new forces which extend the range of man's optic and auditory nerves. By radio, man now can hear even a whisper or the buzz of a bee across the seas; through the electron microscope, he peers into the realm of the molecule and the atom. By television, he sees beyond the horizon.

OHIO WAS THE FIRST STATE FROM WHICH A REPUBLICAN NATIONAL CONVENTION WAS BROADCAST. THAT WAS IN 1924 . . . AT CLEVELAND.

While these are inventions that open new vistas and widen man's earthly range beyond the microscope and telescope, we have ample proof that these forces are not confined to the surface of our planet. This world of ours actually spins in a boundless, inexhaustible laboratory. Radio beams flash through the ozone layer to probe through the dust of interstellar space. The plane that soars 40,000 feet to learn the secrets of cosmic rays, or the rockets that carry automatic recording instruments more than 100 miles into space, are but feeble short-distance efforts of man to pierce the upper atmosphere.

Radio is Relative of Light

Planes and rockets are mechanical devices and they meet the resistance of Nature. But radio, radar and television, travel on wings more closely allied with Nature. They will encounter less opposition as they mingle with meteors, the nebulae and galaxies. Radio, like sunlight, travels 186,000 miles a second. Indeed, radio is a relative of light and the shorter the radio waves, the more their kinship becomes apparent.

The radar "peep" that echoed from the moon was more than a faint signal of hope to radio scientists and astronomers. To them it was as important as the first feeble transatlantic signal to Marconi's ears when he plucked the letter "S" from the ocean air. That flash of three dots in the Morse code told him that world-wide radio communication was possible. Similarly, the radar signal from the moon proved that man might some day reach out to touch the planets; it revived speculation on interplanetary communication and inspired great hope for interstellar scientific exploration. With electronic computers, sensitive photoelectric cells and infrared eyes that see in the dark, the mystery story of the upper altitudes will become available for man to read. The telescope with its giant mirrors is no longer the only exploring eye for discovery above and beyond the earth. Man's perspectives and concepts of the universe are rapidly being broadened by science.

TURN ON A TELEVISION CATHODE-RAY TUBE, AND ITS FACE LIGHTS UP WITH A PICTURE OF THE UNITED NATIONS MEETING IN NEW YORK, OR THE 80TH CONGRESS OPENING IN WASHINGTON, OR THE ARMY-NAVY FOOTBALL GAME IN PHILADELPHIA.

Radio and radar have proved that space is not empty and we know now that it is accessible to man. He may even learn how to use the moon and the planets as radio sounding boards and reflectors, to bounce or relay broadcasts and to mirror television pictures. The moon is only 240,000 miles, or radiowise less than 2 seconds away. It looks like a good radio concession! We may find future broadcasters staking claims for Saturn, for Jupiter, or for Mars and Venus as well.

If it is within the scope and power of the inhabitants of another planet to eavesdrop on our radio and television broadcasts as well as on the multiplicity of radiotelegraph messages and news, our planetary neighbors must have a comprehensive idea of what sort of people we are and what sort of a place this world has turned out to be. It would be interesting to learn what our neighbors above really think of us below.

New Opportunities

Let no youth of today deplore the lack of opportunities. Look up at the Milky Way and behold a myriad of challenges for any lifetime. Science through radio and radar is providing new tools with which to explore electronics, chemistry and physics. New resources are to be found in space which may be captured and brought to earth, to be harnessed or synthesized for the welfare of mankind.

The chemistry of the atmosphere with its nitrogen, carbon, oxygen, hydrogen, the "noble gases" and perhaps other yet to be discovered elements or particles, represents intriguing continents of exploration. We now hear of a new component — the meson — believed to result from the interaction of the primary cosmic ray with atoms in the atmosphere. The so-called meson is estimated to have a mass 200 times that of the electron. Herein may exist a clue to devising a new source of energy to be harnessed and controlled by man.

The mystery of the atom, including its nuclear physics and the curious chemical isotopes, traces unlimited frontiers that beckon youth, just as the telegraph instrument enchanted the newsboy Edison. The dots and dashes that imprinted messages on his imaginative mind now find their modern counterpart in the explosions of atomic fission—in radar pulses and in the impact of cosmic rays.

Science is soaring to new altitudes. In the upper atmosphere there are new wonders of the future, new benefits for the welfare of all people, new power for industry and transportation. In the stratosphere lie swift routes between nations and broad highways to new continents in physics and chemistry.

Air Has Become Common Medium

The explorer who now seeks, as Columbus did, a new passage to India, or a Northwest passage as did Sir John Franklin, must traverse high altitudes. The links to world union will be welded in space. Today, the air is the common passageway of mankind where once it was the land and the water. The air, of course, has been ever present, but man did not learn how to use it until the turn of the century when radio and aviation were born. As a result of the vision of Marconi and the Wrights, and others who followed them, the air has become a common medium that brings nations together. By radio, Moscow and Chungking are as near to Washington as Cincinnati and New York. By airplane the great cities of the world are only hours apart.

Radio now spans the gaps of the hemisphere, leaps frontiers, ignores boundaries and cannot be stopped by any man-made political "curtain." For radio goes everywhere — and through word and picture can bring information and understanding to all peoples of the world.

Already we are on the threshold of individual radio communication. A motorist on the streets of New York may talk with a friend in Bombay, or with a relative on a ship somewhere on the Seven Seas. The day is coming when radio will speak man to man, and television will place them face to face in New York, London or Shanghai. All this is the essence of one world.

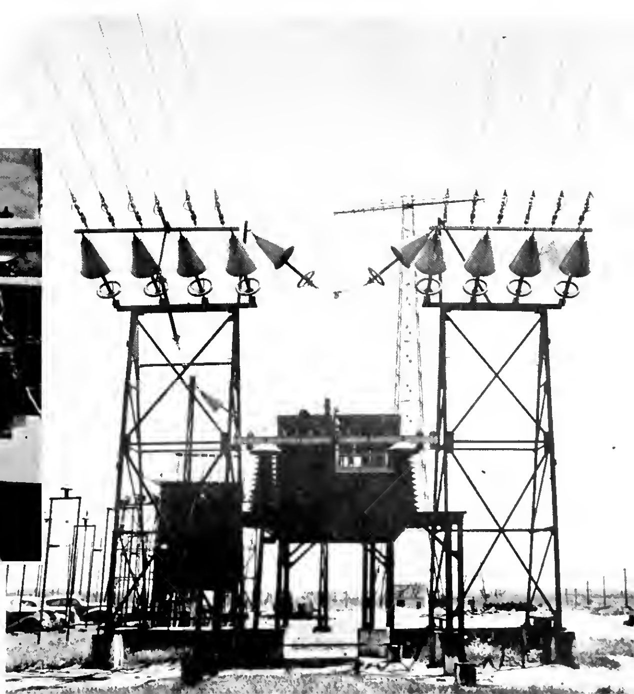
Distance Is No Security

These remarkable advances of science emphasize the importance of the United Nations and its responsibilities to world welfare. Space has been a formidable fort throughout the ages. Enemies had to get within range by arrow, shot or shell in order to wage warfare. But science has shrunk space, and distance no longer provides protection or national security. Today's weapons are not confined to a range of a few miles as in the past. In World War II, big guns showered projectiles across the English Channel. Robot bombs and rockets travelled even greater distances and were directed to their targets by radio. Shells carried radio proximity fuses which caused them to explode when close to the target, whether it was a ship or a plane.

Now, if a missile is launched into the stratosphere to travel at 3,000 miles an hour as predicted for the decade of the Fifties, then space completely fades as a bulwark of defense. Hindenburg, Maginot, and Siegfried Lines are crumbled fables of the past. Trench, channel, river, mountain or forest are part of the past's outmoded military strategy, rendered impotent by science. By radio and radar a high-speed missile, loaded with germs or explosives, can be guided with such precision that the Atlantic and Pacific are no more effective in preventing attack than was the Delaware River when Washington crossed it.

RADIO NOW SPANS THE GAPS OF THE HEMISPHERES, LEAPS FRONTIERS, IGNORES BOUNDARIES AND CANNOT BE STOPPED BY ANY MAN-MADE POLITICAL "CURTAIN".

THE RADAR "PEEP" THAT ECHOED FROM THE MOON . . . WAS AS IMPORTANT AS THE FIRST FEEBLE TRANSATLANTIC SIGNAL TO MARCONI'S EARS WHEN HE PLUCKED THE LETTER "S" FROM THE OCEAN AIR.



ROBOT BOMBS AND ROCKETS WERE DIRECTED TO THEIR TARGETS BY RADIO.

A nation that is complacent and ignores the swift advances of science courts disaster; for ignorance and weakness lead to destruction. Therefore, America must foster research, advance its industry and continually bolster its national defense with modern science. We must maintain our strength and thus help to preserve our national security. Law and order, based on strong foundations can best protect the peace. Our country staunchly believes in the United Nations and has given proof of its willingness to cooperate fully in efforts to achieve international understanding and world peace. But the United States must remain a mighty power so that its world-wide policies and its international relations are not based upon fear. Fear itself can destroy our freedom. Freedom of science must prevail. Research must be stimulated and advanced through the scientific training of American youth in Government, industrial and university laboratories. The pursuit of science is a task that never ends.

The world has had a war in which science was predominant. As the months turned on the calendar of 1946, it became more and more apparent that the world needs a peace in which science will play the constructive role. Science in wartime proved that it possesses immense and dynamic power for good or for evil; it can advance or destroy civilization. The new forces which science has released must be made to serve the ends of peace. And the path to peace must be found by men of good will whose capacity for leadership is matched by courage, vision and imagination. Such qualities of heart and mind would recognize the need for organized research in the social as well as the physical sciences — research that reaches for higher altitudes and points the way upward in man's eternal quest for peace and plenty, freedom and happiness.

But to achieve these blessings, it is not enough for mankind simply to explore in the vastness of space for new material conquests. Man must also raise his social sights. At the new altitudes he must seek and find the faith and inspiration that will enable him to express the true purpose of science—which is to provide for all mankind a good life and a lasting peace.

RESEARCH MUST BE STIMULATED AND ADVANCED THROUGH THE SCIENTIFIC TRAINING OF AMERICAN YOUTH IN GOVERNMENT, INDUSTRIAL AND UNIVERSITY LABORATORIES. THE PURSUIT OF SCIENCE IS A TASK THAT NEVER ENDS.

TYPICAL SCENE IN WEATHER FORECASTING OFFICE SHOWING SOME OF THE INSTRUMENTS THAT WILL SUPPLY INFORMATION TO ELECTRONIC COMPUTERS.

CAN STORMS BE CONTROLLED

Dr. V. K. Zworykin Discusses Possibilities of Weather Control and Significance of the Electronic Computer.

CONTROL of hurricanes, prevention of killing frosts, and precipitation of rain in dry areas are possibilities of an electronic weather forecaster now in its early stage of development, Dr. V. K. Zworykin, Vice President and Technical Consultant of the RCA Laboratories Division, Princeton, N. J., told a joint meeting of the American Meteorological Society and the Institute of Aeronautical Sciences at the Hotel Astor, January 30.

Pointing to the great economic significance the new development may have for transportation, agriculture, and the saving of human life, Dr. Zworykin disclosed that the electronic forecaster also holds promise for accurate weather predictions over the entire globe.

The success of any overall system of weather prediction and control, Dr. Zworykin emphasized, will "require an increasing degree of cooperation between the peoples of the world. Only as a world-wide service can it attain its maximum effectiveness and yield its greatest benefits."

The principles of an electronic computer now being developed at RCA Laboratories, with the cooperation of Dr. John von Neumann of the Institute for Advanced Study at Princeton, N. J., Dr. Zworykin said, can be used in the construction of an electronic forecaster. This would enable the making of reliable weather forecasts for days ahead in a matter of minutes. But even more important, Dr. Zworykin pointed out, may be its application in the control of weather, not over vast areas but in modifying such local conditions as dangerous storms, droughts, frosts, and fogs.

At present, the meteorologist has two methods upon which he bases his predictions, Dr. Zworykin explained. They involve application of the laws of physics and comparisons of new weather maps with old ones, and are based on information gathered at meteorological stations covering an extended area. In practice, accurate forecasts require a synthesis of the two approaches. However, Dr. Zworykin continued, if all the information is considered to its fullest extent, the prediction cannot be completed in time to be of value.

Previous methods of changing the weather, he said, have been successful only on a small scale because of their cost and the fact that it has been impossible to determine where the control should be applied for maximum effect. The electronic forecaster, he said, will supply this guidance.

"The hope for effective weather control rests in the fact that the condition preceding many of the weather processes which it may be desirable to control is essentially unstable or metastable, characterized by the accumulation of large amounts of potential energy during an extended period," continued Dr. Zworykin. "Thus, while the energy finally released may be enormous, that required to trigger the release may be quite modest. Furthermore, the magnitude of the triggering energy required will greatly depend on the time and place at which it is applied. Since the electronic forecaster should make it possible to observe the effect of applying given amounts of energy at different points of the weather map almost instantaneously, it will point the way to the most economic measures which will lead to the desired change in the evolution of the weather.

"Consider as a specific application the control of tropical hurricanes which periodically wreak havoc in Florida and along the Gulf coast. These storms originate in the Belt of the Doldrums, off the west coast of Africa and a few degrees north of the equator. Two possible ways offer themselves for affecting the evolution of the hurricane. The building up of the hurricane can be prevented by interfering with the storage of energy within the storm area, or the hurricane once formed can be deflected into regions where it is allowed to dissipate itself with the least damage."

Where these counter measures should be put into effect, Dr. Zworykin said, could be determined beforehand by a series of model experiments on the electronic forecaster, which will be a computing

WEATHER CONDITIONS IN THE UPPER AIR ARE RECORDED BY SENSITIVE INSTRUMENTS CARRIED ALOFT BY BALLOONS.

device capable of automatically handling vast amounts of weather calculations.

Two methods are available, Dr. Zworykin explained, for providing the energy needed to alter the evolution of weather changes. A combustible substance such as oil might be spread on water over a considerable area and ignited. This would add energy directly to the air, causing an updraft and affecting the air movement in the surrounding region. Similar results, he said, might be obtained by using the sun's radiations to modify weather conditions. This, he said, could be accomplished in several ways.

Weather control patches blackened by deposits of carbon could be established at strategic points to act similarly to the large burned-over blackened land areas in South Africa which have been found to be centers of repeated thunderstorms. In contrast, he said, these same areas could, at will, be converted into highly reflecting areas by covering them with artificial fog using techniques widely applied in the war. Here again, Dr. Zworykin pointed out, the electronic forecaster could be used to deduce the most advantageous location and the required magnitude of such patches to produce the desired effect.

In subsequent comments on the electronic computer and the myriad facts that it will be called upon to handle, Dr. Zworykin used as an example, the relatively simple atmospheric phenomena that produce rainfalls.

He pointed out that the sun's rays, striking the earth, raise the temperature of the soil which causes the moisture to evaporate. This vapor rises into the air to a height of a mile or more. As the moisture moves upward through the rarified air, it expands and is chilled, forming clouds. As the chilling continues, the moisture condenses into droplets which fall to the earth as rain.

This process is affected by a multitude of factors including the constantly changing temperatures of earth and air, variations in air pressure and humidity, and the velocity and direction of wind currents at different altitudes.

Although much of this information is available today, Dr. Zworykin said it would take so long to collect and interpret it fully, using existing methods and machines, that the weather would undergo a complete change before the computations could be completed, even though the forecast were limited to a small area.

For long-range forecasting, he added, meteorologists are supplied with only a small fraction of essential data. For that reason, they must make approximations based on their knowledge of atmospheric changes which are known to have resulted from a combination of similar factors.

GLASSFORD APPOINTED TO EUROPEAN POST

Vice-Admiral William A. Glassford, U.S.N. (Ret.), has been appointed European Manager for activities of the Radio Corporation of America in the United Kingdom and on the Continent of Europe. His headquarters will be at 43 Berkeley Square, London.

Admiral Glassford served with distinction in World War I and World War II, and upon conclusion of the latter conflict became Commander of U. S. Naval Forces in Germany, in control of sea communications for the U. S. Army of Occupation. He participated in negotiations with the British, French and Germans in solving German and Austrian inland water-way problems, and was American representative on the Tripartite Commission with the British and Russians for division of the German Fleet and Merchant Marine.

Admiral Glassford's retirement from the Navy became effective on March 1, after 45 years of service.

NEW TELEVISION SCREEN GIVES BRIGHTER IMAGES

Projection-type home television receivers providing pictures two and one-half times brighter than earlier large-screen models, made possible by a newly-developed screen, were shown publicly for the first time before the New York Section of the Institute of Radio Engineers on April 2. Antony Wright, Chief of the RCA Victor Television Receiver Design Section, and Edwin L. Clark, Senior Engineer of the Section who jointly conducted the demonstration, revealed that the new screen will be employed in RCA's projection television receivers which are scheduled for commercial distribution this year. The large pictures of greater brilliance provided by this screen are expected to extend television's usefulness in public places, schools and auditoriums, and in the home.

The screen is a development of the RCA Laboratories Division and is based on a new application of plastics. Incorporated in a console type receiver, it presented a picture 15 x 20 inches, about the size of a standard newspaper page.

HOW RECORDS ARE MADE

Today's Discs are Produced by the Finest Musical Talent, Combined with Expert Factory Skills using Ingredients from Many Countries.

By W. T. Warrender
General Plant Manager, RCA Victor Record Dept.

A TURBANED man raising bugs in India and the leader of a symphony orchestra or jazz band have a share in producing the music records of today. So do electrical engineers, sound engineers, chemists, clay diggers in the midwest, gold miners in the Far West, music directors and air-conditioning experts.

In fact, that plain-looking little black disc that music lovers have taken for granted for so long is the end-result of a complicated series of operations that reach to the four corners of the globe. The job of producing it is a combination of the exotic with the matter-of-fact operations of a giant industry.

The making of a record can be broken down into three main phases: the complex science of reproduction of sound; the artists whose performances are recorded, and the materials that go into the physical structure of the record itself.

Chief ingredients of a disc are shellac, which comes mainly from the secretion of an insect cultivated in India; gums from the Philippines and Africa; fine limestone from Indiana; red slate from Pennsylvania; carbon black and many other materials.

First step in the making of a record, of course, takes place in the studio where the performance is placed on the master record, and here one sees the scientific side of the job developed to its finest point. In the RCA Victor studios in New York, as an example, one notes upon entering that walls and ceilings have been carefully processed to achieve acoustical perfection. At the end of a room is a glass-enclosed booth, the control room, nerve center of the establishment. In this room is the monitor panel, where the control engineer controls the quality and loudness of the music. In this room also are the amplifiers which increase the volume of sound picked up by the super-sensitive RCA microphones outside, where musicians or other artists operate. Here also are the recording machines, which cut the master record.

In the studio outside the control room a popular band is "warming up" for a recording. There is an informal atmosphere as the musicians get into the mood. The selection to be recorded is rehearsed until it meets the approval of the leader, who is inside the control room with the engineers, listening to the music as it will sound on a record.

Through the control room window the band leader gesticulates to his musicians as the amplifiers register the results of their rehearsals. The instrumentalists are moved back and forth until the desired balance is attained. Then the number is played through as it would be played for the record. The control engineers, the recording supervisor, the band leader and the players are satisfied. Now they're ready to make a recording.

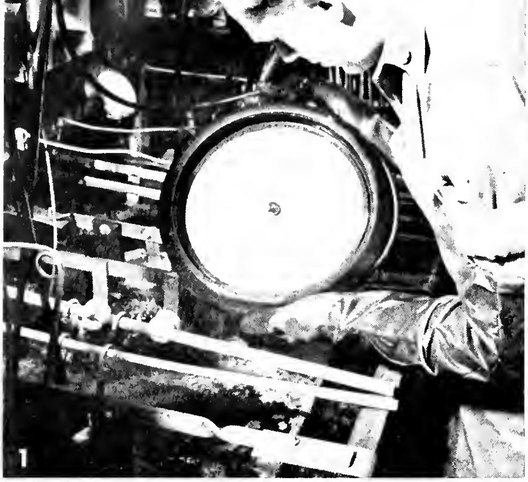
Preparing to Make a Record

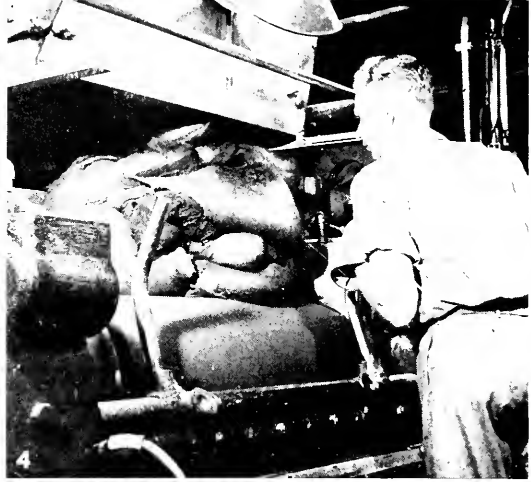
It's a far cry from the RCA Victor recording studio, where a big name band is about to impress a tune on wax, to a big industrial plant, a cross-roads diner, an isolated farm or a luxurious apartment where the record is spinning out the tune. It's a far cry but it starts this way:

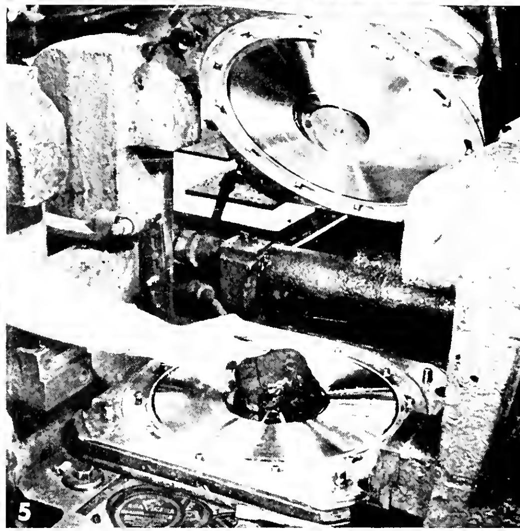
A saxophone player in the band takes off his shoes, places them beside his chair in the recording studio and wiggles his toes. A

THE RECORDING ENGRAVED ON THE LACQUER DISC IN FOREGROUND IS TRANSFERRED TO WAX DISCS IN THE REAR.

STOP WATCH IN HAND, A RECORDING ENGINEER CHECKS ON AN ORCHESTRA AS IT "CUTS" A RECORD IN AN RCA VICTOR RECORDING STUDIO.







couple of other instrumentalists linger over bottles of soda pop. Another peels off his coat and rolls up his shirt sleeves, while the band leader moves nonchalantly about.

Technicians in the glass-enclosed control room meanwhile watch the bandmen; they're waiting until the players are in "the Groove" or sufficiently relaxed to go ahead with the session. Finally the band is drawn together; it runs through the tune several times. With sound engineers, recording supervisors and players satisfied with rehearsals, one or more test records are made and played back so that the performers themselves can hear just how their rendition sounds. This allows, too, for the last minute changes. Now the men in the control room go into action. Onto a turntable goes a master lacquer disc. Then the signal for the final recording is given. A buzzer sounds. A light flashes on.

Outside, in the studio proper, the band begins to play, and as the microphones carry the vibrations from studio to control room turntable, a stylus cuts into the disc on the revolving turntable, registering vibrations produced by the music.

When the recording is finished, the next step is to transfer the cutting on the master to several wax coated discs. Each disc then undergoes a "gold-sputtering process." First the wax is cleaned with nitrogen. Then it is placed in a vacuum chamber in which there is a large sheet of 24-karat gold. An electric current of 2,500 volts is turned into the chamber and for 12 minutes this current produces a vapor of gold that covers the wax impression. The gold, being of molecular structure, fills in the most minute grooves of the record. It is so thin as to be transparent, about two millionths of an inch.

HOW RECORDS ARE PRESSED

1—THE WAX DISC, COVERED WITH A THIN FILM OF GOLD, IS LOWERED INTO A COPPER PLATING BATH TO MAKE IT MORE RIGID.

2—THE GOLD-FACED MASTER RECORD WITH COPPER BACKING IS STRIPPED FROM THE WAX DISC, AFTER WHICH IT IS NICKEL PLATED AND AGAIN COVERED WITH COPPER.

3—INGREDIENTS THAT GO INTO THE COMMERCIAL DISC ARE CAREFULLY WEIGHED AND MIXED.

4—AFTER MIXING, THE COMPOUND IS RUN THROUGH ROLLERS AND PRESSED TO THE CORRECT THICKNESS.

5—"BISCUITS" OF COMPOUND ARE PLACED BETWEEN THE TWO STEAM-HEATED MOLDS REPRESENTING BOTH SIDES OF THE RECORDING AND SQUEEZED UNDER HEAVY PRESSURE.

6—THE COMPLETED RECORD IS STRIPPED FROM THE MOLD, AND EXCESS COMPOUND TRIMMED FROM THE DISC.

Copper Applied to Wax Surface

Next step in the process is to apply electro-chemically, a thick layer of pure copper to the gold-covered wax surface. It is only when every part of the wax surface has been made electrically conductive by the gold sputtering that it can receive the copper plating. The wax is suspended in a copper plating solution which is constantly circulated and filtered. The wax disc is kept rotating in this solution in order to insure a uniform coating. When the disc is removed after four hours, it has a perfect copper coating 20 thousandths of an inch thick over the gold surface.

To produce the huge number of RCA Victor Records demanded by the public it is necessary to make duplicate molds and record stampers. This is accomplished by stripping the gold-faced copper master, which has been produced, from the wax disc. The gold surface is then treated, nickel is plated on it and copper plated against the nickel through electroplating baths. Now the two surfaces are separated, creating a nickel mold and a gold master. The latter goes into RCA Victor's priceless treasure vault of masters while the mold is nickel plated and the same process repeated. Next the two nickel surfaces are separated or stripped, leaving the original nickel mold and a new nickel stamper which is used to press out the finished record. The mold may be used to make any number of stampers.

Following the making of the "master record" at the studios, and from that the duplicate matrices or metal stamping discs at the factories, the making of a record becomes a matter of combining the ingredients of which the disc is composed and pressing out the finished product.

With infinite care the workmen carefully mix and blend the dozen ingredients. After a precise screening operation, the blended materials are drawn off in a powdered form and dumped into one of the most amazing machines in the record industry—the Banbury mixer.

In the Banbury mixer, the record ingredients are thoroughly blended and fused into a black, plastic mass resembling asphalt. Steaming hot, this material is dropped on a rolling machine which kneads it back and forth like a monster rolling pin, finally sheeting it on a long conveyor belt on which it moves through a set of revolving knives that cut it into sections known as "biscuits", each biscuit containing sufficient material to make a record.

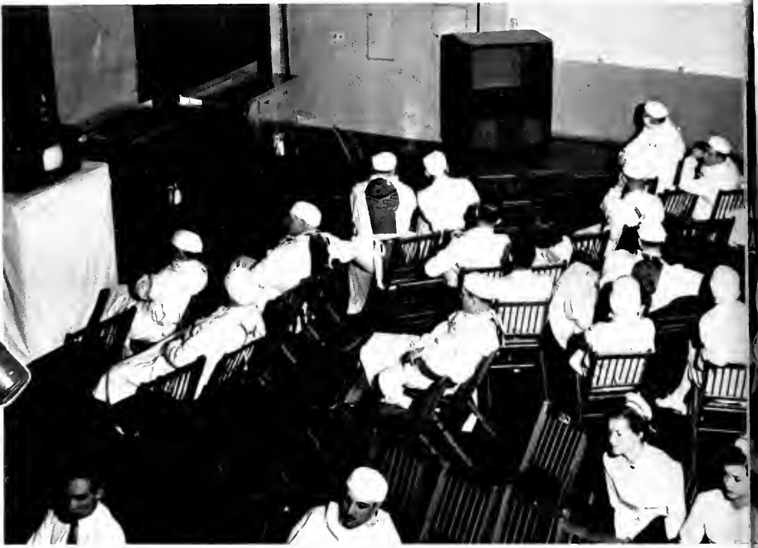
The operation now moves into the pressing department. As previously explained, metal stampers have been formed from the duplicates made from the master record, the number of stampers being determined by the number of records to be made and the speed with which an order is to be filled.

Two metal stampers are required

(Continued on Page 31)

IN THIS TEST BOOTH, EACH RECORD IS INSPECTED FOR QUALITY AND FREEDOM FROM SURFACE IMPERFECTIONS.

SURGEONS, INTERNES AND NURSES STUDY OPERATING TECHNIQUES FROM SCREENS OF RCA VICTOR RECEIVERS INSTALLED IN A VIEWING ROOM AT JOHNS HOPKINS HOSPITAL IN BALTIMORE.



RBED IN MASK AND CAP, A TELEVISION GINEER FOCUSES HIS IMAGE ORTHICON CAMERA ON THE OPERATING TABLE.

Hospital Television

More Than 300 Doctors and Surgeons Witness "Blue" Baby Operations on Television Screens During Baltimore Demonstration.

THE use of television as a means of explaining surgical techniques to large groups of doctors, surgeons and medical students was demonstrated by RCA Victor Division during actual operations at Johns Hopkins University and Hospital in Baltimore on February 27, 28 and 29. Reception of the images was restricted to receivers in rooms on the operating floor of the hospital.

The experiment was arranged by Dr. I. Ridgeway Trimble and Dr. Frederick M. Reese of the hospital staff, with the approval of Dr. Edwin L. Crosby, director of the hospital, to permit 300 members of the Johns Hopkins Medical and Surgical Association to witness the operations.

The first operation to be televised was the so-called "blue" baby operation. Other operations, including a second "blue" baby operation, were televised on succeeding days.

Two super-sensitive RCA Image Orthicon cameras were used. One was mounted above the operating table to give a detailed view of the operation. The second camera, equipped with a telephoto lens, was set up in the gallery of the amphitheatre.

Surgeon Described Operation

The camera directly over the operating table was pre-set and controlled automatically. A suspended microphone permitted the surgeon to comment as the operation progressed.

Ten RCA Victor receivers, including the new 10-inch direct view table model and two large screen projection models were installed in the viewing rooms.

Commenting on the experiment, Dr. Crosby said, "Adequate observation facilities to teach surgical techniques have long been a serious problem. The physical limitations of amphitheatres sharply restrict the visibility of the operating field. Television has brought the operative field within the critical sight of large numbers of doctors and students, and will permit them to witness many operations. The experience, although short, with this experiment, indicates that television may be extremely valuable in this type of teaching.

After the demonstrations, Dr. Trimble declared that the results were "highly gratifying and indicate a possible modification in surgical teaching." He said the new method might affect construction of operating amphitheatres and said the technique also had the advantage of reducing even further the possibility of infection. Properly aligned lights and television camera, he continued, would permit the clear reception of almost all operations.

TELEVISION FOR ST. LOUIS

Post-Dispatch Station Goes On the Air with Latest Television Equipment.

THE race for the honor of being the first newly equipped postwar television station to go on the air with regular schedules has been won by KSD-TV, St. Louis, Mo., with assistance from the Radio Corporation of America and the Interstate Supply Company, RCA Victor distributors in St. Louis. Although video transmissions were inaugurated February 8, officials of the St. Louis *Post-Dispatch*, owner of the new television station, selected Edison Centennial Week, beginning February 10, as the time to launch programs on daily schedules.

Attracted by advertisements in local newspapers, the public responded enthusiastically to the new entertainment service. Thousands flocked to the stores where television sets were on display and for sale. In some places the throngs blocked the store entrances. Within a short time after their arrival the first shipment of several hundred RCA table model television receivers had been snapped up by eager St. Louisans. Sponsors, too, were not long in making their appearance. Thirteen firms bought time on KSD-TV during Edison Week.

As the opening date approached and certain pieces of equipment had failed to arrive, KSD-TV officials flew in the essential units from the RCA Victor plant in Camden, N. J. Included in the airborne shipment were several RCA image orthicon cameras which because of their supersensitivity were widely used during the first week in picking-up street interviews, fashion shows and sporting events outside the studios.

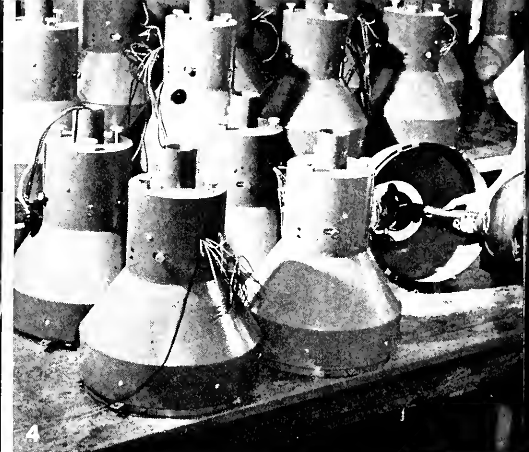
The temporary transmitter and antenna provide an effective range of about ten miles but the permanent units which are expected to be operating some time this month will include a 20 k.w. RCA transmitter with a range from 35 to 40 miles. The antenna will then be erected on a tower atop the *Post-Dispatch* building, 550 feet above the street and will deliver signals over an area of 4,300 square miles serving an estimated population of nearly one and one-half million.

Superiority of postwar equipment was immediately noted on the screens of RCA receivers. Experts rated the images the best yet achieved in actual transmission.

To give flexibility in programming, the station's facilities include an RCA radio relay link transmitter and receiver and an RCA 16 mm. projector and film camera.

ROBERT COE, CHIEF ENGINEER OF KSD-TV, AND RCA ENGINEER ED RISK EXAMINE TELEVISION CAMERA AND CONTROL.

STUDIO OF KSD-TV AS VIEWED FROM THE CONTROL ROOM. RCA EQUIPMENT IS USED THROUGHOUT.



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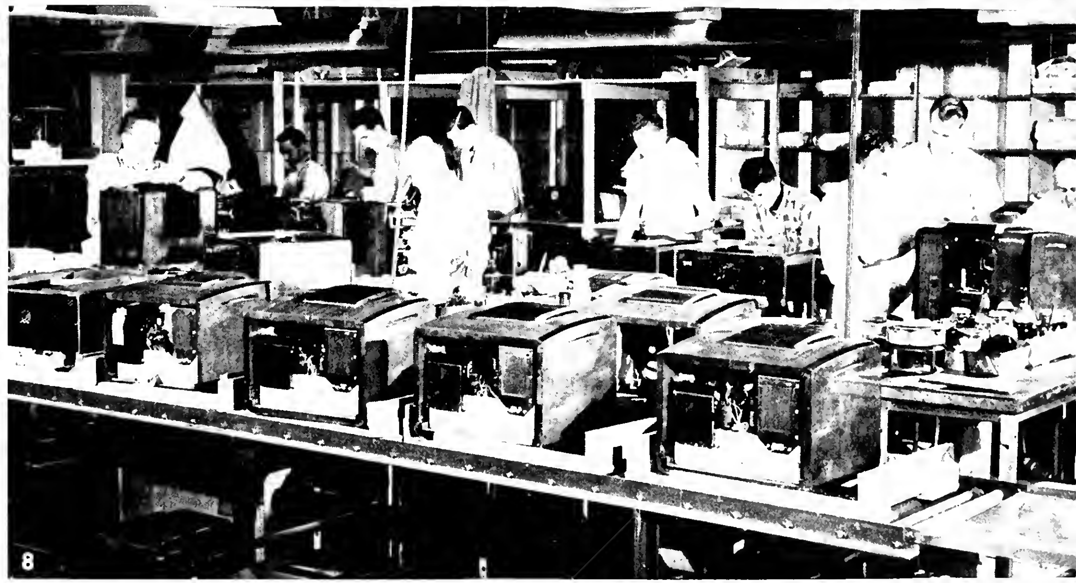
NES FROM RCA PLANT[illegible]ORIES



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1 Curved antenna and driving motor of a [illegible] radar equipment being inspected [illegible] Corporation of America.

2 Technician at RCA Industry Service [illegible] precision check on a component [illegible]

3 Skilled girls draw intricate diagram[illegible] at the Industry Service [illegible]

4 Twelve-inch cathode-ray [illegible]

RCA Makes Annual Report to Stockholders

Reconversion to Peacetime Operations Has Laid Foundation for Increased Commercial Activity—Financial Results for 1946—Television Activity Increases.

RE-ESTABLISHMENT by RCA of peacetime commercial operations in the service of the nation and the public was announced by Chairman James G. Harbord and President David Sarnoff, speaking for the Board of Directors, in a joint statement issued February 27 to the Corporation's 218,000 stockholders. As a result, they said, foundations were laid for increased commercial activity throughout the entire RCA organization.

Net earnings of Radio Corporation of America in 1946 amounted to $10,985,053, equivalent to 56.4 cents per share of common stock. This compares with $11,317,068 in 1945, when earnings after payment of preferred dividends were equivalent to 58.8 cents per share.

Total gross income from all sources amounted to $236,980,770, representing a decrease of 15.2% compared with the total of $279,503,615 in 1945, when the Corporation was still engaged in filling substantial Government orders.

Personnel Increased in 1946

As of December 31, 1946, RCA personnel numbered 39,361, representing an increase of 6,376 over the total at the end of 1945. Various labor problems were solved by RCA without strikes during a year of widespread labor unrest throughout the country. RCA as a whole negotiated and maintained continuous relations with 37 separate labor unions.

In the manufacturing division of RCA the number of employees increased to a postwar high of 28,300 in December, 46% of whom were female employees. During the war, a total of 6,720 employees entered the armed forces and of this total, 3,493 have been re-employed. In addition, 4,171 veterans who were not former employees have been hired.

General wage increases were granted in the RCA Victor Division to the majority of hourly and salaried employees in an amount to provide average increases of at least 17½ cents per hour. An additional 5½-cent increase was granted to most employees in certain plants toward the end of the year. Average hourly earnings, excluding overtime, were $1.081 in December, an increase of 19.7% over December, 1945, and 60% over January, 1941. The average weekly take-home pay for hourly paid employees was $47.41 in December, an increase of 27.7% over December 1945, and 87% over January 1941.

Ten-Year Table of Operations

The Report contains a table of financial results achieved by RCA for the past ten years—year by year. This compilation shows that RCA has annual averages of: $194,475,000 gross income; $21,975,000 net profit before Federal income taxes; $12,416,000 Federal income taxes; net profit after income taxes of $9,558,000. The profit before taxes represents an annual average over the ten-year period of 11.3% of the gross income and an annual average of profit after taxes of 4.9%.

During the ten-year period, dividends paid to stockholders amounted in total to $60,086,242. Of this amount $32,376,346 was paid to preferred stockholders and $27,709,896 to common stockholders. During this same ten-year period the net worth of the corporation was increased by $39,108,225 and now is $101,876,817. The total earned surplus at December 31, 1946, amounted to $54,099,043, an increase of $5,060,916 over earned surplus at the end of 1945.

The RCA Victor Division, engaged in manufacturing and sales, exceeded the records it had established in production and merchandising during any previous peacetime year. Nevertheless, the availability of products at no time matched the demand, the Annual Report stated.

Nearly 1,500,000 units — including RCA Victor home radio, phonograph and television instruments — were produced during the year, despite the fact that manufacture was restricted by shortages of such items as wood cabinets, record changers, steel, plastics, and loudspeakers.

Television Prospects

The Report said that delivery of RCA super-sensitive television camera and field equipment during 1946 enhanced programming in general and greatly facilitated advances in the art of telecasting sports and news events. The prospect for new business in the television field was revealed to be good, with home receivers and transmitter apparatus in demand.

The year 1946, marking production of its billionth phonograph disc, was the best in the history of the RCA Victor record business. Coordinated efforts of manufacturing, engineering and purchasing departments made it possible to operate plants in Camden, Indianapolis and Hollywood to capacity during the entire year. A fourth record manufacturing plant at Canonsburg, Pa. is expected to begin operation this summer to help meet increased demand.

The RCA International Division, which has the responsibility for the foreign activities of RCA, ended the year with a back-log of orders that reached an all-time high, according to the Report. Contracts for RCA products were signed in many countries. One important transaction provided for modernization of Turkey's communication system and installation of Radiomarine equipment aboard 30 Turkish merchant ships.

The RCA Laboratories Division reported that its scientists and the research staff, having completed wartime assignments and responsibilities, directed their efforts in 1946 to research useful in developing new radio-electronic products and services. Their scientific achievements enabled engineers to put electrons to work in many new processes and applications, the Annual Report stated. At the same time, research pertaining to the national security was continued and intensified.

Recalling that color television pictures produced by all-electronic means were demonstrated publicly for the first time on October 30, 1946, at RCA Laboratories, the Report said the demonstration disclosed a revolutionary development in radio science as far-reaching as the creation of the original RCA all-electronic television system, which supplanted the mechanical discs used in the first black-and-white television operations.

"The new RCA electronic color television system is a major contribution to the television leadership of the United States," the Annual Report stated. "Like other developments of RCA Laboratories, it is available to the entire radio industry."

New Light-weight Microphone

The Report revealed development at RCA Laboratories of a new light-weight microphone for use in sound motion picture studios. The instrument was said to have twice the output of microphones previously used for such purposes. Scientists at the Laboratories also succeeded in reducing noise in sound reproduction systems, improving their fidelity as well as that of radio reception generally.

Based on extensive experience in the electronic computing field during the war, RCA Laboratories was disclosed to have established a program with the Institute for Advanced Study in Princeton to construct a universal all-electronic computing machine. It will solve almost instantly complicated problems in higher mathematics in such fields as electricity, acoustics, chemistry and other branches of engineering through use of a new type of electron tube known as the "Selectron".

RCA Communications, Inc. reported that in 1946 the volume of international radiotelegraph traffic it handled was the largest in the company's history. Commercial traffic increased more than sixteen per cent over the previous year. During the year, RCA completed the first phase of a modernization program through which its radio circuits are being converted from the old method of Morse operation to an automatic tape relay basis, providing faster and more efficient service.

New direct circuits were opened in 1946 with seven foreign centers and direct circuits were re-established with three additional countries. Use of the Tangier relay station, opened by RCA early in 1946, expedited traffic between United States and terminals in Russia and India. RCA now has direct communication with 60 countries.

The National Broadcasting Company, which celebrated its 20th Anniversary in 1946, surpassed all previous years in the scope of its services to the American public, in the size of the national audience attracted to its programs and in its volume of commercial business. The network entered 1947 with a total of 161 broadcasting stations, of which 155 are independent affiliates and six are owned by the Company —WNBC (formerly WEAF), New York; WRC, Washington; WTAM, Cleveland; WMAQ, Chicago; KOA, Denver; and KPO, San Francisco.

During the year, a staff of 65 experienced newsmen occupied reportorial posts in the principal world capitals and across the United States. NBC continued to expand its television program service, presenting new plays, national events, motion pictures and newsreels to the growing television audience in the New York metropolitan area.

Radiomarine Corporation of America, alert to the practical peacetime application of wartime radio-electronic aids to navigation, designed and added radar apparatus, as well as loran and other navigational advances to its line of equipment in 1946.

RCA Institutes, Inc., with veterans of World War II comprising three-fourths of its enrollment, had a total of 2,023 students during 1946, and at the year end its facilities were operating at full capacity. Augmenting the diversified technical courses in radio training, special courses in television technology were conducted during the year in New York and Los Angeles for the benefit of broadcast station engineers.

STUDIO LISTENERS VOTE ELECTRICALLY

A SMALL PUSH-BUTTON PERMITS EACH LISTENER TO REGISTER HIS VOTE WHEN DEBATES ARE STAGED IN NBC'S RADIO CITY STUDIOS.

INSPECTING THE CHART WHICH RECORDS THE VOTES OF THE STUDIO AUDIENCE.

NEW TUBE HAS "MEMORY"

"Selectron", Under Development at RCA Laboratories, Helps to Solve Complex Mathematical Problems With Lightning Speed.

DEVELOPMENT of a new electron tube with uncanny powers of "memory" was disclosed by Dr. Jan Rajchman, of RCA Laboratories, Princeton, N. J., in a paper presented March 4, to the 1947 National Convention of the Institute of Radio Engineers, at the Hotel Commodore, New York.

This unusual tube—known as the "Selectron"—has been designed for use in electronic calculating machines through which, according to Dr. Rajchman, it is possible to complete the multiplication of two numbers of as many as twelve digits (one thousand billions) in about a hundred-millionth of a second.

Calculations with this lightning-like speed are imperative, it was explained, in solving mathematical problems relating to supersonic air flow, atomic physics, weather predictions, and other scientific or technical equations in which ultra-rapid solution is a factor.

Dr. Rajchman emphasized that work on the Selectron is still in the laboratory stage and tubes of this type are not yet available commercially. He revealed, however, that RCA scientists contemplate using tubes of the Selectron type in an electronic computing machine being built in Princeton in cooperation with the Institute for Advanced Study.

One of the principal requirements of electronic computing machines, Dr. Rajchman reported, is that of "inner memory" such as that being achieved by the RCA Selectron tube. He said that this requirement arises from the fact that in solving equations fast registry and delivery must be made for long sequences of computations in order that the results of one operation become the data for a subsequent operation without the use of mechanical gadgets or humanly limited equipment.

Through its ability to retain data originally fed into the calculating machine and data subsequently accumulated in the process of computation, for arbitrarily long or short storing times, the Selectron makes it possible to compute the long sequences.

Each of multiple "on-off" signals, representing factors of the mathematical operation, is stored in terms of electrostatic charges on the surface of an insulator. This is called "writing". Two sets of tiny metallic wires at right angles to each other are located between the source of electrons and the insulating surface. These two sets create a checkerboard of windows which can be closed or opened to the passage of electrons at will.

The tiny metallic bars of the "windows" are internally connected in such a way that by applying "on-off" voltages to a relatively small number of sealed-in leads, the flow of electrons can be blocked from all except one selected window. This selection is part of the process accounting for the "memory" characteristics of the tube. During so-called storing periods, electrons pass through all the windows and forcefully maintain the potential of subdivided areas on the insulator.

In the experimental Selectron tubes under development at RCA Laboratories, Dr. Rajchman said, the source of electrons is an axial cathode. The Selectron has a capacity of 4,096—equal to 64 times 64—"on-off" signals. Dr. Rajchman disclosed that forty such tubes with a capacity of 163,840 "on-off" signals will be used in the electronic computing machine being constructed for the Institute for Advanced Study.

To register a signal during the bombardment of electrons, it was explained, a specific window is opened to the exclusion of all others, and a voltage pulse is applied to a metallic plate backing the insulating surface.

SMALL SIZE OF THE "SELECTRON" TUBE BELIES ITS UNUSUAL POWERS OF "MEMORY" IN HELPING TO SOLVE COMPLEX MATHEMATICAL PROBLEMS.

This pulse is negative or positive depending on the polarity of the signal and overpowers the local electronic locking mechanism. Immediately following this registration, all windows are opened again, and the previously registered potentials are locked in. For reading any signal, once more the proper window is opened at the exclusion of all others and a signal is obtained from the backing plate. The "writing" requires no previous erasing and takes only a few millionths of a second. The reading, which requires no scanning of undesired elements, follows the reading call by a few millionths of a second and can be repeated indefinitely.

Radio and Television Use Plastics

By J. A. Milling,
General Manager,
Parts Department,
RCA Victor Division

Innumerable Items Ranging from Cabinets to Small Parts Are Made from These Easily Worked Synthetic Materials.

TAKE half a pound of lifeless, grey powder pour it into a mold along with two bricklets of the same dull material; apply 200 tons of pressure and 340 degrees of heat, and three and a half minutes later, as surely as though a fairy godmother had waved her magic wand, out pops a beautiful, shiny black cabinet, intricate in design and rivaling the work of a master craftsman in its finished perfection. Cinderella never enjoyed a more miraculous transformation!

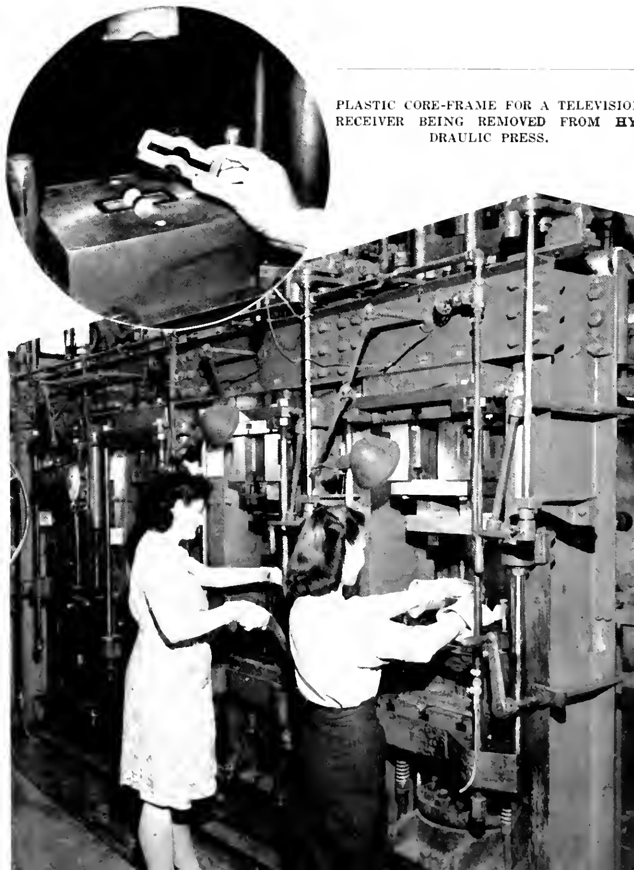
Almost a thousand variations of this same Cinderella act can be performed in the Plastics Section of the RCA Victor Division's Parts Department, Camden, N. J. There, plastic parts and components that find their way into practically every finished product the company makes are designed and manufactured. Little "preformed" balls of plastic powder ride into a press on a feeder tray and pop out again as finished bases for radio tubes, 49 at a time. Small preformed plastic discs vanish into a press to reappear, in almost less time than it takes to tell, as shining terminal boards for transformers.

Output of the Plastics Section ranges from tiny, bright-red pinjacks to highly polished plastic lenses for television receivers rivaling the best optical glass in refracting qualities at a fraction of the cost of glass. Typical products are control knobs, decorative and utilitarian, for every kind of equipment; cabinets for small radios and intercommunication systems; coil forms; meter cases; capacitor bases; spools; lenses, etc.

R. V. Beshgetoor was summoned from the company's Argentina plant in 1941 to organize the plastics operation in Camden. He is now merchandise manager of the Plastics Section which is a branch of the Parts Department. Earl F. Selby is production manager and J. S. Bokeeno is Engineer in Charge of the Plastics Molding Section.

The use of plastics by RCA has paralleled the expanding history of the plastics industry, for the natural characteristics of certain plastics are of special value in radio equipment. Polystyrene, for example, has a remarkably low-loss factor which makes it almost invaluable in high-frequency radio equipment. Many other plastics are excellent electrical insulators. Since the beginnings of the new "Plastic Age," in the second decade of this century, other characteristics of plastics have resulted in their gradual introduction in many radio applications, as replacements for wood, glass, and metal.

Plastics are cheaper, as well as



PLASTIC CORE-FRAME FOR A TELEVISION RECEIVER BEING REMOVED FROM HYDRAULIC PRESS.

GANGS OF HUGE PRESSES QUICKLY CONVERT PLASTIC MIXTURES INTO POLISHED PARTS FOR RADIO EQUIPMENT.

better, in many applications. Plastics are easy to mold. Complicated and expensive machining costs are eliminated. The finishing costs of plastics are relatively small, and there's no need for sanding, polishing, or painting. After the removal of a slight bit of "flash" or excess material squeezed out of the mold, the finished part is ready for the assembly line.

Plastic parts are "born beautiful," with smooth gleaming surfaces, in any color of the rainbow. The color won't wear or chip off, because it's inherent in the material. Plastics are also warm and pleasant to the touch.

Wartime Achievements

Armed with all the know-how of plastics, the Plastics Section serves as counselor to the company's technicians and design engineers on proper applications and materials. During the war, the Section found itself faced with the unusual problem of finding a rugged plastic for the nose piece of the proximity fuse, a tiny sending and receiving radio station that searched out enemy targets and detonated shells with the most lethal effect. The problem was to find or develop a plastic that would stand the shattering impact of being fired out of a cannon. The Plastics Section molded parts of all available materials, until finally a plastic tough enough to meet these requirements was demonstrated and approved by the Armed Services.

Another wartime achievement was the molding of parts of the sound-power telephone developed by RCA, which saw wide service on all types of Navy ships, operated without batteries, on power generated by the voice of the user.

Two basic types of plastic compounds are used in the manufacture of plastic products. These are "thermosetting" and "thermoplastic" materials. Among the thermosetting materials are the formaldehydes of phenol, urea, and melamine. These materials are usually cheaper than the thermoplastics, will withstand heat better, and harden permanently when molded. They are used in the manufacture of knobs, tube bases, cabinets, and terminal boards.

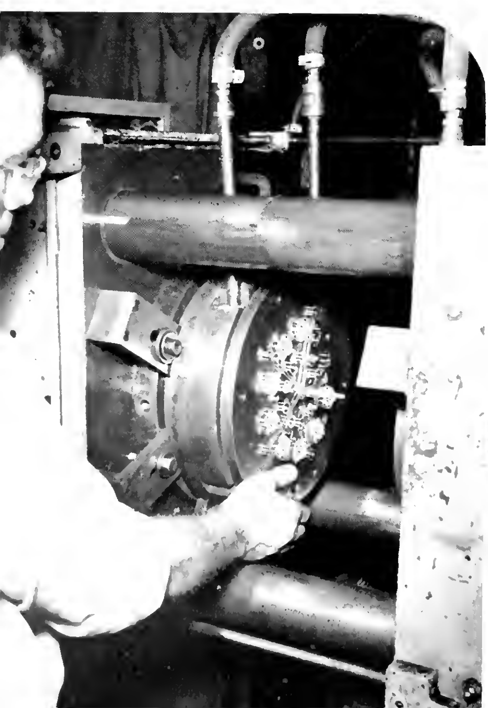
The thermoplastics, on the other hand, soften when heated and harden again upon being chilled. The Plastics Section uses such thermoplastics as Polystyrene, Plexiglas, cerex, and nylon (the same nylon that sheathes milady's limbs) in the manufacture of fine television lenses, transparent and delicately shaded knobs, and for meter cases with transparent faces.

Exerts Pressure of 1,500 Tons

Specialized machinery used in the Plastics Section ranges from a king-size "hobbing press," having the tremendous compressive force of 3,000,000 lbs. down to a "baby" 7000 lbs. molding press. (The latter exerts a force sufficient to lift two automobiles.)

A variety of molding processes are used—some almost as simple as squeezing toothpaste out of a tube or baking a cake in an oven. Molding by compression, for instance, consists merely of applying heat and pressure to a plastic powder confined in a mold of the desired shape. For molding more intricate or delicate shapes to accurate dimensions, the "transfer" method of molding is used in which the "raw material" is plasticized by heat and

FORMING THIN DISCS OF CRYSTAL-LIKE PLASTIC FOR USE AS ELECTRONIC INSULATORS.



ONE OF THE POWERFUL PRESSES AT THE RCA VICTOR PLANT TURNING OUT PLASTIC PARTS FOR RADIOS.

pressure in a transfer chamber, and then squeezed through an orifice into a closed mold, where it flows evenly around small inserts. "Injection" molding consists of heating the material and squirting it into a closed and chilled mold. In some cases, a combination of injection and compression molding is used. Some plastics are simply "cast" by pouring the liquid material into a mold and putting it in an oven to "cure" or set.

Feats in Lens Making

In a separate Optics Branch of the Plastics Section, spectacular feats in the art of lens-making have taken place. Molded lenses used to focus enlarged images in the RCA Victor large-screen television receivers, soon to be offered commercially, are among the impressive "firsts" chalked up by the Plastics Section. These lenses are rated as the most accurate parts ever molded in the plastics industry. The tolerances on the optical surfaces of these lenses are held to within ten millionths of an inch! The lenses have an index of refraction high enough to allow them to be used in place of fine optical glass yet they can be produced at a small fraction of the cost of glass lenses.

Another unusual lens, molded in the Optics Branch by a "blow" molding process in which air pressure is used to create the desired shape, is a large liquid-filled lens. Placed in front of a direct-viewing television receiver, it magnifies the image one and a half times.

The Plastics Section pioneered in the application of radio-frequency current in the preheating of plastic materials. Preheating drives out moisture and gases which might otherwise cause blisters in finished parts, and brings the temperature of the material up close to that of the mold, thus reducing the curing time as well as the molding pressure required. R-f preheating heats materials uniformly and greatly speeds up the process.

The Section has also done important development work on iron cores for coils and other radio parts. The molding of iron cores is within the scope of the Plastics Section because the material used is powdered iron compounded with a resin binder. The Section produced the first large, molded iron core used in high-voltage, yoke-deflecting transformers for all types of television receivers, reducing the cost to a sixth of that involved in making cores by the conventional use of laminations. Molding these cores takes a pressure of 60,000 pounds per square inch! Hundreds of other types of iron cores and associated coils were developed by the Plastics Section and are now in wide use throughout the radio industry.

A PLASTIC TELEVISION PROJECTION LENS IS CHECKED FOR FLAWS.

New Plastics Developed

Many more "workaday" firsts have been scored by the Plastics Section. Low-loss coil forms of polystyrene were developed by RCA engineers in the late '30s, and are now in general use throughout the industry for radio-frequency coils and transformers. The problem of dirt and moisture getting into and disturbing the delicate mechanisms of meter cases was solved by the development of a hermetically sealed meter case molded out of a transparent plastic material by the Plastics Section. In some cases, rigid requirements have actually led to the development of new materials. One such material, "Cerex," has unusual heat-resisting qualities as well as low-loss electrical properties. Cerex was developed as a result of requirements for parts used in military radio apparatus.

Ever on the alert for new applications of plastics to the products of RCA, the Plastics Section is a unique combination of production plant and engineering laboratory. The results are consistently lowered costs and improved quality as the new Plastics Age continually uncovers new and better plastic "wonder materials".

ELECTIONS

Election of Glen McDaniel as Vice President and General Counsel of RCA Communications, Inc., 66 Broad Street, was announced April 4 by Thompson H. Mitchell, Executive Vice President.

Mr. McDaniel joined RCA Communications as General Counsel in February, 1946, after serving as Chairman of the Navy Board of Contract Appeals and as Special Counsel to Secretary of the Navy James V. Forrestal when Mr. Forrestal was Under Secretary.

W. W. Watts, Vice President in Charge of the Engineering Products Department, RCA Victor Division, was elected on April 4 to the Board of Directors of Radiomarine Corporation of America, a service of RCA, it was announced by Charles J. Pannill, President.

Appointments of John G. Wilson as Vice President and General Manager of the RCA Victor Division; Fred D. Wilson as Vice President in charge of Operations and Joseph H. McConnell as Vice President in charge of Law and Finance, were announced April 8 by Frank M. Folsom, Executive Vice President of the Radio Corporation of America in charge of the RCA Victor Division.

FILAMENTS FOR MINIATURE TUBES ARE MADE BY RUNNING WIRE AS FINE AS SILK THROUGH THE DIAMOND DIES OF THIS MACHINE WHICH REDUCES THE WIRE DIAMETER TO ONE THIRD THE THICKNESS OF HUMAN HAIR.

CEMENTING INSULATORS TO THE WIRE LEADS IN THE BASE OF MINIATURE TUBES TO PREVENT ELECTRON LEAKAGE.

MINIATURE RADIO TUBES

Out of RCA Research Have Come 45 of the 50 Tiny Audions Which Are Finding Favor in the Radio Industry.

MANY years ago, RCA engineers saw the tremendous possibilities — technical and commercial—which would result from a miniature-size tube. Today, as a result of well-directed research and development, RCA's miniature tube line numbers more than 45 types comprising the most extensive line offered by any manufacturer and one that is constantly growing.

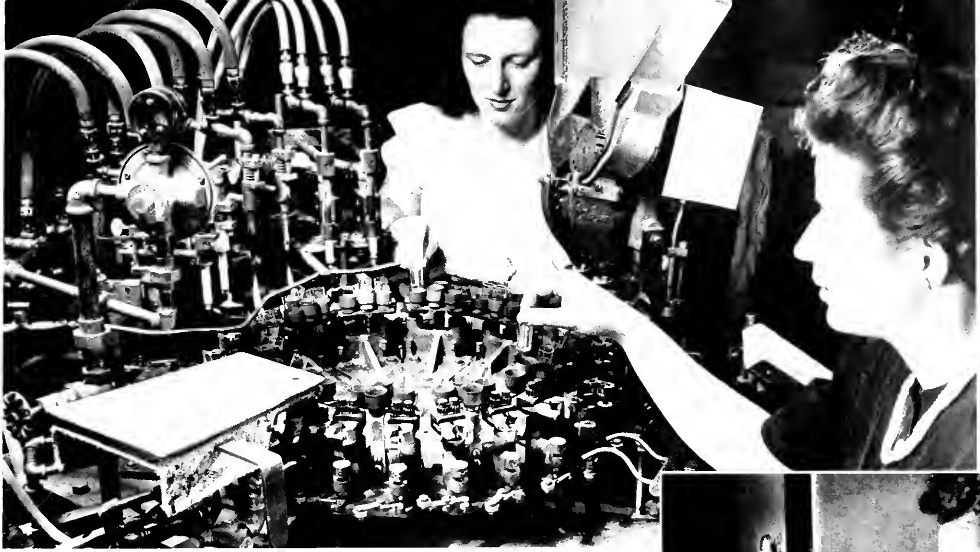
The obvious advantages of these "mighty midgets" insure a major role for them in many electronic applications—make them stand out even now as the "tube of the future". Savings in space, weight and materials, combined with performance which equals, and in many instances surpasses that of the conventional metal and glass types, are major factors leading to their incorporation in new circuit designs. Added to their adaptability, also, are such features as superior operation at high frequencies, low filament power consumption, and effective heat dissipation.

New and numerous applications of these small tubes in radio, AM and FM, television and industry, and in a host of electronic developments, are presenting bright horizons for miniature tubes sales.

The story of RCA's miniature tube development and manufacture is the history of miniature tubes. Success of the Tube Department's pioneering is reflected by the fact that 45 of the 50 miniature types in use were developed by RCA. What, then, are the factors which have contributed to this success and to RCA's pioneering position in miniature tube manufacture?

Once upon a time, the entire tube industry plodded along mak-

SLIDING A GLASS ENVELOPE WITH EXHAUST TUBE ATTACHED OVER THE ELEMENTS OF A MINIATURE TUBE.



THIS MACHINE SEALS A PIECE OF GLASS TUBING TO THE TOP OF EACH MINIATURE TUBE SO THAT AIR AND GASSES INSIDE THE ENVELOPE MAY BE EXHAUSTED.

ing tubes according to the old lamp manufacturing practice: a large glass bulb with the elements mounted inside in spacious grandeur, like fish in a bowl. But the electrodes, unsupported at the top of the bulb, often shifted in position, thereby short-circuiting and otherwise ruining the tube. Breaking with tradition, RCA tube engineers fixed a round piece of mica at the top of the electrode mount and reshaped the glass bulb so that the mica shouldered against it, anchoring the electrodes firmly.

A few years later—in 1935—along came the metal tube. Its effect also was to cut down the size of standard receiving tubes. At this point, the obstacle to further reduction in the size of tubes appeared to be the metal stem. It also offered a difficult production problem in that each of the tube leads required its separate glass insulator. These insulators had to be welded to a special alloy eyelet, and each eyelet had to be welded to the stem. This process involved the welding of as many as 17 tiny, separate parts. In 1938, RCA tube engineers found the answer. This was the button stem. The large stem was reduced to a little glass pancake surrounded by a metal ring, permitting the tube wires to run directly through it without the need for special insulators, eyelets, etc. Now the true miniature tube could be fashioned, and soon it came into existence in the development laboratories of the RCA plant at Harrison, N. J.

NBC EXECUTIVES MAKE NATIONWIDE TOUR

Following the opening session in New York, NBC representatives headed by President Niles Trammell and Executive Vice President Frank E. Mullen entrained March 13 for a nationwide tour during which they discussed problems of the broadcasting industry with station representatives in Chicago, Atlanta, Dallas and Los Angeles. Three-day meetings were held in each city.

In addition to Trammell and Mullen, the group included William S. Hedges, John F. Royal, Frank M. Russell, C. L. Menser, Ken R. Dyke, Easton C. Woolley, Hugh M. Beville, Charles P. Hammond, Sydney H. Eiges and Sheldon B. Hickox, Jr.

MACHINE SPRAYS MAGNESIUM OVER SMALL PIECES OF MICA USED FOR INSULATORS IN MINIATURE TUBES.

AGEING RACKS WHERE RCA MINIATURE TUBES ARE "SEASONED" BEFORE PACKAGING FOR SHIPMENT.

Students In NBC Competition

$1,000 Award to "University of the Air" Program Offered Teacher Trainees in UN Thesis Contest.

By Dr. James R. Angell

Public Service Counselor,
National Broadcasting Company

IN July 1942, the National Broadcasting Company, acting upon the recommendations of an advisory board of leading American educators, presented the first program in the University of the Air series of broadcasts. These broadcasts under the general title of "Lands of the Free" dramatized important events in American history. Since that time, the scope of the series has been extended to include programs in the widely diversified fields of music, politics, economics and literature. Today, the University of the Air is presenting five series including "Your United Nations," on current history; "The Story of Music;" "World's Great Novels;" "Home is What You Make it," on home economics, and "Our Foreign Policy," which offers authoritative discussions of this country's foreign relations.

In the five years of its existence, University of the Air has produced more than 25 different series of broadcasts.

It was, then, with a great sense of pride that the NBC learned early this year that the University of the Air had been selected by readers of *Magazine Digest* as the winner of that publication's special prize of $1,000 for "outstanding public service during 1946."

Upon notification of the honor, NBC decided that a happy event of this kind should be utilized as the occasion for a thorough reexamination of our achievements and our philosophy as well as for the establishment of new goals still farther ahead.

At the same time it was decided to utilize the award in full accordance with the terms of the *Magazine Digest* contest which stipulated that the prize must be used "to help others". Accordingly, the University of the Air announced that the $1,000 check will be devoted to a competition to be conducted among teacher-training students in the U. S. and Canada under the supervision of the American Association for the United Nations and the United Nations Society in Canada.

Contestants will be required to write a thesis from 1000 to 2000 words in length on "The Teacher and the United Nations," showing how teachers can promote the work and ideals of the United Nations.

Winning Paper to be Broadcast

The first prize winner will receive $300; second prize $200; third prize $100 and fourth prize $50. The next 14 winning contestants will receive $25 each. Final decisions will be made before May 25, 1947 by the board of judges consisting of Clark M. Eichelberger, director of the American Association for the United Nations; Dr. Willard E. Givens, executive secretary of the National Educational Association; Murray Simmons, editor of *Magazine Digest*, and the writer.

The winning paper will be utilized as the basis of a later broadcast on the "Your United Nations" series.

The NBC University of the Air is the first endeavor in network history in the United States to provide systematic subject-matter instruction in a carefully balanced variety of subjects, correlated with existing classroom instruction in colleges and universities throughout the nation. The radio institution has planned its curriculum in close consultation with outstanding educators representing every region of the United States, as well as many other American nations, in order that the broadcasts may have the maximum of practical utility for as many instructors as possible.

Radio Aids Home Study

For the general adult audience, numbered in millions, as well as for students in schools, the NBC University of the Air offers particular advantages over random radio scheduling. It gives to those who have never gone to college and to those whose college days are behind them, the opportunity, right in their own homes, to continue with systematic and up-to-the-minute education, under the most favorable and interesting conditions. Though each program of the NBC University of the Air is a complete unit in itself, and will stand quite alone for the casual listener, each is also an integrated link in a great chain of knowledge and is designed to encourage the casual listener to become a systematic listener, first to one entire series and, finally, to the rounded whole.

For the listener who finds his interest and imagination so stirred by the programs as to lead him on from the status of listener to that of student, the institution goes beyond the broadcasts on the air to meet his needs and to provide well-rounded education. This is done through the publication of comprehensive handbooks, which give background material for reading in connection with the broadcasts and bibliographies of suggested reading related to each of the programs.

Our belief at NBC in a broad, fixed framework of public service programming must be reconciled with the equally great necessity for providing the variety that is essential to appeal to many tastes and keep pace with the changing world. This is achieved by constant reexamination of program series. We frequently try out new production techniques; we explore new areas and re-explore old ones, we seek and encourage original writings. Nothing better illustrates this diversity than the University of the Air.

Coin-Operated Radios

NEW RCA RECEIVER WAS DESIGNED FOR USE IN HOTELS, HOSPITALS, TAVERNS AND TOURIST CAMPS

A HIGH quality RCA coin-operated radio for use in hotel and hospital rooms, taverns, summer resorts, tourist camps and similar locations was shown publicly for the first time at the Coin Machine Show in Chicago on February 3. The demonstration marked the company's entrance into the coin-operated instrument field.

The new set is a two-band receiver, employing six tubes (including one rectifier tube) and a 5-inch permanent magnet speaker. It is equipped with a built-in loop antenna, and an additional 75-foot baseboard antenna is furnished for use when required.

Of streamlined design and rugged construction, the Coin-Operated Radio is engineered to provide high quality program reproduction, "eye" appeal, and maximum convenience and simplicity of operation for the patron.

The sturdy steel cabinet, finished in umber gray with brush chrome bands and speaker grille, was styled by John Vassos, noted industrial designer and design consultant to RCA, and Stewart Pike, head of the Sales Styling Section of the RCA Engineering Products Department.

Simple operating instructions are presented on the easy-to-read coin plate, and a full-vision eye-line dial permits easy location of desired stations. A small chrome frame is mounted on the top of the cabinet to hold a card showing frequencies of local stations and networks. To start the set, the patron has only to insert a coin and tune in the station he wants.

Plays Two Hours for 25 Cents

The timer unit of the instrument is wired for either continuous or intermittent playing, at the option of the coin machine operator. It permits two hours of radio reception for 25 cents, and up to four quarters may be inserted at one time, providing for a total of eight hours' playing time. If wired for intermittent performance, this time could be used up in intervals of any length. The coin box will hold up to $10 in quarters.

DESIGNED FOR THE SPECIAL REQUIREMENTS OF HOTELS, HOSPITALS AND SUMMER RESORTS, THE RCA COIN-OPERATED RADIO HAS FEATURES THAT APPEAL TO BOTH OPERATORS AND USERS.

By means of a unique, super-sensitive slug detector assembly, including a slug rejector mechanism and coin return chute, the radio rejects all types of slugs, regardless of their metallic content. The coin mechanism may be easily cleared of slugs, bent coins, or other objects by pressing a "scavenger" button on the coin plate.

Both mechanism and coin box are protected from tampering by a heavy die-stock back plate, reenforced with a steel band riveted around the edge and secured by a strong triple-tumbler lock. A steel dial plate prevents access to the cabinet through the dial opening. For extra protection, the coin box is formed of hardened steel, welded to the cabinet, and fitted with a separate, sturdy, pickproof screw-type lock, permitting chassis service without access to the coin box.

Loss of the instrument through theft is minimized by unique styling which makes it virtually impossible to enclose the set in any standard luggage or steamer trunks.

Extra features which may be purchased and easily added to the set include an earphone jack, which automatically cuts out the speaker when in use and allows for attachment of standard headphones or a pillow-type speaker for hospitals and similar use; a two-coin unit, permitting insertion of a dime for 45 minutes' playing time, as well as a quarter for two hours; a hum-free AC-DC inverter which adapts the set for use in large city hotels where only 110-volt DC power is available; and an automatic time switch which turns off the power at a predetermined hour at night and turns it on again at a predetermined hour in the morning, making it impossible for "night-hawks" to disturb other hotel guests with radio programs during the late hours. A coin inserted during the non-operating period is automatically returned. Addition of these features requires no complicated wiring revisions and can be accomplished in a matter of minutes by any trained radio service man.

THESE MINARETS, WHICH FRAME A TURKISH SQUARE, SOON WILL BE DWARFED BY THE 725-FOOT TOWERS OF RADIO ISTANBUL.

Turkey Expands Radio System

Powerful Station Being Built at Istanbul Expected to Be on the Air This Year.

THE monuments of Turkey's past, her towers and minarets, her domes and galleried walls, symbols of a long and proud history, stand today in sharp contrast to her monuments to the future—the bustling modern cities, the clean-lined architecture, the vigorous, ambitious youth of the country.

By the end of 1947 yet another monument to the future—the antenna towers of Radio Istanbul—will rise steeply above the antique spires, soaring to a height of 725 feet.

The new, 150 kw broadcasting station, recently ordered in its entirety from RCA International Division by the Turkish Government, will represent more than a mere broadcasting installation. It will represent the spirit of the new Turkey and the realization of a dream of Turkey's leader, Mustafa Kemal Ataturk.

Under Ataturk the nation abandoned the Arabic alphabet and adopted the Roman. It was a revolutionary step, involving the re-education of the entire population. But it gave the people wider access to information, education and culture than had ever been possible with the difficult Arabic script.

Now, radio supplements books and papers in carrying out the educational program.

The 150,000-watt station will be one of the most powerful transmitters in Europe, exceeding by three times the largest transmitter in the United States. It will be the last word in radio design, from microphones to antennas.

RCA International has been at work on this project since early 1946, when in co-operation with the Turkish Press and Information Service, a government agency under the direction of Nedim Veysel Ilkin, internationally known for his work on UNRRA, RCA engineers and technicians spent several weeks studying the topography of Turkey. Before a suitable site could be selected for the station, hundreds of miles of difficult mountain terrain had to be traversed by jeep, and areas impassable even to a jeep had to be surveyed by observation plane.

Paul C. Brown of the Field Organization, Engineering Products Department, who has supervised a number of important RCA installations around the world, including Radio Belge, the "Voice of Free Belgium" in Leopoldville, Belgian Congo, is supervising the Turkish project.

RCA Supplies All Equipment

The entire job of engineering and installing the station has been put in the hands of RCA International, according to the Engineering Products Department of the RCA International Division. This includes not only microphones, transmitter and antenna but musical instruments, a complete library of recordings, and theatre seats. In addition, the Division is responsible for the design and acoustics of the studios, air conditioning for the building, and, in collaboration with the National Broadcasting Company and RCA Institutes, Inc., the training of personnel in station management, programming, and radio engineering.

The station will be housed in a building chosen as the winning design in a competition for Turkish architectural students. The interior architecture will be designed and radio-engineered by RCA International.

In addition to the Turkish project, RCA International has other notable contracts around the world.

Complete RCA studio equipment will be installed in the streamlined CMQ Radiocentro, a $1,000,000 project now in prospect for Havana, Cuba. The studios themselves will be the most outstanding and modern in the Caribbean area, according to Goar Mestre, Director of the CMQ network. The Center will be known as the "Radio City of the Caribbean."

RCA International has also recently shipped to Cuba a 5 kw transmitter for Radio Salas, in Havana. This is the first 5 kw RCA equipment ever installed in Cuba.

From the Philippines, comes an order for a 1 kw shortwave transmitter, and a 10 kw medium frequency transmitter. Installation of these equipments marks the beginning of the rehabilitation of station KZRH.

Radio Nationale Belge is at present completing the installation of a 10 kw RCA transmitter in Brussels. Later this transmitter will be supplemented by a 50 kw shortwave transmitter, similar to the one erected by RCA International in Leopoldville, during the war.

RCA International Division has shipped and is in process of installing two 7.5 kw shortwave transmitters in Lorenco Marques, Mozambique, Portuguese East Africa, for the "African Announcer" station of the Radio Club of Mozambique. This is the first RCA broadcasting equipment to go to Mozambique.

MEMBERS OF TURKISH PRESS DEPARTMENT AT SIGNING OF CONTRACT FOR RADIO ISTANBUL. PAUL BROWN, RCA INTERNATIONAL ENGINEER IS FOURTH FROM RIGHT.

DR. ZWORYKIN ELECTED VICE-PRESIDENT

DR. VLADIMIR KOSMA ZWORYKIN has been elected Vice President and Technical Consultant of the RCA Laboratories Division.

Dr. Zworykin, who has been Director of the Electronic Research Laboratory of the RCA Laboratories Division, Princeton, N. J., has received international recognition for his achievements in radio, television and electronics. He has been associated with RCA for 17 years.

Dr. Zworykin performed distinguished service in World War II as a member of the Scientific Advisory Board to the Commanding General of the United States Army Air Forces, the Ordnance Advisory Committee on Guided Missiles and three important sub-committees of the National Defense Research Committee.

In the course of his war work, Dr. Zworykin directed research resulting in the development of aircraft fire control, infrared image tubes for the famed sniperscopes and snooperscopes, television guided missiles, storage tubes and effective improvement of radar systems.

As a pioneer in the development of all-electronic television as a service to the public, Dr. Zworykin invented the iconoscope, television's electronic "eye", and developed the kinescope, electronic picture tube of the television receiver. He directed research in perfecting the first commercially practical electron microscope, acclaimed as one of the most valuable scientific tools of the 20th Century, and originated the idea of airborne television.

DR. V. K. ZWORYKIN.

His pioneering work in television has won for Dr. Zworykin many awards, the latest of which was the Howard N. Potts medal of the Franklin Institute, announced on March 3, 1947. In 1934, he received the Morris Liebmann Memorial Prize from the Institute of Radio Engineers. He received the Overseas Award of the British Institution of Electrical Engineers in 1937 for a paper on the iconoscope and in 1938 he received the honorary degree of Doctor of Science from the Brooklyn Polytechnic Institute. In 1940, he was presented the Modern Pioneers Award of the American Manufacturers' Association and in 1941 he received the Rumford award of the American Academy of Arts and Sciences.

CONGRESS OPENING TELEVISED

SCENES AT FIRST SESSION OF 1947 ARE TELECAST IN NEW YORK, WASHINGTON AND PHILADELPHIA

FOUR image orthicon cameras, two in the House Chamber and two in the interviewing anteroom, recorded the opening session of the 80th Congress on January 3, 1947, in a joint telecast by the National Broadcasting Company, the Columbia Broadcasting System and the Allen B. DuMont Laboratories. It was the first telecast made direct from the halls of Congress.

Following a 15-minute television newsreel, the program was shifted to Washington, where the joint broadcast began with an interview of Congressmen. At 12:00 noon, the two image orthicons in the House took over and recorded the formal session, highlighted by the election of Rep. Joseph W. Martin of Massachusetts as speaker of the House. The program concluded at 1:53 p.m.

Speaking in the interviews were Representatives C. A. Wolverton of New Jersey; Sam Rayburn of Texas; Charles Halleck of Indiana; and C. J. Brown of Ohio. Announcers Bill Henry and Bob Coar conducted the interviews.

Clarity of the image as seen in New York was demonstrated by the detail revealed in the numerous closeup shots. A bandage on the finger of a House clerk could be seen clearly as he punched his tally meter to record the vote for Speaker. Closeups of Representatives in their seats revealed the presence of children who had accompanied their parents to the proceedings. One closeup shot showed every detail of the historic House mace, traditional symbol of government.

Coaxial Cable Carries Program

The telecast was seen in Washington in NBC's studios there and over DuMont Station WTTG. From the Capital it was sent via coaxial cable to New York where it was transmitted over stations WNBT, WCBS-TV and WABD. From New York the signal was sent to station WPTZ, Philadelphia via radio relay.

In commenting on this pioneering telecast, Representative Wolverton, new chairman of the House Interstate Commerce Committee called it "one of the most outstanding events that has ever happened in the field of communications."

Predicting that television pickups from the Congress eventually will be a regular part of the American system of television, John F. Royal, NBC vice president in charge of television said: "There is no better way for controversial subjects to be brought before the American people than from the floors of Congress by television. Bringing the mechanics of government into the American home is a great step forward and will most certainly have a tremendous effect on the understanding of our citizens."

RCA IMAGE ORTHICON CAMERAS INSTALLED IN GALLERY OF THE HOUSE OF REPRESENTATIVES ARE TRAINED ON THE SPEAKER'S STAND.

ONE OF THE SCENES AT THE OPENING SESSION OF CONGRESS WHICH TELEVISION TRANSMITTED TO THOUSANDS OF HOMES ALONG THE EASTERN SEABOARD.

TYPICAL "ROLLING THEATRE" INSTALLATION IN DINING CAR OF A CHESAPEAKE AND OHIO TRAIN.

Movies As You Ride

Several C. & O. Trains Are Equipped With RCA 16-Millimeter Film Projectors for Passenger Enjoyment.

PASSENGERS on some of the trains of the Chesapeake & Ohio railroad are now able to enjoy the latest Hollywood films as they ride, thanks to the successful installation of RCA 16-millimeter film projection and sound systems in dining cars. As is usual when exploring new applications, RCA engineers encountered their usual quota of problems.

Overcoming space limitations encountered on the dining cars which were doubling as "theatres-on-wheels," C. & O. set up a tiny projection booth 45 inches wide and 72 inches long. Dual projectors, standing side by side, permit uninterrupted showing of feature-length films with maximum convenience for the projectionist. The projection booth is complete with automatic changeover, monitor speaker, rewinds, film cabinets, etc. Four-inch lenses are used in the projectors. The beaded screen is approximately 60 inches wide.

The speaker system, especially engineered for the "rolling theatres," includes the standard RCA 16mm. speaker in combination with a directional horn unit to insure complete distribution of sound throughout the length of the car. Dining-car tables fold out of the way and disappear under drapes which are pulled across the windows. Seats are set up across the width of the car. Normal movement of trains has no disturbing effect on the projection equipment.

Film Projector Proved in War

RCA engineers pointed out that the RCA projector used in this installation is basically the same unit which was proven "under fire" by the Signal Corps during the war, and also recently purchased in large quantities by the Navy.

A new train, "The Chessie," to be introduced by C. & O. in the Spring, will have specially designed "theatre cars." RCA engineers are currently at work on advanced designs in 16mm. equipment for trains and other public carriers.

HOW RECORDS ARE MADE

(Continued from page 13)

for each record, one for each side. The stampers have been chrome plated to give them a hard, shiny surface. In the pressing machine, the stampers have been perfectly centered to guarantee a true and accurate pressing.

The record press resembles a huge waffle iron, with one stamper at the bottom, the other at the top. The labels which will appear on the face of the record are placed on the stampers and when the pressing is made are baked into the finished record.

The "biscuits", which have been allowed to harden in storage banks, are reheated on a steam table adjacent to the presses. As soon as they become soft and pliable they are folded and placed in the press. The press, which has been heating meanwhile, is closed and hydraulic pressure of many tons is applied causing the plastic record material to flow over the surface of the stampers. Live steam circulates through the press, then in a few seconds the steam is turned off automatically and cold water circulates, cooling the press and hardening the record. The press is opened and the completed record is exposed.

When it leaves the press, or is lifted out as a waffle from an iron, the record has a rim of excess material known as "flash." This excess material is shorn off by nimble fingered operators and then the record goes to the finishing department where it is placed on a lathe. There the edge is ground down to perfection, first with fine emery paper, and then plain white waxed cloth which leaves it smooth and polished.

The finished records now are sent to the shipping department, where they are packed and started on their way to distributors throughout the country. These are the principal steps in the process, developed in more than 40 years experience, of making the RCA Victor Record.

Television gives you a choice seat at the game.

Television—a Season Pass to Baseball !

Every home game—day or night—played by the New York Giants, Yankees and Brooklyn Dodgers will be seen over television this season!

Owning a television receiver in the New York area will be like having a season pass for *all three ball* clubs. And in other cities, preparations for the future telecasting of baseball are being made.

When more than one home game is on the air, baseball fans can switch from one to the other—see the most exciting moments of each through television!

Those who own RCA Victor television receivers will enjoy *brighter, clearer, steadier* pictures through the exclusive RCA Victor Eye-Witness picture synchronizer that "locks" the receiver in tune with the sending station.

To witness baseball or any other event in the ever-growing range of television programs—you'll want the receiver that bears the most famous name in television today—RCA Victor.

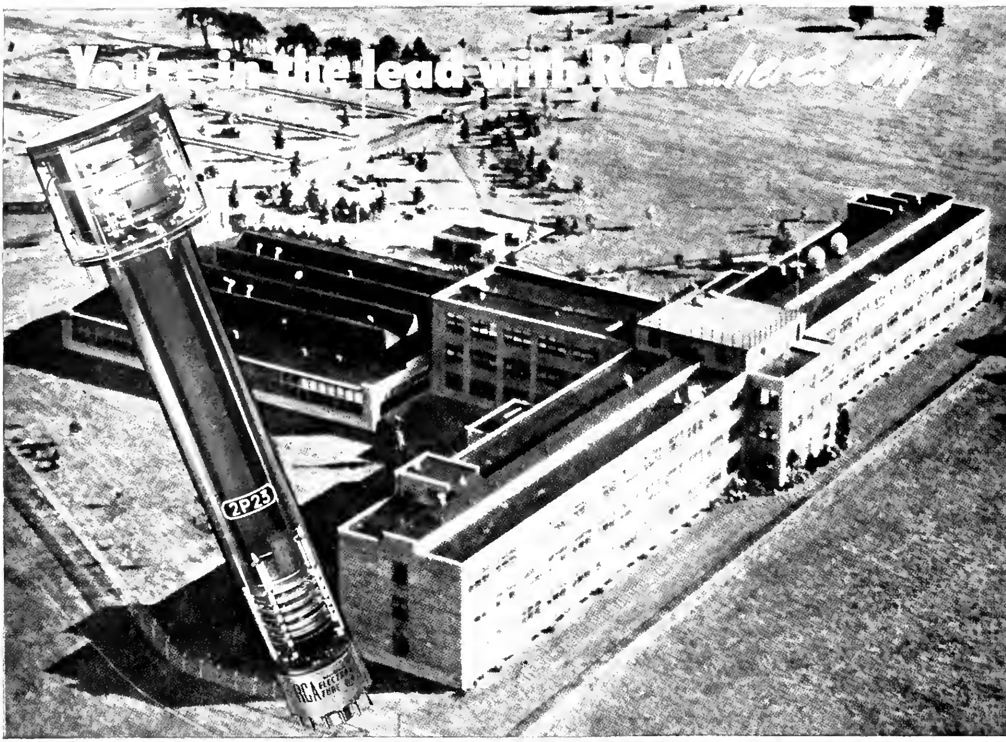
When you buy an RCA Victor television receiver or radio, or Victrola radio-phonograph, or an RCA Victor record or a radio tube, you know you are getting one of the finest products of its kind science has achieved.

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

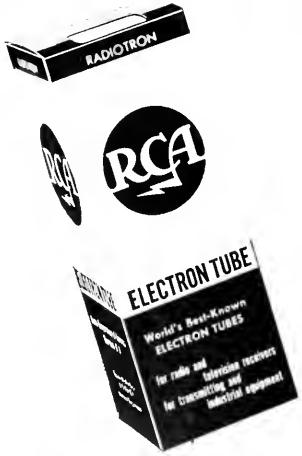
Radio Corporation of America, RCA Building, Radio City, New York 20. Listen to the RCA Victor Show, Sundays, 2:00 P.M., Eastern Standard Time over the NBC Network.

Several television cameras cover the baseball diamond to bring you a close-up of the action wherever it occurs. Here is a supersensitive RCA Image Orthicon television camera used by NBC's New York station WNBT in televising home games of the New York Giants.

RADIO CORPORATION of AMERICA



RCA Laboratories, Princeton, N. J., where televising of outdoor scenes has been greatly advanced through the development of the ultra-sensitive Image Orthicon camera tube.



Engineering...

the fountainhead of modern tube development is RCA

Through the years, RCA has maintained engineering leadership in tube research and design. And as a result of this pioneering, many of the far-reaching advancements in radio, television and electronics can be attributed to the development of new and revolutionary types of tubes by RCA scientists and engineers.

These RCA tubes are the nucleus of your present and future business. They make possible new and improved products for you to sell, and open up ever-widening markets for you to reach. Thus it is that your business can expand as the vast engineering resources of RCA widen the horizons of radio and electronic applications through the development of new electron tubes.

Engineering Leadership is another reason why *you're in the lead with RCA.* So, push RCA tubes and watch your business grow!

TUBE DEPARTMENT

RADIO CORPORATION of AMERICA

HARRISON, N. J.

S

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

JULY

THEME TOWER
RCA Exhibition Hall

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

COVER

Revolving Theme Mast in the RCA Exhibition Hall, Radio City, portrays the history of the Radio Corporation of America with an array of miniature models on a spiral ramp.

Services of RCA are:

RCA Laboratories Division

•

RCA Victor Division

•

RCA Communications, Inc.

•

omarine Corporation of America

•

onal Broadcasting Company, Inc.

•

RCA Institutes, Inc.

•

RCA Service Company, Inc.

•

RCA International Division

VOLUME 6 NUMBER 4 JULY 1947

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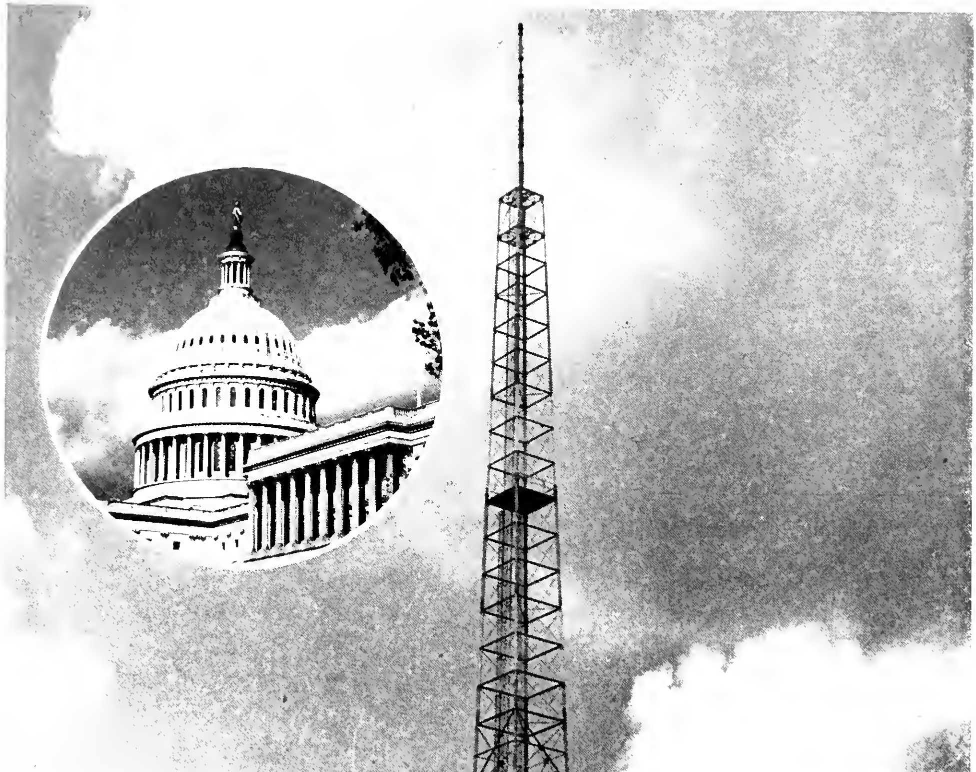
RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.
DAVID SARNOFF, *President*
LEWIS MACCONNACH, *Secretary* — ARTHUR B. TUTTLE, *Treasurer*

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



NBC TELEVISION STATION WNBW, WHICH OPENED IN THE NATION'S CAPITAL ON JUNE 27.

Outlook for the Radio Industry

Television, FM Broadcasting, Industrial Electronics on Verge of Broad Advances, RCA President Tells Radio Manufacturers — He Says Economic Readjustment Now Underway Will Result in a Stronger, Healthier Industry

POINTING to unlimited opportunities for expansion of the radio industry, Brigadier General David Sarnoff, President of the Radio Corporation of America, in an address at the annual convention of the Radio Manufacturers Association in Chicago on June 12, said that the future of the industry is to be found not only in standard broadcasting, but also in television, FM (frequency modulation), industrial electronics and foreign trade.

Television alone with its vast possibilities for home, theater and industrial use represents opportunities, he said, that will enable the radio industry to achieve new records on an unending road of progress. He added that he foresees the ultimate fusion of sound broadcasting with television, and that the 36,000,000 homes now equipped with radio will find new pleasures in sightseeing and attending events by television.

BRIG. GENERAL DAVID SARNOFF

Opportunities Are Challenging

Calling attention to the fact that since the first of the year economists have warned of a business decline, General Sarnoff said:

"A readjustment already is underway. Certainly we need to adapt ourselves to its requirements by a reasonable appraisal of current conditions, by constant efforts to effect economies in costs of production and selling and by improving our products. This readjustment of viewpoint and operations will result in a stronger and healthier industry.

"Radio, by its very nature, is in the vanguard of science. The possibilities that lie ahead in television, radar, electronics, and other products of radio technology present opportunities that are challenging and real. As long as our industry continues to foster research and create new products and services for the public, we need not fear for its future.

"We stand on the firm foundation of a great industry, built by many years of pioneering, production, and service to the public. We began as pioneers in a wilderness of economics. We have moved up and down with changing business cycles, weathered worldwide political storms, and not only survived, but emerged stronger than before. And we are still pioneering.

"Radio manufacturers and merchants are in a far better position today than they were at the beginning of broadcasting. We have learned in the hard school of experience the practical lessons of production and merchandising.

Three New Markets

"Today, the radio industry is on the threshold of three great new markets—FM, television, and industrial electronics—while the older markets for standard broadcast receivers and combination instruments are still fertile. For instance, radio-phonographs and phonograph records are in greater demand today than ever before."

Technical and economic conditions which retarded the growth of FM during the war and in the early post-war period now having been removed, the outlook appears bright for this branch of the industry, General Sarnoff said, in urging whole-hearted cooperation of all who can contribute to its progress.

"The measure of its success will be determined largely by the quality and variety of the programs transmitted over FM stations," he said. "I believe that the fullest benefits to the public and the larger opportunities for sales will come only when programs now broadcast by standard stations and networks are permitted to be sent simultaneously over FM stations. Let us hope that present-day restrictions, which forbid this, may soon be removed."

Television, General Sarnoff asserted, is a service designed not only for the home, but also is destined to have great implications for the theater, the motion picture studio and the entertainment film, and last, but not least, in the manifold processes of industrial life.

Television Opportunities

Television, therefore, he pointed out, offers the radio industry a combination of opportunities: first, to make transmitting and receiving sets; second, to equip theaters; and, third, to manufacture for industrial applications. He declared that there is no need to wait for television on a national scale to receive the benefits it already affords to city-wide, or local communities. He described the small town as "a natural television stage".

"The belief that a local television station cannot be erected and operated without a large investment is wrong," he continued. "Television programming can be started by local stations, in a small way, with a minimum of facilities, and expanded as receiving sets and commercial sponsors increase. In the meantime, until networks are available, films of live shows and newsreels can be flown to stations throughout the country to add to their program variety. Like the many independent local broadcasting stations, which are successful and profitable, television stations also will thrive upon local talent and community service."

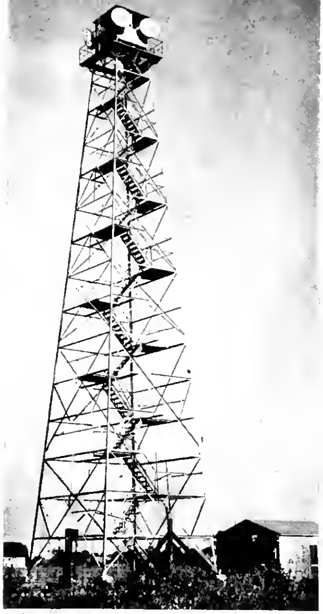
Dispelling several false notions regarding television, General Sarnoff said that television will not reach the homes over wires, but definitely will be broadcast through the air and the programs will be free to the "looker" as sound broadcasts are to the "listener".

50,000 Television Sets in Service

"The argument that television must offer a continuous flow of Hollywood extravaganzas is also false," he continued. "The great attraction of television is timeliness. Many of its programs are seen as they happen; they are both entertainment and news.

"Our reports, since production of postwar television receivers got underway, reveal a tremendous public interest, and therefore a vast potential market extending the length and breadth of this land. Today, it is estimated that approximately 50,000 television receivers are in service, and this figure is rising daily. As rapidly as additional television transmitters go on the air, new areas will be opened for the sale of receivers. Manufacturers now have in production approximately fifty of these transmitters for which licenses and construction permits have been issued by the FCC. Many of these transmitters are scheduled for delivery in the present year. There are ten television stations in operation in eight cities, and the eleventh will go on the air in Washington, D. C., this month.

"New York, Philadelphia, Washington, Schenectady, Detroit, Chicago, St. Louis, and Los Angeles, with television stations already on the air, represent links in eventual nation-wide television networks. The first of these networks should be in operation before 1950. The East will see the West, and the West will see the East. Television will project pictures across the prairies, over the mountains and into the valleys."



"AUTOMATIC RADIO RELAY STATIONS, EITHER ALONE OR IN COMBINATION WITH THE COAXIAL CABLE, SHOW GREAT PROMISE FOR SPEEDING THE EXTENSION OF TELEVISION PROGRAM SERVICE THROUGHOUT THE NATION."

Fusion of Sound and Sight

General Sarnoff said that it is natural today for the manufacturer as well as the broadcaster to wonder what effect the ever-increasing interest in television will have upon his established business. In looking to the future as he foresees it, he stated:

"What the ultimate effect will be upon the balance sheet and income statement of an established radio manufacturer or broadcaster will depend upon his courage, wisdom and action. The blacksmith, who remained at the anvil, found that his forge went out, but the blacksmith who turned his shop into a garage prospered. In television, as in other fields of American industry, the dynamic forces of competition will definitely assert themselves.

"While I foresee the ultimate fusion of sound broadcasting with television, this, it is evident, will take years to achieve. Nevertheless, it is destined to come in radio, just as the combination of sight and sound came in motion pictures.

"Indeed, the time may come when an important broadcast program that we cannot see will seem as strange as a movie that we cannot hear. This does not mean that such a development is around the corner. Programs limited to sound and prepared through the techniques of

"TELEVISION CAMERAS ALREADY HAVE SCANNED THE CONGRESS AND THE PRESIDENT OF THE UNITED STATES."

sound broadcasting alone will continue to serve the millions through many hours of the broadcasting period when the eye cannot be riveted on the television picture."

In discussing the great possibilities of theater television, General Sarnoff said:

"Television, essentially, is a picture in motion. And there are motion picture people quite alive to the promise of television in the theater as well as in the home. Their theaters may soon be open to television equipment developed for service of the theater screen. These leaders of the film industry are among the few who did not shut their ears to sound, which came just in time to open a new vista for the then silent movies.

Television as a New Art Form

"There are many more, however, who are strangely indifferent to the new art—or perhaps they are waiting until television delivers itself on a silver platter to the motion picture industry. They have the know-how, the experience, and the talent for picture making, and their pride is understandable in view of the huge box-office they have experienced. But they tend to shut their eyes, as they once shut their ears, to another momentous electronic development—sound on film. They measure the impact of television on their own industry by comparing the entertainment values of the theater screen with the programs they see on the present television set. They are greatly mistaken. Television promises to develop an art form of its own, and the immediate impact of television on theater attendance will come from the timeliness and dramatic interest of the event that television will bring to the home.

"But it would be folly to suppose that television will ever supplant the theater any more than radio has supplanted the concert hall or the opera house. Broadcasting greatly multiplied the audiences for both. Television can do as much for the movie theater. Time will tell whether a failure to face the facts is the best possible protection of studio investments and the theater box-office.

"In its technical aspect, television as a method of simultaneous distribution of motion pictures to the theater may revolutionize the trade structure of the motion picture industry.

"Furthermore, it brings into view a new method of booking to theaters the action of live talent, vaudeville, drama, opera, sports and other events, simultaneously distributed to hundreds of thousands of movie theaters."

There are interesting indications, he continued, that as television transmitters begin to spot the country, progressive independent producers will see their opportunities not alone in terms of the present twenty thousand theaters, but of the many millions of homes that may be eventually equipped with television. It may even be that such independent television production, financed by the same methods that presently exist in the movies, may flow to the theaters in full-length form, after exhibition on the air, instead of vice versa. That, he admitted, is projecting thoughts considerably into the future.

"But this much is already evident," he added: "the newsreel theater of today could readily become the television theater of tomorrow.

"TELEVISION IS AN IDEAL ADVERTISING MEDIUM, UNSURPASSED IN ITS SIMULTANEOUS APPEAL TO THE EYES AND EARS OF MILLIONS OF PEOPLE."

"With the camera as well as the microphone focused on the stage, television can be expected to become a vastly greater means for the discovery of talent than sound ever was.

"It was radio and electronics that gave the film its voice. It will be radio that will equip the theater with a television eye. I believe that television can be as great a boon to the theater as sound was to the silent picture."

Television Aids to Industry

General Sarnoff warned the manufacturers not to permit their enthusiasm for home and theater television to obscure the great possibilities of industrial television.

"The television eye makes it possible to see anything, almost anywhere," he declared. "It can be used to observe dangerous chemical processes. It can be put into blast furnaces to permit the study of the flame. Television brings a camera eye into mines and tunnels. It can be lowered into tank cars as well as into the depths of the sea. Fishermen may drop a television eye over the side to locate schools of fish and oyster beds. Explorers will scan marine life and the geology of the ocean floor. Wrecks at any depth will be observed from the decks of ships without endangering divers.

"Television presents a panoramic view. I envisage factory superintendents at their desks overlooking their outlying plants, even those in distant cities, through television. Centralization of inspection is made possible; the assembly line can be observed at one or at many points, thus facilitating visual control of all operations. Coordination along the line is made possible; the delivery of parts can be watched and properly timed; movement of the belt can be regulated for utmost efficiency and work performance can be surveyed and time-studied.

Display Window for Nation

"I foresee the department store manager at his desk, yet with his eye on the entire store. Intra-store television will present dramatic visual displays of merchandise. Seated in comfortable viewing salons, that may be known as 'telesites', shoppers will see fashion shows and the goods on sale in all departments. By pushing buttons, executives will watch the functioning of their organizations. Television will provide a display window to the entire nation; people will shop by television and then telephone their orders."

In addition to industrial television, General Sarnoff pointed to industrial electronics as a relatively new field which already indicates a continued growth and rapid expansion of incredible proportions. He said that it shows a promise of becoming one of the largest economic factors in the radio industry, for electronics, born of radio, is no longer the exclusive servant of electrical communications. In fact, wherever heat and precise control are needed, radio-electronics comes into use, at the same time enhancing the meaning of safety in industry.

The radio industry, having had its production facilities greatly multiplied by the war, now must expand its markets both at home and abroad, General Sarnoff said in pointing out that on the ever-broadening international horizons there are endless opportunities for radio throughout the world. The radio manufacturer has every reason to be interested in and to promote world peace and world trade, he said. He urged the manufacturers to push on to new ventures, to encourage research, to create new methods, new devices and new services.

Science and National Security

Recalling the "unbelievable inventive and production records" of the radio industry in supplying the United States and its allies with radio-electronic equipment during World War II, he added:

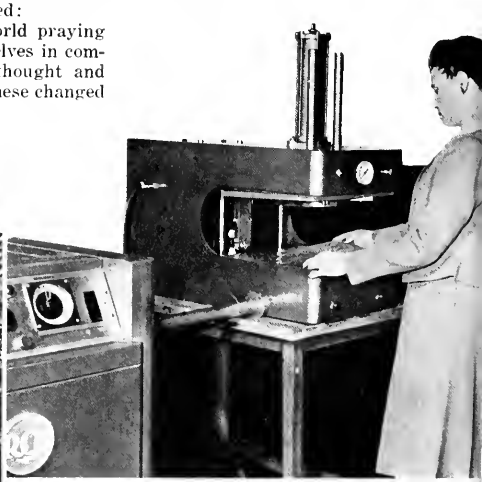
"Today, with the world praying for peace, we find ourselves in completely new areas of thought and action. We must keep these changed conditions constantly in mind as we plan for the future. It is of extreme importance, as we apply the new developments of radio and electronics to peacetime pursuits, that we do not lose sight of the continued relationship of science and industry to our national security. Radio research and invention, and every new instrument should be constantly evaluated to determine their application to the strength and security of our country, as well as to its commercial progress."

Concluding his address, General Sarnoff said:

"We go out to face new problems and changing conditions. By the application of intelligence, seasoned with the wisdom of experience, by courage and cooperation within this industry, manufacturers and broadcasters alike can focus on new opportunities for progress.

"The radio industry along with other industries naturally is affected by political, social and economic conditions, at home and abroad. All of us can make constructive contributions toward the improvement of these basic factors. And given a reasonable measure of stability in these larger fields of human endeavor, I believe that our industry may look to the future with confidence."

"THE SMALL TOWN IS A NATURAL TELEVISION STAGE. LOCAL MERCHANTS WILL FIND TELEVISION AN EFFECTIVE MEANS OF ADVERTISING. DRAMATIC GROUPS, COUNTY FAIRS AND COMMUNITY SPORTS EVENTS WILL ENLARGE THEIR AUDIENCES.'



"WHEREVER HEAT AND PRECISE CONTROL ARE NEEDED, RADIO-ELECTRONICS COMES INTO USE."

DISPLAYS WITHIN THE RCA EXHIBITION HALL ARE VISIBLE FROM THE STREET THROUGH A GLASS FRONT 200-FEET LONG.

RCA EXHIBITION HALL

Panorama of Radio, Television, Radar, Global Communications, Electronic Equipment and Newest Home Instruments Revealed as Permanent Exposition is Opened to Public in Radio City

THE RCA Exhibition Hall, latest addition to New York's showplaces for citizens and out-of-town visitors, opened its doors May 14 to the first group of spectators who, since that day, have continued to throng the exhibits from morning to late evening. Before the lights were put out on the opening day, more than 5,000 guests had inspected the various animated displays which portray the widespread worldwide activities of the Radio Corporation of America.

Behind the Hall's 200-foot window front at 36 W. 49th Street, in Radio City, is displayed the wonders of modern electronics—radio, television, radar, global communications, electronic equipment and home instruments — an exposition combining the gadgetry of The World of Tomorrow with the pageantry of Hollywood.

The entire main floor of the Exhibition Hall, from its 30-foot high laminated ceiling to its carpeted floor, is visible from the street. In its high windows can be seen giant models of RCA tubes containing miniatures of radio and television receivers, sewing machines, and other electronic equipment.

At the left end of the main floor, a 12-foot high plexiglass map of the U.S., shows in bright lights the radio network of the National Broadcasting Company. By flicking buttons on an accompanying keyboard, the affiliated stations light up separately, while another push-button brings in on a loudspeaker the network program being broadcast at the moment.

Highlights of Broadcasting

The story of the stars who have made radio a favorite entertainment medium is told through a series of miniature wood-carvings mounted on four revolving stages at one side of the network map. Seen through viewing windows, the miniatures depict the highlights of 20 years of broadcasting. Above the stages, today's radio stars are reproduced in full-color caricature on large projection screens.

One of the most popular features of the RCA Exhibition Hall is the television display. A person may stand before a television camera mounted on a movable boom and be televised from several angles, while his image can be seen on four viewing screens in front of the display. Moreover, he can satisfy his own curiosity about his telegenic qualities by watching—at the very moment he is being televised—his own image on a viewing screen suspended from the ceiling.

The privilege of hearing "the music you want when you want it" is offered at a recording exhibit. From a printed list, a visitor may request and hear over one of two personalized amplifiers, the music of well-known recording artists on RCA Victor Red Seal and popular records.

RCA Communications circuits which girdle the world are portrayed in neon tubing on a large wire-screen map of the two hemispheres. In front of the map, a keyboard identifies the terminal points of the communications circuits. Pressure on a button lights up on the map the route of the radiotelegraph circuit to a particular city. At the same time, a dummy message intended as a souvenir appears on a radio-teletype machine. The simulated message, in dot-and-dash code, is also seen and heard respectively on an adjoining oscilloscope and loudspeaker.

Ship's Bridge Reproduced

The display of the Radiomarine Corporation of America is centered in a reproduction of the bridge of a ship in New York Harbor. This exhibit contains models of the latest radar, loran (long range navigation), and radio-telephone equipment. And the story of RCA Institutes, one of the foremost

AN EXHIBITION HALL VISITOR EXAMINES A HUGE REPLICA OF THE TELEVISION KINESCOPE PICTURE TUBE.

training schools for radio engineers, is told in a photographic panorama, showing scenes from classrooms and laboratories.

Models of the RCA Laboratories at Princeton, N. J., together with examples of some of the products that have resulted from the company's research activities, such as the image orthicon, antennas, and microphones, are shown on an illuminated mural.

Two large display platforms in the center of the main floor contain the newest in home instruments and electronic engineering products. Television receivers, console combinations and personal radios are present in a variety of cabinet models and finishes. Full-sized electronic devices which are set up for demonstration include an electronic sealer, an oscilloscope, and a metal-detector.

Progress of Radio Portrayed

One of the most spectacular displays in the Exhibition Hall is a Theme Mast, lighted and constantly revolving, which rises for nearly three floors from the concourse level of the Hall. On this mast the history of the Radio Corporation of America is depicted in terms of miniature models on a spiral runway extending the entire 50-foot height of the column.

At the foot of the ramp leading down to the concourse level a public lounge furnished with comfortable chairs and conveniently located television and radio receivers, is available to visitors. Part of the lounge is devoted to an ultra-violet mural showing RCA's world-wide facilities and services. Next to the mural an electron microscope enables visitors to examine specimens of chemicals, bacilli, and other submicroscopic matter.

Beyond the electron microscope is the entrance to a small studio, seating 84 persons, where daily showings of current film subjects serve to demonstrate RCA sound and projection equipment. The studio also is wired for the transmission of live talent radio and television shows.

The remainder of the concourse space is occupied by the administration offices and executive quarters.

The RCA Exhibition Hall is to be a permanent feature, open daily to the public without charge.

AMERICAN TELEVISION SHOWN IN ITALY

THE first demonstration of an American television system on the Continent of Europe was conducted by the Radio Corporation of America at the Milan International Fair, which opened on June 14 at Milan, Italy, during the celebration there of the 50th anniversary of Marconi's invention of radio.

The latest RCA mobile television pickup units, studio equipment and receivers were dispatched to Italy for the event. Other modern radio-electronic services and products, including the RCA electron microscope, sound and theater equipment, FM (frequency moduation) transmitters, police FM equipment, shipboard communication units, air navigation aids and marine radar apparatus also were exhibited.

In announcing the company's participation in the tribute to the inventor whose genius inspired scientists and laymen of all nations, Meade Brunet, Vice President of RCA and Managing Director of the RCA International Division, said:

"Striking evidence of the greatness of Marconi can be found in the significant steps of progress which have emanated from his initial success in spanning the Atlantic with radio signals. Television offers particular proof of his inspirational genius. It was an immense satisfaction, therefore, to demonstrate the magic of RCA sight-and-sound broadcasting for the first time in Europe in his native Italy."

The Milan International Fair, a century-old event, is generally regarded as the most important fair in Western Europe. Its visitors in years past have numbered hundreds of thousands.

Arrangements for the RCA exhibit, Mr. Brunet said, were made by G. A. Biondo, President of the Telonda International Corporation, RCA distributor in Italy. Michael J. Ranalli, Television Sales Manager of the RCA International Division, was in charge of the television demonstration, which included pickups of major events at the fair and the showing of American films.

In connection with the announcement of the RCA television demonstration, it was disclosed that Dr. V. K. Zworykin, Vice President and Technical Consultant of the RCA Laboratories Division, Princeton, N. J., will deliver a paper on the progress of television before the Academy of Science in Rome, as a later phase of Italy's celebration of Marconi's genius.

An important feature of the RCA exhibit at Milan was the first European demonstration of American FM broadcasting apparatus. Relatively inexpensive in cost and operating on low-power, the FM transmitter was designed to be particularly suitable for continental operations.

"Scientific Method" Can Solve Social Problems

Jolliffe Tells Graduating Class at University of West Virginia That Thought Process of Scientists Should by Adopted by Civilization to Bring About Higher Order of Human Behavior

SOCIAL problems that threaten civilization with chaos and self-destruction can be solved by the same "scientific method" that has given the world so many of its material benefits, Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories, declared in an address before the graduating class of the University of West Virginia, at Morgantown, West Virginia, on June 2.

"Many of the causes and effects of social disruption are known," Dr. Jolliffe said. "What we need to do is to amplify this knowledge, develop it as a body of scientific fact, and formulate general laws by which human conduct can be guided and regulated.

"We must give authority and standing to the social sciences. When this is accomplished, we must accept the advice and counsel of the social scientist as readily as industrial management accepts the advice and counsel of the physical scientist. In this manner, and only in this manner, may we expect to bring about a higher order of human behavior."

Progress Slow in Human Relations

Man has made amazing progress, especially in the last three hundred years, in his unceasing fight to control and to utilize the physical elements of his environment, Dr. Jolliffe said. "But in the all-important field of human relations, where one would expect the greatest advances," he continued, "progress has been slow. This imbalance between material and social development has brought on a dangerous state in human affairs."

Pointing to the contention and disagreement among the economic and social elements of the United States, as well as those of the entire world, Dr. Jolliffe declared: "Confusion and uncertainty are characteristics of the times, and now — because of the reality of atom fission — we are fearful of

By Dr. C. B. Jolliffe

Executive Vice President in Charge of RCA Laboratories Division

the future. We know that, for the first time, it has become possible for man himself to wipe out almost overnight the civilization he has built up so laboriously over the last three thousand years."

In explaining how science, which, it is granted, is responsible for our material progress, can overcome the faults of human behavior, he said: "This question is asked because most of us are inclined to overlook the simple concept by which science has achieved its growth and influence. This concept is a thought process known as the "scientific method", and it is my thesis that this method can be just as successful in dealing with social difficulties as it has been with material problems.

"Scientific method is nothing more than the art of thinking developed to the highest degree. It is the key to insight. By it, in my opinion, we will continue the rapid unfolding of material accomplishment and, in addition, achieve that high level of human understanding so necessary to lasting peace and prosperity."

Bacon Advocated Plan in 1620

Dr. Jolliffe recalled that it was Sir Francis Bacon who first advocated, in 1620, the discovery and development of general laws of nature through disciplined observation and experimentation. In later years, he explained, Bacon's idea was expanded and improved by the process of imaginatively conceived hypotheses, checked and corrected by experimentation. While Bacon's system obtained conclusions by induction, he said, the later method involved deduction from general principles.

Develops Definite Conclusion

"Today's scientist employs both," Dr. Jolliffe said. "He observes, asks questions, formulates hypotheses, experiments, tests, checks, analyzes and finally, after giving consideration to all facts, develops a definite conclusion. This, in short, is the modern scientific method.

"We who live in the Twentieth Century can see, as none of our forebears could, the full sweep and power of science. It has relieved us of much burdensome toil. It has taught us how to utilize the earth's rich deposits of minerals in the production of innumerable comforts and conveniences. It has shown us how to harness the energy of coal, gas, oil, water, electricity and, now, of the atom. It has revealed new ways to health and physical well-being."

But with all this marvelous progress in science and industry, Dr. Jolliffe asserted, society is unprepared to deal with current problems in human relations. The coming of the machine and mass production, as a result of progress in the physical sciences, brought about significant changes in the social structure, he explained, and society has failed for the most part to adapt itself to the new conditions of living.

"In today's complex industrial civilization, man has lost his social stability," he continued. "The feeling of individual security is gone. Man does not understand his new social and economic functions and

(Continued on page 14)

Latest Models of RCA Victor Home Instruments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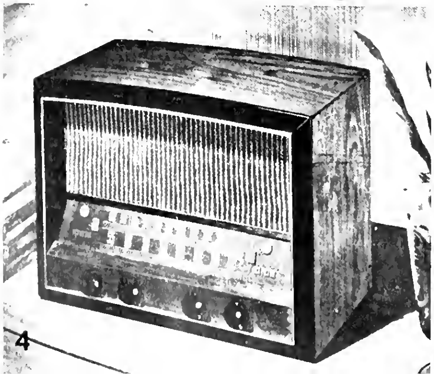
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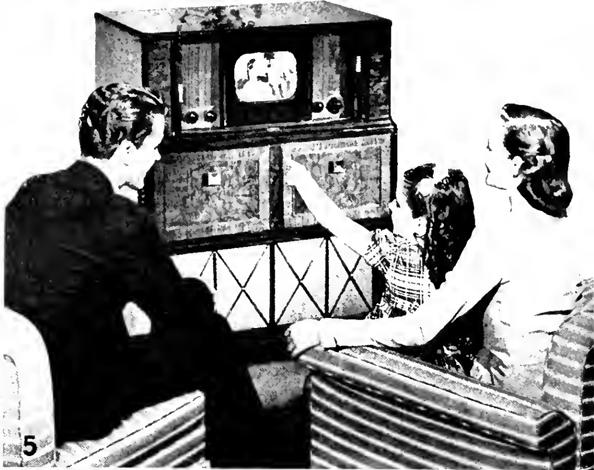
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USES OF TELEVISION

The Video Art Promises Wide and Important Applications in Business and Education

By Noran E. Kersta

Manager, Television Dept., National Broadcasting Co.

THE use of television in the home as a service of entertainment and information is the application which is receiving the most attention in magazines and newspapers, but there are other uses of the video medium which hold great hopes for the future. Because television makes it possible to see people and things at a distance, to transmit events from one point to another and provide means of inspecting processes and services from a central vantage point, the art in its fully developed form should find uses in many fields of human activity. However, in this space only a few of the suggested uses can be outlined.

Television, for instance, could be a valuable adjunct in banking procedure. Obvious applications would be the instantaneous transmission of signatures from the teller's cage to a central identification file where an endorsement, as it appeared on a screen, could be compared instantly with the original. Also, a television camera directed on the patron could project the scene to a "photograph identification section" for even more foolproof and positive identification.

When television expands to equal the coverage of sound broadcasting today, it is logical to prophecy that the ten-year-old youth of the next generation will know more about the world, its industries, its governments and its peoples than his grandfather knew in his entire lifetime. With this promise as a start, we progress to the next obvious thought: "educational television."

"Educational television" means the use of television in school systems, operated independently of public television broadcasting but closely integrated with established methods of learning.

Television in the Schoolroom

While educators have shown considerable interest in the role that can be played by television in school systems, their concern has been limited for the most part to the use of programs primarily intended for the general public but viewed through television receivers installed in the classrooms. Although it is possible that such a plan might be developed successfully, it is likely that more specific and effective uses of television in education are in the offing.

A television-equipped school system, which originates its own presentations, designed to be integrated directly and scientifically into accepted curricula, would appear to possess more advantages. If, for example, a scientific experiment or demonstration were to be transmitted by television, a larger number of students could get a clearer conception of what was taking place than by any other mass teaching method.

Educators adopt new teaching methods slowly. After many years of sound broadcasting in this country, school systems only recently have begun to reveal progress in this field. The production of educational motion pictures for school use and their exhibition in classrooms are only in the starting stage. In view of this, it may seem somewhat ambitious to think of going directly to a complete television educational system. Nevertheless, some educators are busily studying the subject.

Could Help Teacher Shortage

It has been suggested that television might be used to compensate, in part, for the increasing shortage of teachers, a situation which is developing into one of the Nation's critical problems. Through television, a few of the recognized authorities in any subject could teach an unlimited number of students seated before television screens. And, because of the very nature of television, such teachings could be made more dramatic and the effect more lasting. Furthermore, greater efficiency in the outlay of educational funds would be realized when presenting a "one time" lesson, compared to the cost of present repetitive decentralized instruction.

Another visionary but nevertheless logical application of television might be called, for want of a better name, "motion picture film production television."

As Hollywood operates today, a feature motion picture is produced

(Continued on page 25)

Latest Models of RCA Home Instruments

1—THE SOLITAIRE IS A POCKET-SIZE PERSONAL RADIO, HOUSED IN A PLASTIC CASE WITH GOLD-PLATED FINISH.

2—THE GLOBE TROTTER PORTABLE IS ENCLOSED IN A WEATHERIZED ALUMINUM CASE WITH PLASTIC ENDS AND HANDLE.

3—EQUIPPED WITH A RECHARGEABLE BATTERY, WHICH ELIMINATES THE COST OF DRY-BATTERY RENEWALS, THE ESCORT PORTABLE MAY ALSO BE OPERATED FROM HOUSEHOLD LIGHTING OUTLETS.

4—TABLE MODEL RECEIVER INCORPORATING FM AND STANDARD BROADCASTING. IT IS FINISHED IN WALNUT VENEER AND EMBODIES A SLIDE RULE DIAL FOR EASY TUNING.

5—MODEL 641TV IS A FIVE-IN-ONE INSTRUMENT. INCLUDED IN THE CONSOLE CABINET ARE A TELEVISION RECEIVER WITH A 10-INCH PICTURE TUBE, FM, STANDARD BROADCAST, SHORTWAVE AND AUTOMATIC VICTROLA PHONOGRAPH.

6—LATEST RCA VICTOR CONSOLE TELEVISION RECEIVER WITH 52-SQUARE INCH PICTURE SCREEN AND SLIDING TAMBOUR DOORS.

7—VICTROLA RADIO-PHONOGRAPH, MODEL 711V2, WITH FM FACILITIES. PANEL AT LOWER LEFT ENCLOSES GENEROUS RECORD STORAGE SPACE.

ONE OF THE ANTARCTIC CAMPS OF THE BYRD EXPEDITION FROM WHICH RCA PROGRAM SERVICE PICKED UP PROGRAMS FOR AMERICAN NETWORKS.

BELOW: REAR ADMIRAL BYRD'S VISIT TO HIS 1935 HEADQUARTERS WAS DESCRIBED BY SHORTWAVE TO RADIO LISTENERS IN THE UNITED STATES.

From Jungle to Antarctic

Wherever Broadcast Features Originate, Program Service of RCA Communications Reaches Out by Shortwaves and Delivers Signals to Networks

By S. H. Simpson, Jr.

Manager,
Program Transmission Service,
RCA Communications, Inc.

SINCE 1930, when the sound of London's Big Ben ushering in the New Year was first rebroadcast in this country, RCA Communications, Inc. has been serving the public through the use of its international shortwave facilities for the transmission and reception of program material.

During the war thousands of broadcasts were handled by our International Program Service, and, as a result, the listener at his radio was able to hear his favorite commentators as they roamed the world from Alaska to Australia, from Chungking to Algiers, and, in fact, from almost every place where the American GI was stationed.

Stated briefly, the problem of the Program Service is to supply technical facilities and coordinate arrangements between foreign points and the broadcasters in this country for such pickups. A casual visitor to the program control room in 66 Broad Street, New York City, during an early morning news roundup, might well be astounded. In the space of a few minutes, Paris, Athens, Cairo, Jerusalem and Buenos Aires, are brought in by the mere flip of a switch!

Supplies Unusual Facilities

But even this is routine compared to some of the unusual facilities which the Service is called upon to furnish from time to time. Whether it be from a presidential train enroute to Chicago, a lone ship deep in the Antarctic ice floes, a submarine off the coast of California, or an expedition observing a solar eclipse in a dense South American jungle, the worldwide facilities of RCA can be relied upon to help bring the story to the American fireside.

The story behind the broadcasts from the recent Byrd Antarctic Expedition illustrates the difficulties which must be overcome in picking up broadcasts from remote parts of the world. Carrying seventeen press and radio correspondents, the *USS Mt. Olympus* left Norfolk, Va., on December 2, bound for the south polar region with a rather inadequate 350-watt radio transmitter on board and a fervent hope that the plan to pick up a 2½-kilowatt transmitter, which was being flown to Panama, would not fail. Before the Canal was reached, initial tests had been conducted with the small transmitter, and despite its low power and the ship's limited antenna space, the RCA receiving station at Riverhead, L. I., was able to bring in a good signal. But all hands were relieved when the installation of the more powerful transmitter was completed a week after the *Mt. Olympus* sailed from Panama.

Handled Wide Frequency Range

To communicate with the *Mt. Olympus* from New York was in itself a problem. Not only was it necessary to handle the wide range of frequencies from 8 to 21 megacycles, but the vessel's bearing from New York changed considerably, requiring the use of several antennas for adequate coverage. As a protective measure, Buenos Aires, Honolulu and San Francisco were alerted to relay programs from the ship if the direct circuit to New York proved unsatisfactory.

Most of the programs were short news spots covering everything from the first report of the tragic plane crash to what a penguin sounds like in Little America. A highlight of the series was an interview with Rear Admiral Richard E. Byrd aboard the aircraft carrier *USS Philippine Sea* while it was enroute to join the expedition already in the Antarctic.

A Paris-Antarctic Circuit

One of the most interesting international radio programs in connection with the Expedition took place on February 26, when Roger Goupillieres, American representative of Radio Diffusion Francaise, interviewed a member of the Byrd Expedition in Little America. The program was one of a series of broadcasts designed to bring to the people of France a view of American life. Frank Goring, Supervisor of RCA Communications' Program Operations, participated in the three-way conversation between New York, Paris and the Antarctic and explained in French how programs from the Byrd Expedition were being handled.

Despite the great distance to the south polar continent — farther from New York than Singapore— and the notoriously bad atmospheric conditions, American networks carried more than ninety broadcasts from Antarctica with remarkably few failures.

Unusual assignments are commonplace at Program Service headquarters. One day the American Broadcasting Company asked RCA Communications if it could pick up a program from the submarine *USS Segundo*. The network wanted to describe the action in a submarine during a crash dive. Preliminary tests carried on while the submarine was on the surface went well, but nobody knew exactly what would happen to the radio circuit after a crash dive. The worry was largely wasted, for the actual program came through a bit weak but satisfactory.

Through a Veil of Secrecy

Through a veil of secrecy which provided practically no information, the RCA Program Transmission Service was recently called upon to furnish program service from a B-29 flying with General Kenney's Strategic Air Command group in a mock air attack on New York City. The only available information stated that the plane would be flying in from Fort Worth,

PROGRAMS FROM ALL PARTS OF THE WORLD ARE ROUTED THROUGH THIS MASTER CONTROL SWITCHBOARD AT RADIO CENTRAL OFFICE, 66 BROAD STREET, NEW YORK, TO AMERICAN BROADCAST NETWORKS.

SIGNALS ORIGINATING IN THIS CANVAS-COVERED TRANSMITTER AT BOCAYUVA WERE SENT SOUTHWARD TO RIO DE JANEIRO AND THEN RELAYED TO NBC OVER A PROGRAM SERVICE CIRCUIT TO NEW YORK.

BEN GRAUER DESCRIBES THE SOLAR ECLIPSE AT BOCAYUVA, BRAZIL, OVER A MICROPHONE LINKED TO NBC THROUGH AN RCA PROGRAM SERVICE CIRCUIT.

ROGER GOUPILLIERES (RIGHT), REPRESENTING RADIO DIFFUSION FRANCAISE, INTERVIEWS A MEMBER OF THE BYRD EXPEDITION IN A THREE-WAY CONVERSATION BETWEEN NEW YORK, PARIS AND LITTLE AMERICA.

Texas, and would operate on a certain frequency. Suitable frequencies for contacting the plane from the ground were selected and an urgent request given to the broadcaster to "get the information to the plane somehow!" At the scheduled test time the plane was heard calling RCA with a report that its shortwave receiver was in trouble. However, the operator said the program would be started at the stated time. The incoming signal was good and the stage was set. Program time arrived but nothing was heard from the plane. Anxious moments followed while the broadcaster filled-in from another location. Suddenly the missing signal came through from the plane and the broadcaster switched to that frequency just in time to hear the network's flying commentator say, "We now take you to an observer at the top of the RCA Building who will describe the scene from his vantage point!" It was learned later that a last-minute transmitter failure had ruined the show.

When the aircraft carrier *USS Leyte* visited Istanbul, Turkey, on May 6, NBC was anxious to pick up its representative, John Donovan. Tests indicated that the *Leyte's* signals arrived in New York too weak for rebroadcasting, but RCA Communications, through its connecting company in Greece, was able to set up a relay through Athens. This booster station enabled NBC listeners to hear Donovan's eyewitness description of the American flotilla's arrival and reception at the Turkish seaport.

Roundabout Circuit Best

The staff of RCA Program Service demonstrates frequently that while a straight line may be the shortest distance between two points, it is not always the best route for radio waves to travel. This was proved recently. To bring to American radio listeners an on-the-spot description of the solar eclipse on May 20, NBC dispatched a mobile transmitter to the jungle village of Bocayuva, Brazil, site of the observation camp erected by the National Geographic Society. It was planned to use the mobile unit to transmit the commentary of NBC's Ben Grauer, direct to New York. But because of the little station's limited power and the absence of adequate frequencies there was some doubt that the signals would carry through. Transportation problems ruled out the possibility of shipping bulky materials for a suitable antenna, and weight limitations barred a higher powered transmitter. Arrangements were therefore made with Companhia Radiotelegraphica Brasileira in Rio de Janeiro to pick up the signal from the Bocayuva camp—400 miles north of the Brazilian capital—and relay it to New York.

The maneuver was a success and Grauer's colorful description came through clearly to NBC's network listeners.

"Scientific Method" Can Solve Social Problems

(Continued from page 9)

responsibilities. It is this confusion, this feeling of dependency upon unknown factors that causes him to join pressure groups and power blocs for his own, rather than society's gain. Lack of cooperation is characteristic of modern society, and the people are dissatisfied."

Modern sociologists agree that these weaknesses of human behavior all trace to our failure to develop the social sciences, Dr. Jolliffe said.

The first thing to be done in the effort to correct this situation, he continued, is to make people aware of the power of logic and reason to solve the economic and political problems of our times.

"This is a task that must be assumed," he said, "by our more progressive leaders of thought — men and women of education, government, the professions, industry, labor and the arts.

"In my opinion, the art of thinking should be just as much a part of the educational system as reading, writing, and arithmetic.

"A thinking people will insist upon a logical approach to any kind of a problem, whether its character is physical or social. It will resort less frequently to falsely conceived panaceas, quack nostrums, and to expedience."

Television Caravan

Six Station Wagons Carrying Actors and Directors and $100,000 of Equipment Are Telling the Story of Television to the Nation

UNDER the joint sponsorship of Radio Corporation of America and Allied Stores Corporation, a caravan of six jeep station wagons, carrying 12 persons, including actors and directors, and $100,000 worth of television equipment, left Radio City, New York on May 12 to begin a tour which will carry the story of television into 22 cities across the country. At most of the communities visited, the fleet will bring to residents the first television programs they have seen.

When the caravan arrives in a city, a portable studio will be erected in the store and programs will be presented twice daily. Television receivers will be located at viewing sites throughout the store, in special windows and in some instances in nearby buildings where larger crowds can be accommodated.

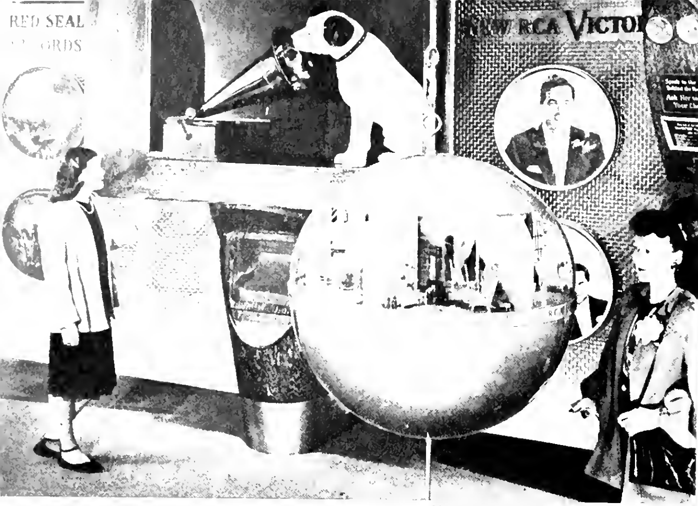
It is planned to arrange special broadcast programs in each city visited by the caravan, and also to promote the television presentations of the traveling staff by newspaper advertising. Whenever possible, local radio programs will be televised at the regular time of their appearance on the air.

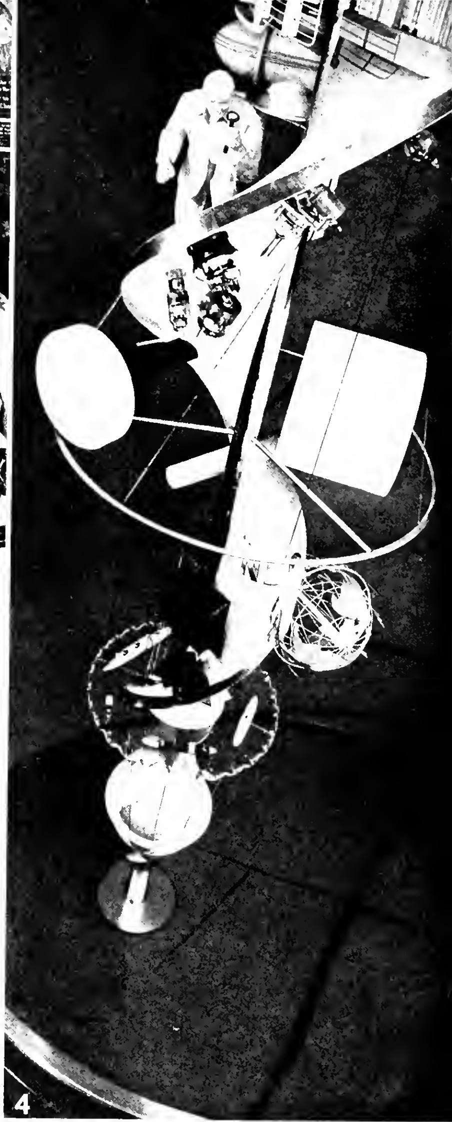
The entire staff, under the general supervision of Samuel H. Cuff, long active in television station management, and Louis A. Sposa, as production manager, will travel in the jeep wagons. To protect the sensitive electronic instruments and to prevent injury to the television receivers and associated equipment while en route, the floors and sides of the cars are lined with soft cellular rubber.

Cities on the itinerary are Reading, Harrisburg and Easton, Penna.; Jamaica and Syracuse, N. Y.; Paterson, N. J.; Grand Rapids, Mich.; Akron, Columbus and Cincinnati, Ohio; Tampa, Fla.; Lake Charles, La.; San Antonio and Dallas, Texas; Waterloo, Iowa; St. Paul and Minneapolis, Minn.; Boise, Idaho; Seattle and Spokane, Wash. and Great Falls, Mont.

BELOW: THE SIX-CAR CARAVAN AND SOME OF ITS PERSONNEL LINE UP IN RADIO CITY FOR REVIEW BEFORE SETTING OUT ON ITS TOUR OF 22 CITIES.

JOSEPH B. ELLIOTT (RIGHT), RCA VICTOR VICE PRESIDENT IN CHARGE OF HOME INSTRUMENTS, SHAKES HANDS WITH SAMUEL CUFF, TOUR DIRECTOR.


RED SEAL



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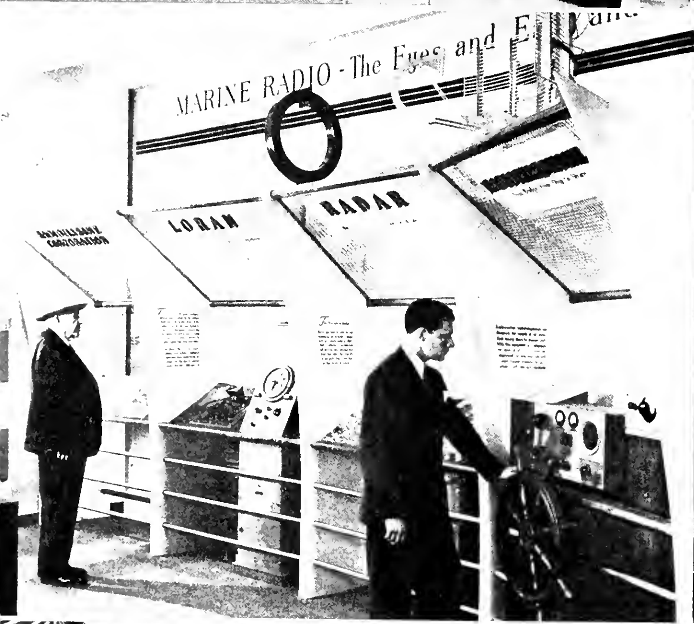
MARINE RADIO - The Eyes and
LORAN
RADAR


The Direct Way

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SCENES

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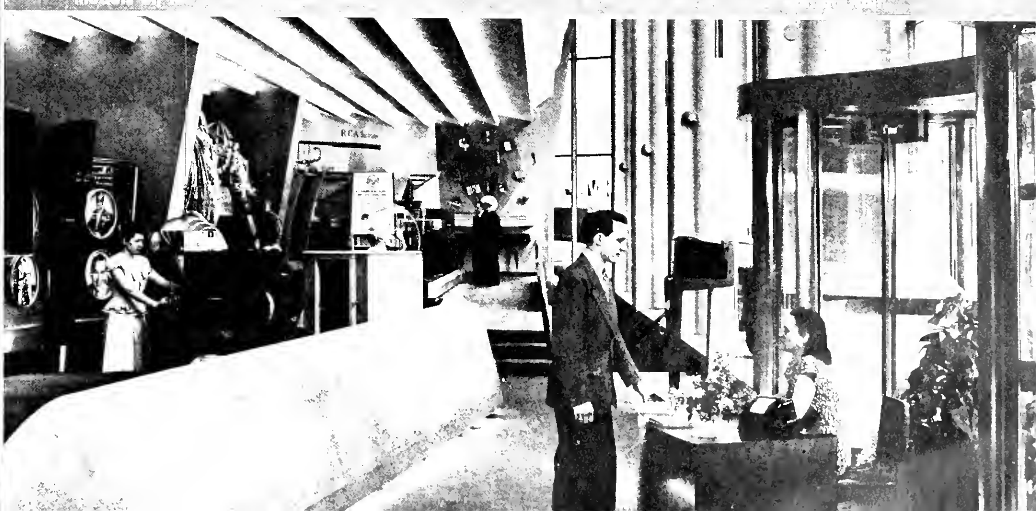


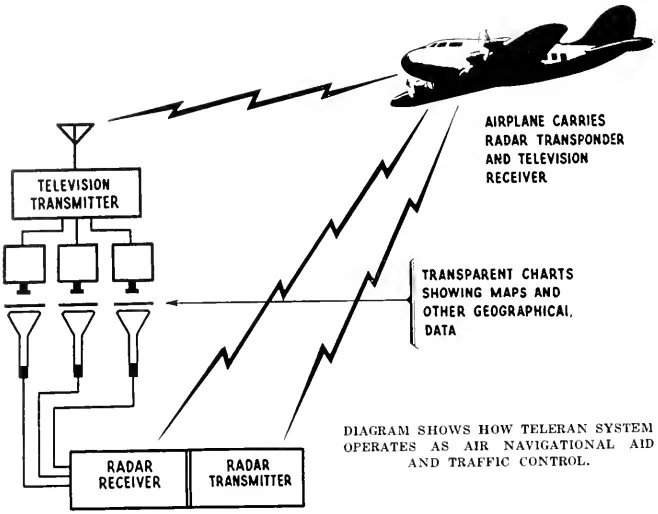


DIAGRAM SHOWS HOW TELERAN SYSTEM OPERATES AS AIR NAVIGATIONAL AID AND TRAFFIC CONTROL.

TELERAN DEMONSTRATED

Laboratory Advances in Television-Radar Air Navigation System, Installed in Flight-Simulator, Revealed to Public

IMPORTANT laboratory advances in Teleran, the system of television-radar air navigation and traffic control under development by the Radio Corporation of America, were revealed in Camden, N. J., April 10, at the first simulated flight demonstration of the system.

Introduced at the special showing in a laboratory of the Engineering Products Department of the RCA Victor Division was an equipment installation in a flight-simulator, capable of duplicating all the maneuvers of a plane in flight. This enabled the guests, seated in an enclosed cockpit, to observe on a Teleran screen their "progress" over a simulated aircraft course approaching the National Airport at Washington, D. C.

The demonstration followed private showings for officials of the Army Air Forces, representatives of the Navy, the Aircraft Owner and Pilots Association, the Air Transport Association, and the Civil Aeronautics Administration. These exhibitions constituted the second of three major steps planned in the development of the Teleran system. The first was a public demonstration, without simulated flight, held at Indianapolis last October. The third will consist of actual flight tests, scheduled to start in Washington, D. C., next fall.

Four new technical advances were demonstrated at Camden. These were: a new "storage orthicon" television pick-up tube especially developed by RCA for Teleran; a Teleran picture tube employing high intensity phosphors for greater image brilliance; an optical map-mixing technique which improves the composite Teleran image and simplifies insertion of additional information when required, and a time multiplexing system which provides for simultaneous transmission of images representing different altitude layers and selective reception of the proper image by planes in any one of these layers.

Instead of using actual radar for the demonstration, RCA employed projectors to simulate the small "pips" or spots of light which indicate the relative positions and courses of aircraft in a selected altitude layer. Air routes, terrain markings, and similar information were superimposed by means of specially prepared slides, resulting in a composite picture which was transmitted to the pilot's cockpit.

Each person using the simulator was in full control of the movements of the pip of light representing his own "plane" in the composite image presented on the Teleran screen on the pilot's instrument panel. He was free to maneuver out of the paths of other moving aircraft pips and glide smoothly past stationary obstacles, according to his handling of the flight controls in the simulator.

The new orthicon tube "stores"

TELERAN SCOPE ON INSTRUMENT PANEL OF PLANE, SHOWING AIR ROUTES AND TERRAIN INFORMATION SUPPLIED FROM GROUND STATION.

E. EBERHARD OF RCA TELERAN ENGINEERING DEPARTMENT HOLDS ONE OF THE NEW HIGH-INTENSITY TELERAN TUBES. BELOW IS A TYPICAL TELERAN IMAGE AS IT APPEARS ON THE TUBE FACE.

each individual image picked up from the radar screen long enough to scan it many times. Coupled with the light response of the new high-intensity phosphors, this provides reproductions on the cockpit screen that are many times brighter than the original radar images, and clearly visible to the pilot in full daylight. The storage characteristic also gives to each light pip a polywog shape in which the position of the tail reveals the course of the aircraft it represents.

The optical map-making system developed for use at the Teleran ground station employs a partially reflecting mirror set at an angle between the radar screen and the television camera. The mirror transmits part of the light from the radar screen, at the same time reflecting to the television pick-up lens an image of the markings on the transparent map which is mounted at one side. This method of mixing the map and radar images overcomes the "off-register" effect which had resulted from the fact that the radar screen is convex, while the map is flat.

The first civilian airport installations of ground surveillance radar, which will comprise one of the basic units of the Teleran system, are planned by the CAA for LaGuardia Airport, in New York, and National Airport, Washington, it was stated. The latter installation will be used in the initial flight tests of the Teleran system.

The demonstration was conducted by Loren F. Jones, Manager of Research and Development Projects of the RCA Engineering Products Department, who conceived the original idea of Teleran, and Dr. Douglas Ewing, Manager of the Teleran Engineering Department.

Color Television for Theaters

Large Screen All-Electronic System Exhibited for First Time Before The Franklin Institute in Philadelphia

COLOR television pictures on a 7½-by-10-foot theater screen were shown publicly for the first time by Radio Corporation of America in a demonstration of its all-electronic color television system at The Franklin Institute, Philadelphia, on April 30. Color motion picture films and slides were projected with utmost realism.

Dr. V. K. Zworykin, Vice President and Technical Consultant of the RCA Laboratories Division, who demonstrated the new system to illustrate his address on "All-Electronic Color Television" before the Institute, said that the large-screen system employs the all-electronic simultaneous method of color television developed at RCA Laboratories, Princeton, N. J.

It was emphasized by Dr. Zworykin that, as remarkable as the advent of large-screen color television pictures appears, color television must be regarded as still in the laboratory stage. Several years, he said, would be required for its development to equal the status of present black-and-white television.

In the electronic simultaneous color process, Dr. Zworykin explained, three separate images in red, green and blue are transmitted at the same instant over adjoining television channels of the same band-width used in standard television.

Then, at the all-electronic receiver which features a new type of receiver-projector, the three color signals are applied to kinescopes, or picture tubes, one with a red phosphor face, one blue and the other green. The flickerless pictures formed on the face of each kinescope are projected by an optical system to the auditorium or theater screen, where they are superimposed in perfect registration to

LARGE SCREEN COLOR TELEVISION AS PRESENTED BY THE RCA ELECTRONIC PROJECTOR.

form a single image blended in the same colors as the original.

Dr. Zworykin, who recently received the Potts Medal of The Franklin Institute for his outstanding contributions to television, pointed out that color television is passing through a series of development stages similar, in many respects, to those that black-and-white television passed through in its progression toward perfection. He said that a great step was made in the advance of television when RCA developed the simultaneous all-electronic color system, which eliminated all mechanical parts and rotating discs.

Compatible With Present System

"This system is completely compatible with existing monochrome television and has other important advantages," he continued. "The transition from monochrome to simultaneous color television can be made at a time in the future when color television is ready, without obsolescence of the monochrome receiving and transmitting equipment. It can from that time be developed side-by-side with black-and-white television without fear of obsolescence of the latter and without loss of investment by the public, by manufacturers and by television broadcasters. The progress that has been made so far in color television—and it is not inconsiderable—has been due to the efforts of many men working in close cooperation."

In presenting the demonstration, Dr. Zworykin said that development of this large-screen color television system was the result of cooperative efforts of several research groups at RCA Laboratories. He said that specific credit should be accorded to the following members of the staff: R. D. Kell, Television Section Head, and his associates, for developing the principles of the system; Dr. D. W. Epstein, Cathode-Ray and Optics Section Head, and his associates, for designing and building the receiver-projector; also, for contributing to the optical design of the unit; Dr. F. H. Nicoll, Research Engineer, for developing the necessary special projection kinescopes; Joseph Ford, of the Drafting Department, and R. A. Marple, of the Model Shop, for assisting in completion of the apparatus, and A. C. Schroeder, K. R. Wendt and G. C. Sziklai, of the Television Section, for contributing to the development of the flying-spot color pick-up unit.

Incorporates "Flying Spot"

Dr. Zworykin disclosed that the pick-up unit used in the demonstration incorporates the electronic "flying spot" which has been under development for nearly ten years. In this system, he explained, the flying spot of light is created on the screen of the kinescope by the electron scanning beam.

The light from this spot is projected through color slides or films, scanning the entire surface of the scene or object, point by point. As the light beam, then tinted with color, emerges from the film or slide, it passes through a series of filters which separate respectively the red, green and blue portions of the color in the beam.

Each color then is reflected into photocells which change the light values into electrical signals for transmission to the receiver. The flying spot method, he added, assures perfect picture registration by permitting the transmission of the three color values of each picture element simultaneously.

Tube Advances Outlined

Dr. Zworykin revealed that the special projection kinescopes used in this large screen color television system owed their brightness and effectiveness, in large part, to improvements achieved by RCA since development of the original kinescope.

"Some of these improvements, such as the design of electron guns to operate at higher voltages and to yield smaller, sharper dots, and the development of efficient phosphors, with a wide range of color, have been practically continuous," Dr. Zworykin said. "Other important contributions of relatively recent date, are the use of metal backing for the fluorescent face of the tube and the utilization of an improved optical system."

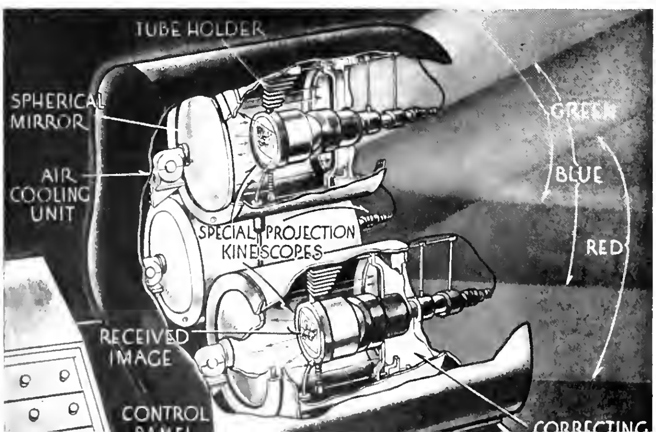
Television of theater-screen size in life-like colors represents "a spectacular advance in the art of sight-and-sound broadcasting, and holds fascinating prospects for the future," declared E. W. Engstrom, Vice President in Charge of Research of the RCA Laboratories Division who cooperated with Dr. Zworykin in the Philadelphia demonstration.

"The purpose of this demonstration," Mr. Engstrom explained, "is to make known to the public the latest advance in RCA's program of all-electronic simultaneous color television development, first introduced in October, 1946.

"At that time, we demonstrated two stages of our laboratory timetable when we televised still pictures from color slides and motion pictures from color films on a home-receiver screen 15 x 20 inches," said Mr. Engstrom. "The next step was disclosed in January 1947, at Princeton, when RCA transmitted live-action studio scenes in color

(Continued on page 29)

THIS DRAWING SHOWS HOW THE THREE PROJECTION KINESCOPES ARE ARRANGED WITHIN THE LARGE SCREEN ELECTRONIC COLOR PROJECTOR.



THE 28TH ANNUAL MEETING OF RCA STOCKHOLDERS HELD IN AN NBC STUDIO, RADIO CITY, NEW YORK.

RCA STOCKHOLDERS MEETING

Net Profit After Taxes of Radio Corporation of America for First Quarter of 1947 Amounted to $4,680,065 — Earnings Per Common Share for the Quarter Equal to 28 Cents, Compared with 17 Cents for First Quarter in 1946

NET profit, after taxes, of the Radio Corporation of America for the first quarter of 1947 was $4,680,065, representing an increase of $1,519,841, or 48 per cent, over the same period in 1946, Brigadier General David Sarnoff, President of RCA, announced at the 28th Annual Meeting of stockholders held on May 6, in a studio of the National Broadcasting Company at Radio City. Profit for the first quarter of 1947 — before Federal Income Taxes — amounted to $7,919,065.

Earnings per common share for the first quarter of this year amounted to 28 cents, as compared with 17 cents per common share for the first quarter in 1946.

Consolidated gross income of RCA during the first quarter of 1947 amounted to $76,560,096, compared with $48,972,924 for the same period last year. This represents an increase of $27,587,172, or 56 per cent over the 1946 figure.

General Sarnoff pointed out that over the past ten years, RCA paid more than $60,000,000 in dividends to its stockholders. Of this amount, $32,300,000 was paid to holders of preferred stock and $27,700,000 was paid on the common stock. He said that during the same ten-year period the net worth of the Corporation was increased by $39,000,000, and is now in excess of $100,000,000, thus revealing the increased strength of the Corporation, its growth and its increased value to stockholders.

"When RCA began operations in 1919", he said, "it employed 457 people. On May 1 of this year, RCA personnel numbered 40,600. Of this number, 60% are men, and 40% are women.

Wage Increases Granted

"To meet the increased costs of living, the Radio Corporation of America has from time to time granted general wage increases to its employees. The average weekly take-home pay for hourly paid employees in our manufacturing unit was $48.53 in April of 1947, an increase of 74% over April, 1941. The rates we pay are comparable to those paid by other manufacturers engaged in similar work. Since V-J Day, the increases granted by RCA to its employees amount to approximately $24,000,000 a year.

"The complex labor problems, which are part of present-day operations, have been solved by collective bargaining with the thirty-seven separate unions representing our workers. There were no strikes in the RCA."

RCA operations cover all phases of radio — research, engineering, manufacturing, broadcasting and world-wide communications, General Sarnoff pointed out.

"Reconversion of the RCA Victor Division's manufacturing facilities from wartime to peacetime operations was practically complete in 1946," he declared. "Attainment of full-scale production now depends chiefly upon an uninterrupted flow of materials.

"Despite scarcities that still plague production, all of our manufacturing plants had a substantial increase in output during the first four months of 1947. Public demand continues very good for our Victrola radio-phonographs, phonograph records, television receivers and the new RCA FM receivers. We are making delivery of FM as well as standard broadcast transmitters, and are in production of television transmitters for which we have substantial orders."

Reporting continued demand for RCA products in foreign countries, he said that the distributing organization of the RCA International Division has been expanded. Subsidiary companies in Brazil and Argentina have revealed increased activities, and in Mexico RCA anticipates augmented business through the opening of a new phonograph record plant.

"While the research facilities of the RCA Laboratories Division are again directed to peacetime pursuits, we realize our responsibility in continued and intensified research pertaining to national security," the RCA President asserted. "The war, in which science had such a vital role, taught this nation that the study and application of science and invention to military, naval and aviation operations should never be neglected or underestimated. Therefore, in applying new knowledge and discoveries in science to peacetime services, we shall determine their relationship to our national security."

Progress in television was reported being made by RCA on three fronts—research by RCA Laboratories, manufacturing by the RCA Victor Division, and telecasting by the National Broadcasting Company.

"Television was an important factor in the selection of Philadelphia as a site for the Republican National Convention in 1948," declared General Sarnoff. "That city is on the coaxial cable line that links New York and Washington into a television network. The Convention will be within view of a large audience along the Atlantic seaboard from south of Washington to north of Albany. Television, therefore, with its audience increasing daily, will play a new role in the 1948 national political campaign.

"We demonstrated all-electronic color television on a 15 x 20-inch screen of home size on October 30, 1946. An important further step was taken by RCA Laboratories last week when it successfully demonstrated its color television system on a 7½ x 10-foot theater screen at The Franklin Institute in Philadelphia. This was the first showing of color television pictures of this size, and as a result a new field is open for television entertainment in theater and motion picture houses."

He said that RCA believes that research and development work in color television have by no means been completed, and added: "Our scientists and engineers are building new instruments with which to explore the higher frequencies, conduct field tests and lay the groundwork for a complete service. We shall carry on these experiments energetically and hope that

GENERAL SARNOFF REPLIES TO A QUERY FROM A STOCKHOLDER.

the American public will enjoy the finest and most practical all-electronic television service in both black and white and color at the earliest possible date."

Plans for the mechanization of facilities of RCA Communications, Inc., have been partially completed, it was disclosed, and conversion from manual to printer operation is being made on the important radio circuits between New York and London, Paris, Rome, Berne and Stockholm. RCA trans-pacific circuits, operated from San Francisco, are on a printer basis. Substantial improvements have been made in RCA stations in the West Indies. The recent opening of a new radiotelegraph circuit to Greece gives RCA Communications direct circuits to 61 countries outside of the United States.

Marine Radar Tests Successful

It was reported that successful demonstrations of marine radar, developed by engineers of Radiomarine Corporation of America — a service of RCA — have led to sizable orders for equipping merchant ships. Thus radar has been added to the RCA line of radiotelegraph and radiotelephone instruments and direction finders manufactured for marine use. Radiomarine now operates eleven coastal stations and serves ships throughout the world.

It was announced that RCA Institutes, Inc., today has more than 1,300 students, 70 per cent of whom are war veterans, taking training courses in various branches of radio, television and electronics.

"While we are mindful that American, as well as international economy, is subject to rapid shifts in the years that follow war, we believe that 1947 will be a year of scientific achievement and industrial progress," General Sarnoff continued. "Further economic adjustments may be expected. I assure you that the Directors and Management of Radio Corporation of America are alert to all such trends.

"There are few important industries in America where competition is as wide and as keen as it is in radio. This is so, not only in the manufacture and sale of instruments, but also in broadcasting, communications, and all other branches of the art and industry. The war has served to increase the size and scope of competition in radio and the struggle for survival goes on alongside the struggle for volume and profits. The profit margin in the radio business are among the lowest in American industry. No one in America has a monopoly in radio.

"Radio is fortunate to have television as a new postwar industry for it gives promise of a growing business and affords constructive opportunities for extended service and growth. Wherever a television station goes on the air, a new market for home receivers is immediately opened. At the same time, other services of radio and electronics, modernized by wartime developments in science, are opening new commercial opportunities.

"Our operations in every phase of radio are built upon a firm foundation of long experience," he concluded. "We believe that research and developments in manufacturing, broadcasting, communications, television and electronics offer great opportunities to expand business and increase our service to the public. We have confidence in the men and women who constitute our organization. Our faith in RCA and its future is strong."

HEADS RCA INSTITUTES

General Ingles, former Chief Signal Officer, U. S. Army, Elected President and a Director of Technical Training School

MAJOR GENERAL Harry C. Ingles, who served as Chief Signal Officer of the United States Army from July, 1943, to March, 1947, was elected President and a Director of RCA Institutes, Inc. on May 8.

General Ingles, a native of Nebraska, retired from the Army on March 31 after a long career in military service. He holds the Distinguished Service Medal, awarded for service in the Caribbean Theater, and the Oak Leaf Cluster, which he received in recognition of his wartime record as Chief Signal Officer. In addition, he has been decorated for distinguished service by Great Britain, France, Venezuela, and Colombia.

As Chief Signal Officer, General Ingles was responsible for the Army's world-wide communication system, the enormous supply program of communication and electronic equipment for the Army, as well as the Signal Corps' research and development program.

After serving on the War Department General Staff from 1935 to 1939, General Ingles was assigned as Signal Officer to the Caribbean Area. This included the Panama Canal Department, the "hot spot" of pre-Pearl Harbor years. Then, he commanded the Mobile Force and served as Chief of Staff in the Caribbean Theater during the early part of the war. In 1942, he was selected by Lieutenant General Frank Andrews to serve as his Deputy Commander in the European Theater of Operations.

General Ingles was born March 12, 1888. He attended country grade school and was graduated from High School at Lincoln, Neb. He studied electrical engineering at the University of Nebraska and, in 1910, received an appointment to the United States Military Academy at West Point. After his graduation from West Point in 1914, he served in the infantry until his transfer to the Signal Corps in 1917.

MAJOR GENERAL H. C. INGLES.

In World War I, General Ingles was in charge of military and technical training of Signal Corps officers. Then he took over the Signal Corps Reserve Officers Training Corps and studied electrical engineering in the Graduate College of the University of Minnesota.

Subsequently, he became Signal Officer of the Philippine Division, 1921-24; Director of the Signal Corps School, Fort Monmouth, N. J., 1924-27; Instructor in Army Command and General Staff School, 1928-31; Director of the Signal Corps School, 1931-33, and Commander, 51st Signal Battalion, 1933-35.

Founded Signal Association

General Ingles is the founder of the Army Signal Association, which is regarded as an important contribution toward national preparedness. On April 28, 1947, he was honored by the Association with a certificate as an Honorary Life Member. In the educational field, he holds the degrees of Bachelor of Science and Doctor of Engineering. He is a graduate of the Army Signal School, a distinguished graduate of the Army Command and General Staff School, and a graduate of the Army War College.

RCA Institutes, Inc., the oldest technical training school in the field of radio and electronics in the United States, is located at 75 Varick Street, New York.

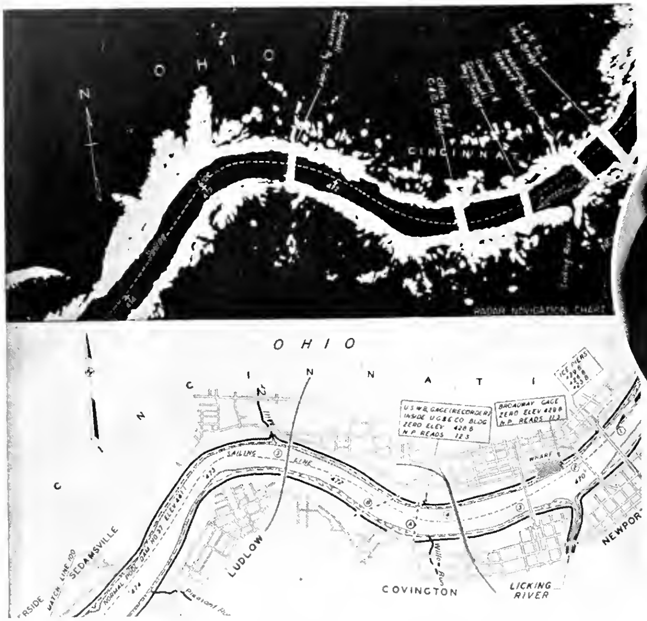
New Television Camera Works on 90% Less Light

A new studio television camera which makes it possible to reduce present studio light requirements by as much as 90 per cent has been announced by the RCA Engineering Products Department. "Eye" of the improved studio camera is a new type of image orthicon television pickup tube.

By operating with only one-tenth the light demanded by the best previous cameras, the new camera permits considerable savings on expensive studio lighting equipment and air conditioning units, according to W. W. Watts, Vice President in charge of the RCA Engineering Department.

The new studio-type image orthicon pickup tube combines the light sensitivity of the RCA image orthicon tube with the sharp resolution and contrast of the older kinescope. It produces brilliant, sharply defined pictures with excellent halftone shading at light levels of 100 to 200 foot candles.

LATEST TELEVISION CAMERA.



COMPARISON OF RADAR MOSAIC (TOP) WITH STANDARD CHART OF SAME SECTION OF RIVER SHOWS ACCURACY OF NEW MAPPING METHOD.

BRIG. GENERAL D. L. WEART, (LEFT) OHIO RIVER DIVISION ENGINEER, CONGRATULATES COL. B. B. TALLEY, DEVELOPER OF THE METHOD OF CHARTING INLAND WATERWAYS BY RADAR.

MAP-MAKING BY RADAR

Rapid Preparation of River Navigation Charts through Method Developed by Army Engineers, Is Made Possible by Use of RCA's 3.2-Centimeter Radar Equipments

PREPARATION of river navigation charts from radar photographs assembled in mosaic form has been accomplished by the Army Corps of Engineers, Ohio River Division, using 3.2-centimeter radar equipment manufactured by Radiomarine Corporation of America. Col. B. B. Talley, Army Engineers Corps, developed the map-making method and conducted initial tests of the apparatus aboard the U. S. survey boat *Cherokee*.

In making a radar mosaic, an automatic camera is attached to the radar instrument and adjusted to photograph images on the scope at regular intervals. The prints are then matched to produce a continuous strip-map reduced to the scale of standard navigation charts. On the assembled charts, engineers add dotted lines indicating the channel to be followed, together with figures showing the depth of water, and brief identifying descriptions of important landmarks.

According to Brig. General Douglas Weart, Ohio River Division Engineer, the importance of this development in chart-making is "comparable only to the introduction of steam power on the river."

Knows Position At All Times

"By using radar and radar charts," General Weart said, "it is possible for a pilot to know exactly where he is and 'see' the obstacles before him regardless of fog—one of the bugbears of river navigation—or other soupy weather. Each image on the radarscope, whether showing an island, shoreline cliff, a building or a cluster of gas storage tanks, will be recognizable as though he could see the landmark itself."

The cost of charting a river by radar, it has been pointed out, would be low in comparison to the savings that owners of Radiomarine 3.2-centimeter radar equipment could make through the general speeding-up of traffic and the elimination of delays due to weather conditions.

The 3.2-centimeter super-high-frequency band on which Radiomarine radar equipment operates, gives sharp, clearly-defined images that are easily photographed from the radar's 12-inch scope by Colonel Talley's method. The high-frequency beam hugs the surface of the water and picks up buoys or other small objects over distances twice as great as those afforded by lower frequency radars of the type used in wartime. Two or more closely spaced objects appear on the Radiomarine radar scope as separate, distinct targets in their true relationship to each other. Locks, bridges, shorelines, channel markers and approaching tows can be picked up by the radar.

LISTENING TASTES TESTED

RCA Laboratories Confirms Belief That Majority of Persons Prefers Natural Music With Full-Range of Tone Quality

ALTHOUGH some surveys have indicated that music reproduced by loudspeakers is more acceptable to the public when its tonal range is restricted, a substantial majority of listeners prefer natural music in its full range of tones and overtones, Dr. Harry F. Olson, section head of the Acoustics Research Laboratory of RCA Laboratories, Princeton, N. J., reported to the Acoustical Society of America at its meeting held in the Hotel Pennsylvania, New York, on May 9. Dr. Olson based his conclusions on tests carried out at the Laboratories on more than 1,000 persons of various ages and vocations.

In making the tests, Dr. Olson said, a small orchestra, consisting of piano, trumpet, clarinet, violin, contrabass, drums, and traps, was placed in a room acoustically treated to simulate conditions in an average size living room. A partition constructed of material that absorbed all tonal frequencies above 5,000 cycles — the normal limiting range of radio reproduction—was placed between the musicians and the audience. By revolving movable panels in the partition, this limitation on tone quality could be removed, allowing the music to reach the audience unchanged.

Additional tests with subjects in various age groups, Dr. Olson added, showed that 75% of listeners between 30 and 40 preferred the full frequency range of popular music while only 59% of those between 14 and 20 expressed an appreciation for the unrestricted tonal range in this classification of music.

"The listeners in the latter age group," Dr. Olson stated, "are probably influenced by listening to radios, phonographs and juke boxes rather than orchestras and are, therefore, conditioned to a restricted frequency range."

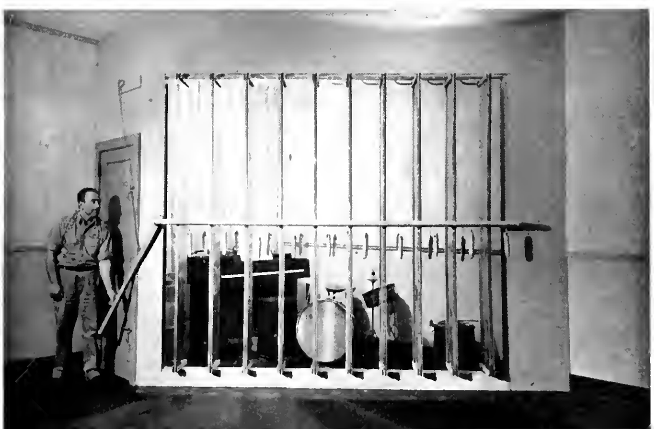
Popular Music Used in Tests

Most of the tests were carried out using popular dance music. The small size of the room made it impossible to play symphonic numbers but listener preference in this direction was checked with a semi-classical selection. For all practical purposes, these results agreed closely with those obtained in the popular-music test.

When tests were carried out on speech, listeners preferred the full frequency range whether the audience was familiar with the speaker's voice or when the voice was being heard for the first time.

In discussing the preferences of listeners for mechanically reproduced music with restricted frequency range, Dr. Olson said that this choice might be due to the distortions of sound which are inherent in common types of reproducing systems. In his opinion, such distortions would be found less objectionable when frequencies above 5,000 cycles are eliminated. These possibilities, he said, would be explored in future investigations.

ACOUSTICAL FILTERS USED IN RADIO-MUSIC TEST.



USES OF TELEVISION

(Continued from page 11)

by making numerous long-shots, close-ups and other special camera versions of the scenes involved in the working script. From the miles of film resulting from this procedure, editors select the sections of footage best adapted to the development of the story. With high definition television cameras and a motion picture television recorder —a device that takes motion pictures of television screen images— these costly and time-consuming operations could be eliminated. This is how such a system might work:

Instead of training a battery of motion picture cameras on the scene, an equal number of television cameras would be focused on the action, at angles specified by the director. The latter would then take his position in front of a group of television monitor screens on which the pictures recorded by all cameras would be reproduced simultaneously. As the director selected the best of the views shown, he would press a button and the output of the television camera which produced that view would be shifted instantly to a single screen. At the same instant, the motion picture television recorder would begin to record the images on a master film strip together with dialogue and sound effects. When all sequences were completed, the feature would be in its final edited form ready for the developing and printing laboratory.

Television's contributions eventually will affect all branches of man's endeavor. As an efficient and effective selling tool, it has no equal. In television also can rest a good measure of the world's social destiny. An opportunity to lift the general welfare is a rare privilege, yet through television all this and more can be done.

ROSALIE ALLEN, WHOSE "PRAIRIE STARS" PROGRAM OF RECORDINGS IS HEARD NIGHTLY OVER STATION WOV, NEW YORK.

RADIO'S RECORD SALESMEN

Nearly a Thousand "Disc Jockeys," Operating from Broadcast Stations, Create New Markets for Recordings.

THE past decade has seen the emergence of the radio "disc jockey" as one of the most potent sales factors in the record business.

Today approximately 1,000 record-playing announcers are heard regularly on U. S. radio stations. The overhead for disc jockey programs is remarkably low; the disc jockey's stock in trade is small—a persuasive, friendly voice, a turntable, and a vast library of popular and classical recordings which are kept up-to-date through purchase of the latest releases.

Once a low-cost method of filling air time for small-budget stations, the disc jockey program has mushroomed amazingly. Nationally known announcers, willing to trade the prestige of network affiliation for the lucrative yield of disc jockeying on small, independent stations, are gaily spinning platters today.

For better or worse, the platter spinner is no longer a phenomenon of radio. He is as much a part of local station operations as comedy headliners, audience participation programs, daytime serials and mystery dramas on the networks.

He has become the target of song pluggers, press agents and promoters. He is no longer the last resort of the sponsor who can only afford low-cost air time.

Stimulate Interest in Classics

In the past year or two the disc jockey has turned to programs of classical music, and these broadcasts have become increasingly popular and are doing much to stimulate interest in symphonic and operatic recordings.

Hand in hand with the interest in classical music that has been developed via the disc jockey route is the program known as "Music You Want" which RCA Victor Records introduced in 1937 as a means of developing new audiences for classical records. Today the "Music You Want" broadcasts may be heard five nights a week on any one of 58 independent stations throughout the United States. This half-hour program operates by means of a loan library of classical recordings which are made available to radio stations together with scripts prepared by the record company. It is a half-hour sustaining show, which has become so popular with independents that today a long list of stations wait for an opportunity to be added to the "Music You Want" circuit. The technique differs from the disc jockey type of show, for each disc jockey maintains his own individuality and builds his show around his own personality.

Program Format Varies

Tune into any one of a number of stations that remain on the air all night and you will hear the voice of the disc jockey, talking about and playing popular recordings just off the presses. The format of these "dawn patrol" shows is varied and informal. Top names in the music field stop in to chat with the jockeys and manage, in the course of a few minutes on the air, to get in some effective plugs for their latest record releases.

Visit an all-night restaurant that possesses a radio, and you will hear these marathon announcers. Five minutes of news on the hour or half-hour; a series of commercial plugs between recordings. That's the way the disc jockey talks and plays his way through the night, a boon to night-shift workers in plants that do not have industrial music; a faithful friend of cab drivers, restaurant countermen and other night owls whose working day starts when other people are getting ready for bed.

Turn on your radio at six in the morning and you will hear voices of disc jockeys, some greeting the dawn with chatter and small talk, others busily plugging their products while people are still rubbing sleep from their eyes.

What percentage of record sales can be attributed to the platter spinner would be difficult to judge. Some endorse and comment on the recordings they really like. Others maintain strict neutrality as regards the merits of the new releases. But if the listener likes a record when he hears it plugged on the radio as a new record release, it is reasonable to assume that someone in the family may want to add that record to the collection, to play it again whenever he wants to hear the tune.

Revenue for Musicians

The two-year ban on record manufacture emphasized the fact that records and transcriptions generally used by the vast majority of small, independent radio stations throughout the country were an important source of revenue to many musicians. The resumption of recording restored the income of musicians, a number of whom are enjoying very comfortable standards of living as a result of increased recording and transcription income.

These musicians are not "name" bandleaders or vocalists. Some are network affiliate house musicians, others are "sidemen" in dance orchestras. Quite a few are members of symphony orchestras, who augment their income by filling in on recording and transcription dates. The recent increase in the union scale for recording, transcriptions and radio performances has made this a lucrative calling.

The end of the war brought back to the air one of the most popular devices of the early disc jockey—the request playing of "favorite tunes" of listeners. Banned during war years as a possible means of code communication between enemy agents stationed in the U.S., the "all request" disc jockey program flashes through the night air once again. A couple about to be married requests a special tune, played by a specific band. A group of convivial tipplers in a neighborhood bar and grill want a favorite drinking song. Lovers effect a reconciliation via the disc jockey, who announces the playing of Perry Como's "Prisoner of Love," for "John Doe, dedicated to Jane Roe."

Listeners Keep Phones Busy

Telephone switchboards buzz and flash throughout the night, and Western Union teletypes located in the disc jockey's studio, chatter away, registering requests for popular and classical recordings.

How many of these requests, telephoned or telegraphed, are legitimate, and what percentage are the artful practices of songpluggers and promotion, is a matter of speculation.

But the calls keep coming, the turntables keep spinning, and the record industry, producing in greater quantity than ever before in history, still cannot keep up with the demand for records, thanks to the record salesmen of radio.

Plane-to-Shore Message Service Opened

Passengers aboard the Pan American World Airways clipper America, on its inaugural round-the-world flight, which was completed on June 30, were able to maintain contact with business associates, friends and relatives in all parts of the United States by means of a new global plane-to-shore communications system entering public service for the first time on this flight.

Arrangements for handling messages from the giant clipper were completed by the air line with the Radiomarine Corporation of America, a service of the Radio Corporation of America. Radiomarine's powerful radio-telegraph station at Chatham, Mass., capable of sending and intercepting world-wide messages, played the key role in the FCC-approved service. Other RCA stations in Manila, Honolulu and Bolinas, Calif., assisted in handling correspondence.

Announcement of the new service was made jointly by James H. Smith, Vice President, Atlantic Division, Pan American World Airways, and the Radiomarine Corporation of America. The transoceanic journey of the clipper America, they said, was the first in which airborne radio communications facilities were available to passengers of an American plane. Describing the system as a much-needed addition in service to the air-travelling public, they said the global flight could serve to determine the practicability of installing the service as a regular facility.

In charge of the radio communications equipment aboard the America, Flight Radio Officer Hugh E. Simpson, of Selma, Alabama, handled the plane's operational messages and outgoing correspondence which took the form of "Via RCA" radiograms.

Plane-to-shore transmissions are picked up by Radiomarine and relayed to proper destinations. The overall message rates for the service are similar to those for ships at sea.

Another modern feature aboard the America was an RCA loran receiver, providing electronic long-range air navigation. This equipment is capable of facilitating quick and accurate positions of flight over distances ranging from 700 miles in daytime to 1,500 miles at night, under all kinds of weather conditions.

Also aboard the clipper was an RCA radar altimeter providing information on absolute altitudes above the earth's surface. This instrument operates on a two-range scale, giving heights from zero to 400 feet and zero to 4,000 feet.

PASSENGERS BOARD PAN AMERICAN CLIPPER AMERICA FOR INAUGURAL WORLD FLIGHT WHICH ALSO INTRODUCED RADIOMARINE'S PLANE-TO-SHORE MESSAGE SERVICE FOR AIR TRAVELLERS.

AN NBC CAMERAMAN FOCUSES THE IMAGE ORTHICON CAMERA ON A DUNGAREE-CLAD MEMBER OF THE SUBMARINE CREW AT ONE OF THE BATTLE STATIONS ABOARD THE "TRUMPETFISH."

SUBMARINE TELEVISION

NBC Stages and Produces First Sight-and-Sound Program from the Cramped Quarters of a Submerged Underseas Craft

By O. B. Hanson

Vice President and Chief Engineer, National Broadcasting Co.

INFINITE attention to every last detail of the project combined with the enthusiastic cooperation of the U. S. Navy made it possible for the National Broadcasting Company to stage the first television program ever to be transmitted from a submerged submarine. The program took place on April 10, 1947 aboard the U.S.S. Trumpetfish, at the Brooklyn Navy Yard, exactly forty-seven years after the Navy had purchased its first submarine, the U.S.S. Holland.

The remote pickup which lasted ninety minutes, was one of the most engrossing in television history. It was also one of the most difficult. The fact that we managed to put it on at all is a tribute to the ingenuity and perseverance of our engineers; and the fact that it turned out so well when it was viewed on television screens is a tribute to the programming ability of NBC's television field staff.

Five major problems faced us in planning the program. We had to devise a way to get our camera-and-sound cable into a submerged craft. A locale had to be chosen that would have all the necessary qualifications, viz., direct line-of-sight to the RCA Building or the Empire State tower; water that was deep enough for submerging, and an adequate and dependable source of power supply for lighting. We had to find out how to set up our cameras in the crowded interior of a submarine. Tests must be conducted to determine how to illuminate the submarine interior; and finally, we had to build a smooth-running program in order that viewers would gain a clear idea of the action aboard a submarine while submerging.

Two men were charged with solving these problems: Alfred E. Jackson, of the Engineering Department, an assistant field supervisor on television programs, and Noel Jordan, a WNBT field program director.

Since the Trumpetfish, then in use by the Navy for public relations work, was based at the Submarine Base, New London, Conn., Jackson, Jordan and Bob Stanton, television special events announcer, went to the Base about ten days before the program. There they got their first good look at the ship, learned what actions should be high-lighted in the program, and discussed with the crew members the best methods to follow in getting the program on the air. As part of the preliminaries, Jordan and Jackson went to sea in the craft and were aboard during three dives.

The Navy first suggested putting

the cables aboard the sub by taking out one of the hull plates, inserting the cables through the hole and then plugging the gap around the cables. Jackson, however, hesitated to subject the comparatively delicate cables to the pressure of the clamps that would be necessary to render the gap watertight when the ship submerged. Furthermore, the Navy was none too enthusiastic about removing plates from one of its submarines.

Spare Periscope Removed

The second suggestion proved practicable. This was to remove the ship's spare periscope and drop the cables through the empty tube. Handled in this way, the cables would not be squeezed by deep-water pressure, since the submarine would not submerge entirely and the spare periscope tube, under such conditions, would remain a few feet out of the water. From the Navy's viewpoint, removing the periscope was an easier task than removing a hull plate.

The problem of finding a dock with enough depth of water, adequate electric power and a line-of-sight view of Radio City was solved when the Navy offered the use of a berth at the Brooklyn Navy Yard where all these specifications were met. Inasmuch as the program was to be put on at night, it was necessary to use 60,000 watts of lighting for the outdoor scenes and to erect high scaffolding on which to place the lights.

The problem of getting our three cameras into the submarine and making them mobile in the cramped interior was solved by the ingenious method, conceived by Jackson, of building special platforms on wheels and bolting the cameras to them. By these means, the cameras could be rolled down the length of the submarine's interior, from one compartment to another, merely by separating platform and camera whenever a hatchway was encountered. In this way, all three cameras inside the sub could cover the maximum amount of space, without being restricted to one particular watertight compartment.

Lighting Problem Complicated

The problem of lighting the submarine's interior was complicated by the fact that our foto-flood lights would not fit Navy lamp sockets. Adapters had to be made —31 of them. Then asbestos pads had to be placed over all parts of the ship's interior that were likely to be blistered by the heat from the foto-flood lights.

The programming side of the pickup is another story. The whole show moved smoothly and provided a clear-cut account of how a submarine is handled, including an extremely convincing mock torpedo attack as seen from the forward torpedo room. There was but one hitch in the program. Just before the mobile unit went on the air, the searchlights which were to illuminate the sub's "target" — a cruiser moored at a nearby dock — failed completely. As a result, viewers were deprived of a periscope view of the intended "victim."

Except for this minor disappointment, the program proceeded according to plan. Four cameras — one atop the mobile unit on the dock, and three in the submarine— registered every action from beginning to end of the dive. Three announcers — Stanton, Ray Forrest and Rad Hall — supplied the commentary and interviewed members of the crew. Approval of the telecast was general. Not only we, at NBC, but the Navy as well, were delighted, and letters from viewers were enthusiastic in praise of the event.

TELEVISION CAMERA ON MOBILE UNIT RECORDS EXTERIOR SCENE AS SUBMARINE EMERGES AFTER ITS DIVE.

COLOR TELEVISION FOR THEATERS

(Continued from page 20)

over an ultra-high frequency radio circuit before a special hearing of the Federal Communications Commission."

Revealing the next big step to be expected in the evolution of color television, Mr. Engstrom said that cameras and other necessary apparatus are being developed at the Laboratories, which will enable a demonstration of color television featuring outdoor scenes in motion. He hinted that autumn tints on the countryside would afford ideal views to test the delicate and sensitive vision of the all-electronic color camera eye.

In looking to the future, Mr. Engstrom said that it is the plan of Radio Corporation of America to perfect color television in such a manner that ultimately it will take its place alongside the RCA all-electronic black-and-white television system, which now is bringing news, entertainment, sports and events of national importance to observers in New York, Philadelphia, Schenectady and along the Atlantic Seaboard as far south as Washington, D. C.

The Story of 16mm. Sound

From Its Start in This Field in 1931, RCA Has Scored Many "Firsts" in Methods and Equipment

SIXTEEN years ago, the Radio Corporation of America introduced the first 16mm sound film projector. Since that date, RCA, through its 16mm Motion Picture Equipment Section, has carried out continuous development work in its laboratories out of which has come the present perfected 16mm sound projector as it is known to the industry today.

The first problem faced in the early Thirties, that of putting sound on the narrow film, only 5/8" in total width, was considered insuperable but RCA solved it. From that starting point, the company went on to score most of the significant "firsts" in the 16mm industry.

The first 16mm sound projector was developed by RCA in 1931. Behind it lay years of pioneering effort aimed at solving the many problems — optical, photographic, electronic and mechanical — which plagued photographic sound recording. RCA's first innovation was 16mm film with one row of sprocket holes which reserved the other side of the film for the sound track. In cooperation with the Eastman Company, the film was presented for standardization to the Society of Motion Picture Engineers and after being adopted as the American standard, was later made world standard.

By W. W. Watts

Vice President in charge of Engineering Products Dept., RCA Victor Division

Film Speed a Problem

The small area available for sound on 16mm film was further complicated by the fact that 16mm film runs at only 36 feet per minute against 90 feet per minute for 35mm film. This slower speed further reduced the linear space available on the 16mm film to only 40 percent of that on 35mm film.

RCA's answer, in 1928, was a revolutionary new "dry" galvanometer, part of a greatly improved optical sound recording system. Outstanding feature of the new galvanometer was a mirror fifteen times larger than previously used on sound film recording systems. The new mirror cast light of much greater intensity and made possible an optical system of high resolving power. This, in effect, was the finer "paint brush" necessary to get good resolution of the hair-fine lines on the tiny 16mm track. The greater light intensity also permitted the use of finer-grain film, resulting in even better resolution.

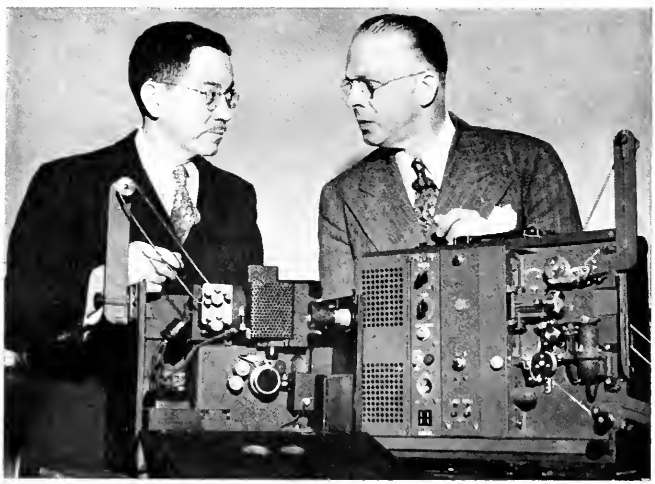
In addition, RCA engineers developed, at about this same time, a magnetic film drive for sound recording which provided smooth and oscillation-free passage of the film through the recording light. A corresponding improvement in the reproduction of sound in the projector was also made possible by RCA's development of the "rotary stabilizer" which passed the film at smooth and steady speed through the projector, ironing out speed variations which previously had made all pianos sound out of tune and introduced Hawaiian guitar effects into all music.

Grain in Film Caused Noise

A source of interfering noise was graininess in the film texture intensified by dirt and imperfections on the sound track which registered as hissing, crackling and "frying" noises. RCA engineers blanked out this static and chalked up a notable "first" in noise reduction by devising an automatic biasing system which, during low-level passages, keeps the clear area of the track no wider than needed at the moment to record the sound on the film.

Reproducing sound from a film track requires an intense beam of

G. A. DEL VALLE, RCA DESIGN ENGINEER, AND O. V. SWISHER, GENERAL MANAGER OF 16MM. ACTIVITIES, COMPARE THE 1931 MODEL PROJECTOR (LEFT) WITH THE LATEST SOUND FILM UNIT.



LATEST MODEL 16MM. PROJECTORS MOVE ALONG THE PRODUCTION LINE AT RCA VICTOR'S CAMDEN PLANT.

light in the form of a sharp line less than a thousandth of an inch wide. In 1932, RCA engineers dipped into the magician's hat of optical science and came up with a radically different sound-reproducing optical system for the RCA projectors. At the heart of the new sound-reproducing system were cylindrical lenses which have the peculiar ability to produce a line image of the incandescent lamp filament directly on the film. The new lenses enabled RCA to get a more uniform image at the film using an economical low-power lamp in its projector. The small lamp could be operated from an oscillator built into the amplifier, producing a high-frequency current which lights the lamp without flicker.

Developed Improved Printer

In 1933 and 1934, improved models of the original RCA 16mm sound projectors were placed on the market, and in the latter year, RCA further improved 16mm sound by designing an optical reduction printer that made it possible for film-processing laboratories to make 16mm prints of finer quality from 35mm negatives.

In 1935, a novel camera, which would be considered sensational even in a post-war year of wonders, was introduced to the amateur movie markets by RCA. This was the RCA 16mm sound camera, in which pictures and sound were impressed simultaneously on a single film.

But RCA did not rest on its accomplishment. The search for an even finer "paint-brush" for applying sound to film tracks continued. The trouble with the white light then used was that it penetrated the film emulsion, and "scattered", spreading the exposure and unduly thickening the fine lines of the sound track. Although this was a real problem in 35mm film recording, it was even more serious in the exacting work of 16mm recording. Finally RCA laboratories found the solution. This was ultra-violet light, first commercially introduced by RCA in 1936. Instead of completely penetrating and scattering as white light had done, ultra-violet light was absorbed before penetrating more than a minute distance into the emulsion, localizing the exposure to the exact area struck by the recording light beam. A wonder tool in 35mm sound recording, the benefits to 16mm sound recording were manifold.

The quality of 16mm sound was boosted still further in 1938, with the introduction of the "electronic mixer", or "compressor" by RCA. By this method the full range of sound was "compressed" onto the 16mm track making the weak sounds loud enough to be distinct without making the loud sounds of such amplitude as to overload the sound track.

Film Damage Reduced

At about this same time, RCA engineers broke the back of another problem that had been plaguing the 16mm industry. This was damage to film in 16mm projectors. Casting previous threading arrangements aside, RCA engineers designed a much simplified threading arrangement and incorporated it in another new projector model. The new arrangement featured large 16-tooth sprockets and the passage of film in wide curves and long flowing lines to end crimping and tearing.

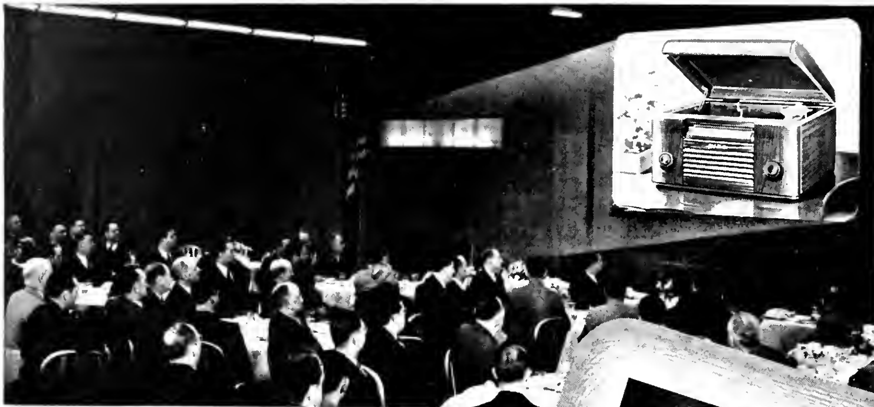
In 1942, the RCA 16mm sound projector donned the olive-drab of the Armed Forces and went to war. As models PG-200 and PG-200A, it saw global service with Army and Navy. Improvements in these models included a slipping-clutch take-up which put the proper tension on the film regardless of the amount of film on the reel, thus extending film life.

During the war, the unusual requirements of field use led to another step forward in 16mm sound with the perfection by RCA technicians of the "closed-cavity" loudspeaker, a development that had been simmering on the scientific fire for almost two decades. Rugged conditions imposed on 16mm sound equipment had brought a request from the Army Signal Corps for a loudspeaker that was weather-tight, small in size and capable of improving the radiation of lower tones. Overcoming the problems of cavity resonance, RCA technicians by 1943 had fulfilled the Army's request. This development put the quality of RCA 16mm sound far in front of the field.

Batsel Directed the Work

The history of progress in 16mm motion pictures is the history of work done by a closely knit group of scientists still functioning as a team in the Advanced Development Laboratories and Design Engineerig Section of the Camden plant. At the head of the group is Max Batsel, Chief Engineer of the Engineering Products Department. In addition to directing the work, Mr. Batsel was a major force in achieving standardization of film in the Society of Motion Picture Engineers and the American Standards Association.

As Chief of the Advanced Development Laboratories, Dr. E. W. Kellogg is responsible for the basic studies and work in film motion. In addition, he holds the basic patents on speakers used not only in motion pictures, but in radio and sound-reproduction devices.



Sales Meeting..

or Complete Convention—

packs dramatic punch on sound film!

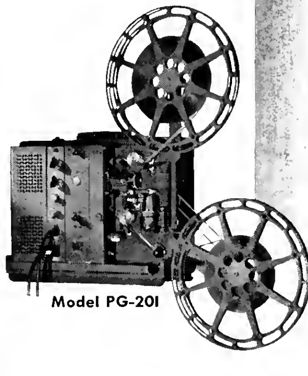
CAPTURE all the fire and technique of the sales manager's hottest sales talk. Use it over and over to inspire distributor and dealer salesmen . . . to increase sales. It is being done, with 16mm sound film and RCA Sound Film Projectors.

Or, stage an entire convention on sound film . . . and present it with telling effect . . . in less time, and at a much lower expense than by methods usually employed.

One manufacturer, famous for the size and character of his distributor get-togethers, recently put the meat of a whole week's show on sound film. He ran off his convention in a single day. Results? Many millions of dollars in direct orders, and a high order of distributor enthusiasm. Furthermore, briefs from the film were reprinted for use in sales-training work throughout the distributor-dealer set-up.

Yes, sound films can be dynamic sales tools—when presented by means of the finest projection equipment. For maximum effect, use an RCA PG-201 16mm Sound Film Projector. Get vital realism in your show, with crisp, brilliant screen images and lifelike, full-range sound. Performance is comparable in every way to professional theatre showings. RCA Sound Film Projectors are easy to set up, use, and maintain. They give plenty of sparkle and power to the presentation of your sales story.

For details address 16mm Motion Picture Equipment, Dept. 66-J, Radio Corporation of America, Camden, New Jersey.



Model PG-201

RCA

16mm MOTION PICTURE EQUIPMENT

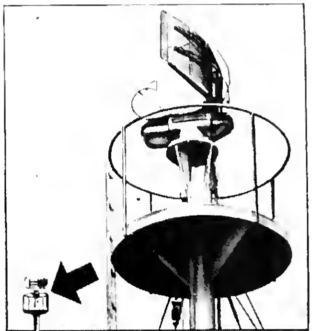
RADIO CORPORATION of AMERICA

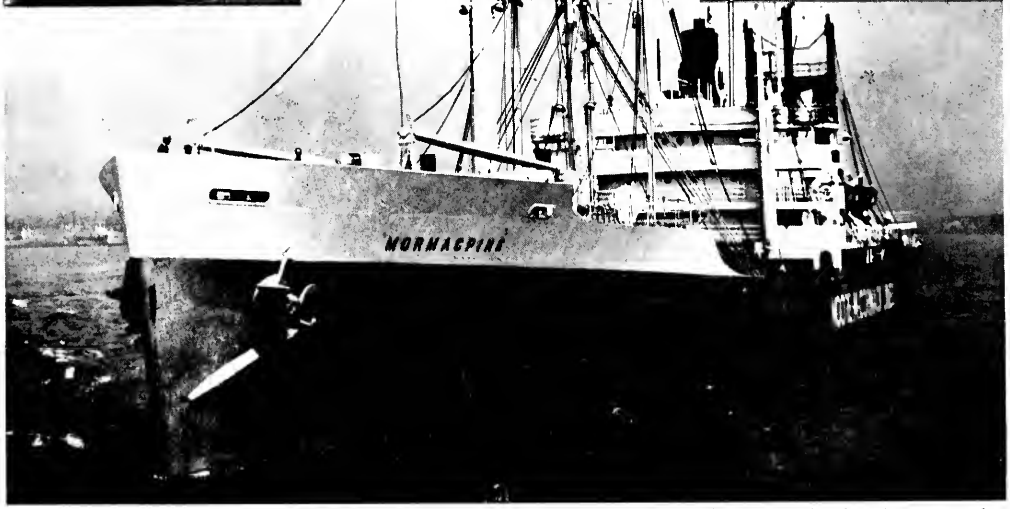
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

Indicator Unit of Radiomarine's Radar being operated by Chief Mate C. H. Preusch, of SS MORMACPENN. Installation is mounted in wheelhouse.

Radiomarine compact Radar Antenna Assembly mounted on the bridge.





The SS MORMACPINE, one of the eight new Mormac ships equipped with Radiomarine Radar. Four of them also have Radiomarine Loran aboard.

Aboard Mormac Ships you'll see RADIOMARINE 3.2 cm RADAR

Radiomarine's 3.2 cm Radar is aboard eight new ships of the Moore-McCormack Lines, Inc.

Through fog and darkness, in all kinds of weather, on high seas, at ports from Buenos Aires to Stockholm, Mormac vessels with Radiomarine Radar sail with greater speed and safety. Radiomarine Radar helps Mormac ships and other vessels to maintain regular schedules in the fast and safe transportation of cargo and passengers.

Here is convincing proof that forward-looking shipping operators are taking full advantage of the efficiency and adaptability of Radiomarine 3.2 cm Radar by installing it now aboard their vessels.

Designed for High Performance

From Radiomarine you get modern, postwar radar of advanced design and construction. Radar that meets the rigid all-weather requirements of present and future merchant vessels operating on the high seas, lakes or rivers.

We're in full production and making installations daily! For prices and further information write: Radiomarine Corporation of America, Dept. F-00, 75 Varick Street, New York 13, N. Y.

YOU GET THESE ADVANTAGES with Rodiomarine Radar

- 12-inch viewing scope
- 86 inches of picture area
- clearer, larger, steadier pictures
- sharp definition between closely spaced and low-lying objects
- true or relative bearings
- range 80 yards to 50 miles

RCA **RADIOMARINE CORPORATION of AMERICA**

A SERVICE OF RADIO CORPORATION OF AMERICA

RCA Miniature Tubes enhance the tonal brilliance of RCA Victor Globe Trotter portable radios.

Wherever you go with an RCA Victor Globe Trotter portable radio you'll enjoy richness and clarity of tone—volume enough for outdoor dancing—made possible through tiny tubes.

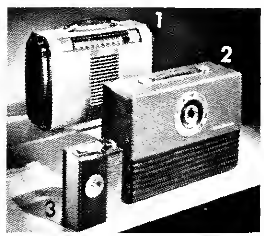
Miniature tubes save valuable space in small radios—space that can be used for larger and better loudspeakers and for longer lasting, radio-engineered RCA batteries.

These miniature tubes were developed by RCA Laboratories—a world center of radio and electronic research—and long a leader in development of electron tubes for all purposes.

At RCA Laboratories, the same research, experimentation and advancement that resulted in these improved tubes, keep all RCA products and services at the top in their particular fields.

When you buy a product bearing the name RCA or RCA Victor—a radio set, television receiver, Victrola radio-phonograph, a radio tube or phonograph record—you get one of the finest products of its kind that science has yet achieved. "Victrola" T. M. Reg. U. S. Pat. Off.

Radio Corporation of America, RCA Building, Radio City, New York 20. Listen to the RCA Victor Show, Sundays, 2:00 P.M., Eastern Daylight Saving Time, over NBC.



Ideal traveling companions. (1) RCA Victor "Globe Trotter" portable radio—operates on AC, DC, or batteries. (2) RCA Victor "Escort"—has a battery *you* can recharge from any ordinary AC electric outlet. (3) RCA Victor "Solitaire"—less than 6¼ inches tall!

RADIO CORPORATION of AMERICA

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

OCTOBER

Ultrasensitive RCA television camera tube cuts studio light requirements 90%

Television finds drama in the dark — with new RCA studio camera

Now television becomes even more exciting as lights are dimmed, and the camera reaches deep inside studio shadows to capture action as dramatic as any on stage or screen . . .

A new studio television camera—developed by RCA scientists and engineers—needs only 1/10th the usual light.

The super-sensitive eye of the new camera is an improved Image Orthicon Tube . . . of the type once used only for broadcasts of outdoor events. With it, studio broadcasts now become sharper, clearer—and since so little illumination is needed, heat in the studio is sharply reduced. No more blazing lights!

Such improvements come regularly from research at RCA Laboratories, and apply to all branches of radio, television, electronics, and recording. These improvements are part of your purchase of any product bearing the name RCA, or RCA Victor.

• • •

When in Radio City, New York, be sure to see the radio and electronic wonders at RCA Exhibition Hall, 36 West 49th St. Free admission. *Radio Corporation of America, RCA Building, Radio City, New York 20.*

RCA Victor home television receivers bring you every dramatic detail that the new camera catches. RCA's "Eye Witness Television" locks pictures in time with the sending station. Let your dealer demonstrate.

RCA

RADIO CORPORATION of AMERICA

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

VOLUME 7 NUMBER 1 OCTOBER 1947

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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.

COVER

Some of NBC's program headliners as caricatured by the noted illustrator, Sam Berman. The series was instituted to promote the network's annual Parade of Stars.

Services of RCA are:

RCA Laboratories Division

RCA Victor Division

RCA Communications, Inc.

iomarine Corporation of America

ional Broadcasting Company, Inc.

RCA Institutes, Inc.

RCA Service Company, Inc.

RCA International Division

Lt. General James Guthrie Harbord, 1866 - 1947

". . . His keen mind, exceptional ability and clear judgment, combined with his high sense of honor, commanded the respect of all those associated with him, and the memory of his kind and lovable qualities and sterling character will be an abiding inspiration to all who enjoyed his friendship.

"By virtue of his preeminently successful and honorable discharge of the duties of high national and international offices, he enjoyed and richly merited the admiration of the public and the deep affection of a world-wide circle of friends."

Television Progress

New Industry Moving Ahead Rapidly and is Destined to Become One of America's Major Industries, Brig. General David Sarnoff Tells NBC Affiliates at Atlantic City Convention.

IN SPEAKING of television for the past twenty-five years or so, we have been accustomed to say that "television is around the corner." In my observations today I should like to bury that phrase. Television is no longer around the corner. It is beyond the doorstep; it has pushed its way through the door into the home!

I would like to go into the subject directly and with a few timely and conservative figures. They will help to illustrate the general remarks I will make about the possibilities of television as a new industry and as an important new service to the public.

The Federal Communications Commission has authorized to date a total of 69 television stations, and 16 applications are pending. This means that 85 television stations already have decided to lead the way. I believe that many more will follow. Today there are 13 stations on the air with regular television programs. By the end of 1947 this number may be doubled. In 1948, the list of stations will increase as transmitting equipment becomes available.

My estimate is that by the end of 1948 there will be approximately 50 television stations on the air in this country with regular programs. There may be more.

Television Receivers

All kinds of figures have been mentioned about television receivers, and here is my estimate: between 150,000 and 175,000 receivers will be in use by the end of 1947. By the end of 1948, I foresee a total of 750,000. This means that for 1948 our estimates are approximately 600,000 above the number that will have been installed at the end of the present year.

Surveys have been made of the number of people within range of present television programs. Approximately 30,000,000 people live within the areas covered by current television broadcasts. By the end of 1947, this figure will be 40,000,000 and thereafter this audience will be augmented by many millions.

Surveys indicate that seven viewers constitute the average audience at each television receiver. Therefore, if you multiply 750,000 by seven you will see that by the end of 1948 there will be a large audience for television — somewhere near 5,000,000.

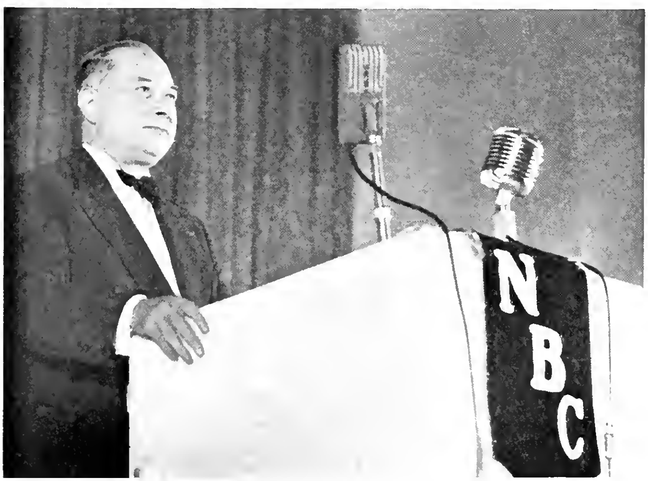
The broadcaster must build his own television circulation as does a new magazine or newspaper. That is the broadcaster's job. He cannot toss that responsibility to the television set manufacturer, any more than the magazine or newspaper publisher can transfer his problem to the printer.

A newspaper or magazine spends a substantial part of its initial investment in building circulation; the job of the broadcasting stations, likewise, must be to build circulation in television.

Sound-Sight Broadcasting Fused

I have previously advanced the idea that sound and sight broadcasting will in due course combine. I repeat that thought now. The fusion of sound broadcasting with television is destined to come in radio ultimately, just as the combination of sight and sound took place in motion pictures. Indeed, the time may come when an important broadcast program that we cannot see will seem as strange as a movie we cannot hear. This does not mean that such development is around the corner.

Programs limited to sound and prepared through the techniques of sound broadcasting alone will continue to serve millions of people through many hours of the broadcasting period when the eye cannot be concentrated on the television picture. We must expect that these



GENERAL SARNOFF ADDRESSING NBC CONVENTION AT ATLANTIC CITY ON "TELEVISION PROGRESS."

services will continue to grow and to supplement each other. Therefore, during the years of transition, it seems to me, there will be ample opportunity for broadcasters operating AM and FM receivers to do a substantial volume of business and to render a vitally necessary public service.

Local Television

I should like to say a few words about local television before entering into a discussion of national service. Television programming can be started by local stations in a small way with a minimum of facilities and expanded as receiving sets and commercial sponsors increase. In the meantime, until nation-wide networks are available, film of live shows and newsreels can be flown to stations throughout the country to add to their program variety.

Like the many independent local broadcasting stations which are successful and profitable, television stations also can thrive upon local talent and community service. There is no end to local program possibilities, for the small town is a natural television stage. People like to see their friends and neighbors on the screen. I can foresee many uses for television in religious and educational activities. Television can be a great aid to good government in city, town and county by making citizens better acquainted with their local leaders and their work.

Effective Means of Advertising

Local merchants will find television an effective means of advertising. Dramatic groups, county fairs and community sports events will enlarge their audiences. Often a local baseball or football game or a prizefight is as interesting to a community as a professional sports event in a distant city. Civic and fraternal organizations and women's clubs also are sources of programs for local television stations.

You can imagine the interest that would be shown in a local community if, for example, one or more department stores were the scene of a shopping hour in the morning or afternoon. The television camera would show the merchandise and the shopper at home could see what each store had to offer before she left home for her marketing. I should think that this would be an interesting experiment in advertising.

"MANY WELL-KNOWN RADIO ARTISTS WILL ADAPT THEMSELVES TO TELEVISION AS SUCCESSFULLY AS THE ARTISTS OF THE SILENT SCREEN ADAPTED THEMSELVES TO THE TALKIES."

Network Television

Automatic relay stations, either alone or in combination with the coaxial cable, show great promise for speeding extension of television program service throughout the nation. Radio relay stations are now in operation between a number of cities, and others are being erected. Eventually these microwave channels will reach out further to connect additional communities in television network service, especially cities not reached by coaxial cables.

Doubtless you have heard about the experiments being conducted from time to time with coaxial cables and radio relays which can carry not only television, but ordinary speech, telegraphy at high speeds, and of course FM and television programs. Because these new cables and relays can handle several services simultaneously, they will be completed, I believe, sooner than we expect. I should not be surprised, if it is possible to have a television coast-to-coast network within the next few years.

In considering home television, we must recognize that good programs are the master key to public acceptance of the art. Television's popularity, as well as its speed of advance, will be governed by the caliber of the shows. That is the important responsibility of the broadcaster. The success of television and the popularity of the video station will depend upon it.

Problem of Talent

The telecaster will, of course, have the problem of talent. He cannot depend solely upon the radio, motion pictures, and other established sources of entertainment for his performers. Television is a new art form that calls for new techniques and for the development and encouragement of new talent to supplement present radio entertainers. Many well-known radio artists will adapt themselves to television as successfully as the artists of the silent screen adapted themselves to the talkies.

News and sports already have proved natural drawing features for television. Films also will play an important part in the flexibility of television programming. But timeliness is the great advantage which television has over all other forms of visual entertainment. Those who recently watched the American Legion Parade in New York, the Davis Cup tennis matches, and big league baseball games throughout this summer, can attest to this. News associations are studying methods of television news service to supplement the service they now perform for sound broadcasting. The presidential nominations and election in 1948, with political candidates competing for public attention, will stimulate public interest in television on a widening scale.

It is an interesting fact that broadcasting received its first real impetus in 1920, when the Harding-Cox election returns were broadcast and picked up by amateur stations. It was the presidential election that really put broadcasting in the news and stirred public interest. Then came the Dempsey-Carpentier fight in 1921, which gave tremendous impetus. And strangely enough, the same factors are asserting themselves in these early days of television.

Recently, there have been several extraordinary demonstrations, one this week, which you perhaps read about in the press: several surgical operations at the New York Hospital were televised by RCA, enabling those attending the American College of Surgeons Congress to view the operations on television screens in the Waldorf-Astoria. Television may prove to be the Medical Lecture Hall of the future. A prominent surgeon remarked, "This is a teaching medium that surpasses anything we have had in the past—I never imagined television could be so effective until I actually saw it!"

Opens New Field

In still another field, the U. S. Navy recently announced success in underwater television experiments in which RCA equipment is used. This opens an entirely new field in deep-water investigations and novel television programs. Fishermen may use television to locate schools of fish and oyster beds. Explorers can scan marine life on the ocean floor as well as wrecks, by lowering television cameras into the sea. Submarines may yet be equipped with television eyes.

You may have observed recent announcements of revolutionary progress in radio communications—only yesterday in Chicago I spoke before a meeting of the United States National Commission for UNESCO and reported that RCA within a short time will demonstrate in Washington, D. C., a new system of communications known as Ultrafax. It is a combination of television and facsimile. Ultrafax uses a television station for transmitting printed matter and messages, maps, books, documents, letters, drawings, balance sheets, etc. This new system can transmit and receive at the rate of one million words a minute. I used to think, in the days when I was a wireless operator, that if an operator could send 35 to 40 words a minute and keep it up for eight hours, it was quite an accomplishment.

Now by the Ultrafax system, a 500-page book can be sent from New York to San Francisco in half a minute, and a Sunday metropolitan newspaper, including the comics, in one minute. A single circuit could carry the equivalent of forty tons of airmail, coast-to-coast, in a day. So we have something here that may dip into the mail bag. We may have a radio mail system!

All of this may give you an indication of the march of science and a picture of the important place which a television station in the future may occupy in the community.

"I CAN FORESEE MANY USES FOR TELEVISION IN RELIGIOUS AND EDUCATIONAL ACTIVITIES. TELEVISION CAN BE A GREAT AID TO GOOD GOVERNMENT . . . BY MAKING CITIZENS BETTER ACQUAINTED WITH THEIR LOCAL LEADERS AND THEIR WORK."

International Television

Today, international television may seem far off. But let us recall that five years after sound broadcasting started as a nation-wide service, we had international broadcasting. While the technical problems of international television are more difficult to solve, nevertheless I believe we shall achieve international television in about the same period of time. The scientific knowledge for doing the job exists. In fact, I know of no problem in international television that money cannot solve.

Television will reach the home by radio as free to the audience as broadcasting is now. A proposed system of so-called wired "phonevision" would introduce a monopoly

"TIMELINESS IS THE GREAT ADVANTAGE WHICH TELEVISION HAS OVER ALL OTHER FORMS OF ENTERTAINMENT."

feature into television by limiting its service to telephone subscribers only. Such a system, which would further limit its service only to those who would agree to pay for the programs as well as for the receivers, is an idle dream. The political implications, the legal and regulatory aspects as well as the technical difficulties of preventing non-payers from receiving the same programs doom such an impractical system from the start. Moreover, the idea is not in keeping with the traditional American policy of "Freedom to Listen" and "Freedom to Look." These are the principles upon which our country's broadcasting is founded and under which it has developed and prospered.

Manufacturing and Broadcasting

I should like to digress a bit to make an observation regarding a statement I have heard from time to time which implied that it is sinful for a company to be interested in both broadcasting and manufacturing. The truth is that manufacturing interests have been largely responsible for the development of television and have provided broadcasters with new opportunities for service. If it were not for research, engineering and manufacturing, there would be no broadcasting, either sound or sight.

Therefore, I feel that while a broadcaster should not be criticized for confining his activities to broadcasting or a manufacturer for confining his operations to manufacturing, nevertheless, where both are conducted by the same organization, the art and industry are advanced rather than retarded. Years of experience have amply demonstrated this to be a fact.

The 25-year period of experimentation and development of television has been full of difficulties. It has been an extremely complex new science and art to establish in the laboratory, the factory, and on the air. The scientists, research men and engineers have done heroic work, for which all of us will ever be indebted.

Television as a New Industry

Television is moving forward rapidly and is destined to become one of the major industries of the United States. In addition to serving the home, television has application to the theatre, the motion picture studio and the entertainment film. In the manifold processes of industrial life, television also is destined to play an important role.

The possible size of the television industry is indicated by the following figures: in the first two years of sound broadcasting, that is, 1921 and 1922, the sales of receiving sets amounted to approximately $100,000,000. In those two years, more than 500 broadcasting stations were on the air.

Now, for the first two full years of postwar television operation, namely, 1947 and 1948, with approximately only ten per cent as many stations on the air, that is 50 instead of 500, it is estimated that the public, during this two years period of television, will spend approximately $375,000,000 for receiving sets—$375,000,000 in television, as compared to $100,000,000 in sound broadcasting. This does not take into account the additional expenditures on television transmitters, the cost of erecting and operating them and the cost of programs. Therefore, in round figures, within a year and a half or so from the present time, we shall approach a $500,000,000-a-year industry in television. And that will be only the beginning. As time goes on, I am confident the industry will grow substantially.

Television will be supported by advertising, both local and national, for it is an ideal advertising medium, unsurpassed in its simultaneous appeal to the eyes and ears of many millions of people. Studies indicate that the pulling power of advertising on television is many times that obtainable by sound broadcasting alone.

Television as Advertising Medium

Television is setting a much faster pace as an advertising medium than broadcasting did in its pioneering days of the early 20's. It is apparent that sound broadcasting soon will face keen competition from television. As television expands on a national scale, this competition is certain to increase.

It seems to me that broadcasters should not consider television solely from the standpoint of profits or losses during the pioneering period. We must look to the opportunities ahead and weigh the obligation which all of us share to render maximum service to the public.

There are other important economic considerations, which must not be overlooked. As the television audience increases and programs improve—and both results are sure to be achieved—many listeners are bound to switch from sound broadcast to television programs. I do not mean that they will switch permanently from sound broadcasting to television, but they will be switching back and forth between these two services. They cannot enjoy both at the same time unless sight and sound are combined in all programs. As the switching goes on, it will reduce the audience of sound broadcasting stations and increase the audience of television broadcasting stations. Those who are not in television will find their sound broadcasting revenue, which is based on circulation, diminished. That fact is self-evident.

To maintain their present position in their local communities, to render the greatest possible service and to safeguard the capital investments and earning capacities of established sound broadcasting stations, prudent owners will consider television as an added new service, vitally necessary to insure their existing business against reduction of audience, loss of profits and depreciation of investments.

A Message to Broadcasters

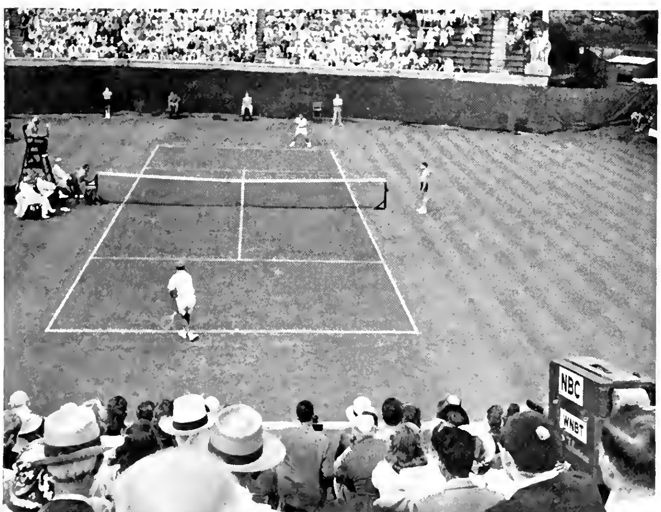
Affiliates of the NBC: This is the message I should like to bring to you. I do not want to ask you to buy television stations, or to erect them, or to urge you to enter television beyond your own convictions, or to promise you immediate profits. But I feel that I should be less than frank if I did not on this occasion, particularly when you are all assembled, share with you the thoughts I hold, not only about the future possibilities of television—and my enthusiasm is unlimited as to that—but also about the possible effects that television may have upon the present broadcasting business.

I have lived through several periods of development in the fields of communications and entertainment. I remember the day when wireless as a service of transoceanic communication was regarded by some as a joke. In the days when I worked as a wireless operator, a cable company could have acquired the Marconi Wireless Telegraph Company of America for only a few million dollars. Those who owned the cables could not see wireless as a competitor of cables. Who, they asked, would send messages that were not secret through the air? Who would entrust important messages to a service that was filled with static?

Today, the law says to the Western Union: "You must divest yourself of the cables." But now it is difficult to find a buyer for cables. Today, radio is the modern method of international communications, and can reach every country directly.

I lived through the day when the Victor Talking Machine Company—and those who founded it did a great job in their day—could not understand how people would sit at home and listen to music that someone else decided they should hear. And so they felt that the "radio music box" and radio broadcasting were a toy and would be a passing fancy. What was the result? Not

"NEWS AND SPORTS ALREADY HAVE PROVED NATURAL DRAWING FEATURES FOR TELEVISION. THOSE WHO RECENTLY WATCHED THE DAVIS CUP TENNIS MATCHES CAN ATTEST TO THIS."



many years after their fatal dream, RCA acquired the Victor Talking Machine Company, and the little dog changed its master.

I saw the same thing happen in the field of talking motion pictures. It was argued by many that people would not go to a movie that made a lot of noise and bellowed through an amplifier and disturbed the slumber of those who enjoyed the silent movie. That, they said, was a preposterous idea! The very virtue of the silent movie, they contended, was its silence! And then —in 1927—came Warner Brothers with "The Jazz Singer" and Al Jolson. Almost overnight a new industry was born. The silent actor became vocal, and the silent picture was given an electronic tongue. Today, who goes to a silent movie?

Radio Has Stake in the Present

Now, I should like to impress upon those of you engaged in radio, that for the first time in its history, radio itself has a stake in the present. It must be careful not to act like the cable company, the phonograph company and the silent motion picture company, which looked upon the new children of science as ghosts of obsolescence that might adversely affect their established businesses. In their desire to perpetuate and to protect their existing businesses, some of them stubbornly resisted change and progress. Finally, they suffered the penalty of extinction, or were acquired by the progressive newcomers.

Let me assure you, my friends, after more than forty years of experience in this field of communications and entertainment, I have never seen any protection in merely standing still. There is no protection except through progress. Nor have I seen these new scientific developments affect older businesses, except favorably, where those who were progressive, gave careful thought and study to the possibilities of new inventions and developments for use in their own business.

A Stimulant in the Theatre

Despite the fact that the Victor Talking Machine Company passed into radio hands, more phonograph records are made and sold today than ever before. And so it is with the entertainment industry. Talking pictures saved that industry at a time when it needed saving and has kept it prosperous ever since. Television in the theatre may be as much of a stimulant to an industry which at the moment, at least, needs a new stimulant, as sound was to the silent movie.

Therefore, may I leave you with this final thought: I am not here to urge you to enter the field of television beyond the point where you yourselves think it is good business for you to do so; nor to propose that you plunge all at one time. Rather I would suggest that you reflect carefully and thoughtfully upon the possible ultimate effects of television upon your established business if you do nothing, and of the great opportunities for your present and future business if you do the right thing!

"MORE PHONOGRAPH RECORDS ARE MADE AND SOLD TODAY THAN EVER BEFORE."

JOLLIFFE ELECTED DIRECTOR OF RCA

Head of Laboratories Division Joined Company in 1935

DR. CHARLES B. JOLLIFFE

Election of Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories Division, to the Board of Directors of Radio Corporation of America was announced by Brig. General David Sarnoff, President and Chairman of the Board, on September 5, following a meeting of the Directors.

Dr. Jolliffe joined the Radio Corporation of America in 1935 as engineer-in-charge of the RCA Frequency Bureau. He was appointed chief engineer of RCA Laboratories in 1941, and early in 1942, he was made Assistant to the President of RCA. In September 1942, he became Vice President and Chief Engineer of the RCA Victor Division. On March 2, 1945, he was elected Vice President of Radio Corporation of America in charge of RCA Laboratories, and on December 7, 1945, he became Executive Vice President in charge of the same division. He was awarded a Ph.D. in 1922 at Cornell University, where he was instructor of physics from 1920 to 1922.

SURGERY TELEVISED

Thousands of Surgeons Attending New York Convention Witness Operations by Television in Viewing Rooms a Mile from Hospital.

FOR the first time in the long history of medicine, the skills of the country's best known surgeons have been closely observed by members of the medical profession at "clinics" remote from the hospital operating theatre. This epoch-making demonstration was conducted during the recent Congress of the American College of Surgeons at the Waldorf-Astoria hotel, when RCA television successfully linked the New York Hospital on East 68th Street with viewing rooms at the hotel, a mile away. The experimental broadcasts were carried out as an indication of the possible application of television to surgical education.

To make the demonstration possible, RCA Victor installed an Image Orthicon television camera on a specially constructed track above the operating table. This arrangement permitted the camera to be moved as required to obtain the best view of the operative procedure. The normal lighting of the operating room was ample for the Image Orthicon camera. As the surgeons worked, their running commentaries were broadcast together with the images.

Pictures were transmitted from the hospital to the hotel by means of a highly-directional television relay link. Because of the narrowness of the line-of-sight beam and the very high frequency used for the transmission, the programs could not be picked up by standard television receivers.

A cable carried the signals from the camera to the microwave radio relay transmitter on the roof of the hospital. From there, the antenna, which was shaped like a parabola, directed the signals to a similar receiving antenna on the 18th floor of the Waldorf-Astoria.

EVERY MOVE OF THE SURGEON IS PICKED UP BY THE IMAGE ORTHICON CAMERA SUSPENDED OVER THE OPERATING TABLE.

THIS PARABOLIC ANTENNA ATOP THE WALDORF-ASTORIA HOTEL INTERCEPTED THE TELEVISION SIGNALS TRANSMITTED FROM THE NEW YORK HOSPITAL, A MILE AWAY.

SURGEONS ATTENDING THE AMERICAN COLLEGE OF SURGEONS CONVENTION IN NEW YORK WATCH CLOSELY AS TELEVISION SCREENS BRING CLOSE-UPS OF OPERATIONS TAKING PLACE AT THE NEW YORK HOSPITAL.

For the convenience of the surgeons, seven RCA Victor television receivers were installed in the Perroquet Suite on the fourth floor of the hotel. Seating facilities accommodated about 300 at a time. Two additional receivers were installed at the hospital. One was placed in the operating room, to enable the operating surgeon to see the operative area covered by the camera; the other was in an adjoining office for the benefit of the hospital staff.

Operations selected for the television clinics included a hernia repair, a thyroidectomy, a gall bladder removal, and a stomach resection.

After witnessing this contribution of electronic science to medical education, surgeons were lavish in their praise.

Dr. Arthur W. Allen of Boston, president of the American College of Surgeons, said:

"This is a teaching medium that surpasses anything we have had in the past. I never imagined that television could be so effective until I actually saw it demonstrated here."

Declaring that this use of television "greatly extends the teaching value of the hospital clinic," Dr. Malcolm T. MacEachern, Associate Director of the American College of Surgeons, said: "This is a wonderful development; we are enthusiastic over its potentialities."

Surgeon Praises Experiment

He hailed the experiment as "a conspicuous example of the way in which advances in the technical arts can be applied to speed progress in medical science and education for the benefit of the patient.

"I think we have been privileged to stage this week," Dr. MacEachern added, "an event that will go down in medical and technical history. Clinics, operative and non-operative, in the hospitals are the principal means of visual education in surgery. Obviously, the accommodations in the operating room for observation, even in a great medical center like New York, are limited compared with the number of surgeons who wish to attend.

"For some years we have supplemented the clinics with surgical motion pictures. This year, for the first time, another supplementary device is being employed—namely, television, which permits surgeons in the headquarters hotel to see operations in a nearby hospital as they are being performed.

"We are grateful to the RCA engineers for their ingenuity in adapting television to surgical education."

The televised operations were made possible by the cooperative efforts of The New York Hospital, the American College of Surgeons, the Johnson & Johnson Research Foundation, and RCA.

BRIG. GENERAL DAVID SARNOFF AND LUDOVIC CHANCEL, FRENCH CONSUL GENERAL IN NEW YORK, WHO PRESENTED CROSS OF THE COMMANDER OF THE FRENCH LEGION OF HONOR TO RCA'S PRESIDENT AT THE WALDORF-ASTORIA HOTEL ON SEPTEMBER 23.

France Honors Sarnoff

RCA President Receives Legion of Honor Medal for his "Distinguished Services" in War and His Contributions to Radio.

AT A CEREMONY and reception given in his honor at the Waldorf-Astoria Hotel on September 23, Brig. General David Sarnoff received the Cross of the Commander of French Legion of Honor, presented by Radio France and its American subsidiary, the American Radio Company.

In presenting the decoration, Ludovic Chancel, French Consul General in New York, announced that it was awarded in recognition of General Sarnoff's "distinguished services in France as an officer in the Supreme Headquarters, American Expeditionary Forces; his re-establishment of communications circuits following the liberation of the French Republic, and his outstanding work during more than thirty years in building friendly relations and understanding between the peoples of America and France."

Arnold Haase-Dubosc, President of the American Radio Company, praised General Sarnoff for having "worked tirelessly toward the goal that the original discoveries of the pioneers in electronics might remain an instrument of peace and an effective arm in the cause of freedom." He said that during the painful invasion of France, General Sarnoff's appeal for the freedom to listen had "won the hearts of the French people."

Other speakers at the reception included Maurice Boyer, Chairman of the Board of the American Radio Company, and Mme. Genevieve Tabouis, noted French newspaper writer and wife of the President of Radio France. Approximately two hundred guests attended the reception in the Le Perroquet Suite.

General Sarnoff had received two decorations previously from the French Government. On February 15, 1935, he was awarded the Cross of Chevalier of the Legion of Honor, and on June 6, 1940, he was presented the Cross of Officer of the Legion of Honor.

POPE PIUS XII POSES FOR THE TELEVISION CAMERA AND WATCHES THE RESULTING IMAGE ON A RECEIVER AT ONE SIDE OF THE OPERATOR.

U. S. TELEVISION IN ITALY

RCA Video Equipments Displayed at Milan Fair and Demonstrated to Pope Pius XII in Vatican, As Part of Marconi 50th Anniversary Celebration.

A VERY old and very new culture met and merged for a few weeks when the RCA International Division made arrangements for a visit of RCA Victor's roving television equipment to Italy.

During our stay in that country we televised the important Milan Sample Fair, equivalent to a World's Fair here, participating with singular appropriateness in the Marconi Day ceremonies. We televised ballet and opera at the beautiful old La Scala Opera, wellspring of much of the world's musical culture. We presented a special series of broadcasts for Premier Alcide di Gasperi, Prime Minister of Italy, and his guests at the offices of RAI (Radio Administration Italia). And, probably most impressive of all, we enjoyed the gracious hospitality of the Vatican when we presented a special broadcast for His Holiness Pope Pius XII at Consistory Hall. Everywhere we found surprises and new ideas about television programming.

By Richard H. Hooper

Promotion Manager
RCA Victor Division

Arrangements for the RCA Exhibit at the Milan Fair, which also included other RCA electronic services and products, were made by G. A. Biondo, President of the Telonda International Corp., RCA distributor in Italy.

Our crew included Joseph A. Jenkins as Director; Chester E. Davis, Chief Engineer; Edward K. Price and John H. Roe, engineers. They left La Guardia Airport Marine Base May 26, landing at Gander, Newfoundland; Shannon, Ireland, and Geneva, Switzerland, before taking the three successive trains necessary to reach Milan. I came along a few days later. In my luggage was an electronic viewfinder for one of the RCA Image Orthicon cameras we used. In the last minute rush there was no time to declare it, so it was brought along almost as a gamble. When our train reached the town of Domodossola, just across the Italian border, customs inspectors came aboard and, with instinct like a bird dog's, they pounced upon the suitcase carrying the viewfinder. When they opened it and saw the intricate-looking electronic gadget, reinforcements were brought in and I had visions of spending my days in Italy in some dark prison. Fortunately, the linguistic ability of a French perfume company executive I'd befriended on the train persuaded them to seal and impound the suitcase and bring it to Milan where our efficient representatives assisted me in reclaiming it.

Programs from La Scala

Since La Scala was to be the source of some of our most important broadcasts for the Milan Sample Fair, we found it advisable to set up much of our equipment there. La Scala was one of the most inspiring experiences we had because there, in culture-loving Italy, we saw what devotion to superior entertainment can mean. As soon as the war was over for the people of Milan, laborers volunteered to work on their opera house almost before they repaired their own homes. From all over the city they "liberated" building materials. Children with only a few lira to buy milk contributed part of their funds to the reconstruction of La Scala. By the time we arrived, the building looked almost exactly as it must have appeared before it was damaged by bombing. Only the library of original manuscripts which had been burned had not been replaced.

MEMBERS OF THE VATICAN'S FAMOUS SWISS GUARD WATCH RCA TECHNICIANS AS THEY MAKE ADJUSTMENTS ON TELEVISION UNITS.

As Ed Price stood on the roof of the building one day, getting ready to set up the antenna, an Italian workman approached him and excitedly dropped his load to explain with words and gestures that Ed should move over — but slowly. Later he indicated that Ed could stop. Then he gingerly made his way to where the RCA engineer had been standing and jabbed a pointed stick through the roof. Only four thicknesses of tar paper had supported the weight of the man and his equipment. Directly below — a drop of some 300 feet — was the stage of the opera house.

Eleven Receivers in Equipment

The television equipment we had brought along included two RCA Image Orthicon cameras capable of operating under all the lighting conditions we would be likely to encounter, other standing remote pick-up equipment including relay facilities and ten RCA Victor 630TS, 10-inch table model television receivers, plus one of RCA Victor's new 648 PTK receivers showing the bright, 15 x 20 inch, big-screen picture. This ultra-modern gear was hauled from customs to the Auditorium of the Marconi Building by horsecart. The relay link was set up on the roof of the tall Sports Palace. At the main Auditorium, where the largest crowd would be gathered during our visit, we set up most of the television receivers. The rest of the receivers, including the 648 PTK, were set up along with a wide range of RCA's other advanced products at the Marconi Memorial Building. An FM transmitter, an induction heating exhibit, a tube display and marine radio were among the products shown here in the building dedicated to Marconi on the 50th anniversary of his sending that first historic message across the Atlantic.

In La Scala, one of the Image Orthicon cameras was mounted in the Royal Box, the other on the second tier near the stage. The control equipment was set up in a room behind the Royal Box.

In the process of televising live music without restrictions, we were afforded an excellent opportunity to discover much about what to expect when arrangements are made for American broadcasters to incorporate live music into their programs. We learned, for example, that some of the operas, as they have been staged down through the years, will benefit from the more plastic and flexible lighting and the dramatic implications of mood variations which flexible lighting can bring about. "Rigoletto" and "Orpheus", as presented at La Scala, were too dimly and uninterestingly lighted to make good television fare. Other fine music, including opera, ballet and concerts, were superb for television programming, with camera movement and selectivity doing much to arrest and retain audience interest in the entire performance. This was attained by use of the various turret mounted lenses and by carefully selecting segments of the action.

We televised "Madame Butterfly" and "La Traviata", finding that the television camera could do much to help convey the meaning of the operas and help observers feel more aware of the emotional messages of the artists. "Coppelia", "Invitation to the Dance", "Three-Cornered Hat" and "Bolero" were ballets our crew televised at La Scala. Here, again, we found that television could contribute to the arts in addition to extending their audiences. Our crew became familiar with the dances during rehearsals. Then, we took the premier danseur's more magnificent leaps, and close-ups of the varying centers of interest, such as the ballerina, and we followed the action with flexible camera movement, all interspersed with long orientation shots. Thus we were able to fall into the spirit of the performance and, according to some of the critics who saw the show, help television partake of and contribute to the over-all enjoyment of ballet.

Official Addresses Televised

In addition to these shows, we televised addresses by officials of the Italian government, including the Minister of Communications, fashion shows, various radio programs, variety shows, and interviews with ordinary visitors to the fair and many well-known personalities. We had frequent opportunities to demonstrate the equipment to influential people during the visit to Milan. The Mayor and his family, the president of the Fair, U. S. Ambassador James Dunn and Mrs. Dunn and others became familiar with the advances made in television by American industry.

On July 1, we moved from Milan to Rome and the Vatican. Thanks to Count Enrico Galeazzi, Economic Administrator for Pope Pius XII, we had the freedom of the Vatican to make the installation for a special showing of television to the Holy Father. We set up the equipment in the reception hall on long cables so that it could be moved into the Vatican Library quickly.

Wherever we turned, we found interesting information about the Vatican during our few days there.

The ceiling of Consistory Hall, in which the Pope holds sessions with the College of Cardinals, is done entirely in gold frames, each frame enclosing an original mural by Michael Angelo depicting a scene of the world's creation. The gold for the frames came from the first shipment brought over from America in 1493-94. The Swiss guards in full uniform identical with those worn there for centuries, the exquisite art by Michael Angelo, the quiet beauty and awesome dignity of the Vatican, all helped make the visit memorable to every member of our crew.

Special Program for Pope

On July 9, after carefully checking all gear and rehearsing with the Vatican chorus of 13 male voices singing ancient madrigals, we presented the special hour-long show. Pope Pius XII entered his chambers at 5:56 P.M., sat in a gold chair before a 630TS television receiver, and, with the original, hand-illuminated manuscript of the music before him, alternately watched the broadcast and followed the original score. The performance consisted of three songs by the Vatican choir from Consistory Hall and scenes of the surrounding countryside, including an observatory on a hill in Rome some five miles away picked up with a telephoto lens. Pope Pius expressed great interest in the new medium. He speaks flawless English and has the softest voice I've ever heard.

After the broadcast he said, "The quality is astounding. The clarity is phenomenal. Your company is to be congratulated. An exceedingly fine show."

He inspected the control equipment and posed before the television camera, seemingly amused by the fact that he could watch his image on a receiver at the same time. Following the demonstration, he issued a Consistory Memorial Medal to Frank M. Folsom, Executive Vice President of the Radio Corporation of America in Charge of the RCA Victor Division, through whose offices arrangements for the demonstration were made, and also to each of us representing RCA at the Vatican.

Cameras Set Up in Record Time

Our next stop was at Rome where, on July 12, we were to present a special broadcast for Premier Alcide de Gasperi, Prime Minister of Italy and Presidente del Consiglio (Council President), and his party, plus officials of R.A.I. (Radio Administration Italia, the Italian radio network), at the latter's offices. The audience consisted of nearly 200 people. Here we were especially grateful for the efficiency with which the RCA remote pick-up equipment was designed. We erected our gear in what, for us, was the record-setting time of 55 minutes! Using a large studio and a control room, we ran cables to six receivers in other studios. We secured power from a 20 kw generator mounted on a truck in the street.

Language Barrier Overcome

R.A.I. supplied the program artists for us, consisting of a harpist, three vocalists, a string ensemble, four models who presented an excellent fashion array, a master-of-ceremonies and an 18-piece orchestra. The latter was nearly to prove my undoing. While our crew's mastery of Italian was, at best, negligible, my knowledge of the language only served to lower the average. Strangely enough, though, we felt perfectly at home here because the radio hand signals familiar to every American broadcaster are also used as another form of international language.

You couldn't help but be impressed with the sensitive, artistic appearance of these musicians. Already we had experienced the high cultural levels attained by the artists at La Scala and the rich, ancient music of the Vatican choir. Therefore, we were prepared for the purest of classical artistry by the orchestra. I gave the leader the stand-by signal. He raised his baton. I pointed my finger at him to start the music. Then he led the orchestra in the hottest rendition of "Tiger Rag" I have ever heard.

The quality of the artists, both classical and contemporary, was excellent and the broadcast was the kind that gives the producer a sense of satisfaction to have had a hand in it.

These shows in a fascinating foreign country, these superb artists, were those that American audiences would enjoy, just as overseas audiences would certainly enjoy watching our television broadcasts.

NATIVE ARTISTS PRESENT SPECIAL PROGRAM FOR PREMIER DE GASPARI IN A STUDIO OF THE ITALIAN RADIO NETWORK, AS TWO RCA IMAGE ORTHICON CAMERAS FOCUS ON THE SCENE.

Freedom to Listen and Freedom to Look

Radio of the Future will be a Combination of These Freedoms, Internationally Enjoyed, General Sarnoff Declared in Address to U.S. National Commission for UNESCO.

SUCCESS in establishing world peace and understanding depends upon who wins "the battle for the minds of men," said Brigadier General David Sarnoff, President and Chairman of the Board of Radio Corporation of America, in an address delivered September 12 at a luncheon sponsored by the Chicago Council on Foreign Relations in honor of the United States National Commission for UNESCO. He was introduced by William Benton, Assistant Secretary of State.

"Since the fighting war ended two years ago," declared General Sarnoff, "another global conflict has started—a battle for the minds of men. Forces of totalitarianism and aggression still are attempting to mislead the masses. Fully aware of the power of radio, they are using it to spread propaganda that runs contrary to peace, freedom and democracy.

"Our American concept of radio is that it is of the people and for the people. Its essence is freedom —liberty of thought and of speech. Our purpose in fostering international broadcasting is to help make the spectrum of radio truly a spectrum of peace.

"By its very nature, radio is a medium of mass communication; it is a carrier of intelligence. It delivers ideas with an impact that is powerful. In the preservation of peace, the electron, which is the heartbeat of radio, may prove more powerful than the atom. In a forum for international discussion and education, the voice of radio can carry knowledge of public issues around the earth and mold public opinion far more quickly and far more effectively than any other means."

General Sarnoff recalled that for more than twenty years he had given thought and study to the subject of international broadcasts embodying the principle of "Freedom to Listen," and that he had the privilege of discussing it on several occasions with President Roosevelt, Secretaries of State Hull and Marshall and other high officials of the American government and the United Nations. He said that with the advent of television "Freedom to Look" had become as important as "Freedom to Listen," declaring:

Television Moves Forward

"In recent months you have doubtless seen and read much about the progress of television. It is on the way and moving steadily forward. Television fires the imagination, and I can foresee the day when we shall look around the earth, from city to city and nation to nation, as easily as we now listen to global broadcasts. Therefore, 'Freedom to Look' is as important as 'Freedom to Listen' for the combination of these will be the radio of the future. This is no idle dream and no one need doubt that we shall have international television.

"This extension of television is nearer than most people may realize. When nation-wide broadcasting began, it was only five years before listeners overseas were picking up the broadcasts, and before long, regularly scheduled international broadcasts became an established fact. Therefore, in looking ahead, we may reasonably expect that international television will follow much the same pattern of progress. In fact, it may develop more rapidly because the foundation is laid by international sound broadcasting. Already the scientific principles and means for world-wide television are known. No technical problem is involved that money cannot solve.

"May I point out that when I speak of international television, I do not think of it as only between the United States and Europe, Asia or South America, but intracontinental as well; for London may look-in on Paris, Berlin, Rome or Moscow, while their citizens in turn will look-in on London or on other cities of their choice.

"Such television has broad possibilities in portraying the way of life of one nation to another. For example, disscussion in the press or on the radio of a food shortage is one way of imparting information, but to be able to see hungry men, women and children in breadlines would help more fortunate people to visualize instantly the dire circumstances and basic needs of their fellow-man."

Cost Relatively Unimportant

While expressing confidence that international cooperation and statesmanship could solve the problems involved, General Sarnoff remarked:

"So far, I regret to observe that very little has been done about it. Yet no one has seriously opposed the idea of an international broad-

"ALL PEOPLES HAVE THE RIGHT TO KNOW THE TRUTH IN THE NEWS, AND IT IS THE DUTY OF INTERNATIONAL BROADCASTING TO PROVIDE THEM WITH THE TRUTH."

"IT BEHOOVES THE UNITED NATIONS TO SPEAK OUT IN ALL TONGUES, CLEAR ENOUGH TO BE HEARD ON LAND AND SEA, ON DESERTS, FARMS AND STEPPES."

casting system based on the principle of 'Freedom to Listen' for all peoples of the world. Such questions as have been raised in some quarters seem to relate primarily to finances.

"If the principle is right, and if the job needs to be done, it is clear, it seems to me, that the cost is relatively unimportant. Even if the cost of operating such a world-wide system should prove to be as much as $50,000,000 a year, that figure is far less than the cost of one modern battleship; it is a mere fraction of what a single nation spends yearly for its armament. It is less than one-fifth the amount that was spent on fighting in a single day during the last World War.

"Dedicated as it is to the service of all mankind, it is difficult to understand why the question of cost should determine the need of an effective world-wide radio voice for the United Nations. To me, the question is not what other activities justifiably could take precedence over such a project, but what possible activities could be entirely effective without it. In this Atomic Age, the world has gone far beyond the luxury of discussing freedom of communications from a purely ideological standpoint.

"I submit that such freedom is vital to the maintenance of world peace. It is one of the armaments to prevent the next war. It is as important as the provision of any weapon to secure the peace."

This, then, is "no time for whispering, or for mere lip service," General Sarnoff declared, and added:

"The 'Voice of Peace' must be made strong—strong enough to be heard above the tumult that would stifle freedom or kindle the fires of atomic war. It behooves the United Nations to speak out in all tongues; clear enough to be heard on land and sea, on deserts, farms and steppes. Its broadcasts should carry not only information and news, but entertainment and melody as well; for music is a universal language.

Radio Can Spread Truth

"It is the use to which radio is put that is all-important. Broadcasting and television may function free and unfettered, or they may be muzzled and restricted to the use of a few. Radio can spread truth and untruth with the same speed and over the same range. The choice must be made by man. We saw, during the recent World War and during the years that led up to it, how radio could be perverted by dictators. We have also seen how it was used as the 'Voice of Victory' so effectively that the 'Voice of Aggression' was silenced in the defeat of those who perverted this great tool of science to their own evil purposes."

The address stressed the urgency for America to "do more — much more — than it is doing now in this vital field." It held that the maintenance of international short-wave broadcasting from the United States is as important today as it was at any time during the war, with beams aimed to friendly, democratic nations as well as to those whose governments may be unfriendly and undemocratic.

Referring to the State Department's recent discontinuance of broadcasts to Scandinavia as cause for shock to a large and friendly audience, General Sarnoff quoted from a letter which he said epitomized the feeling of dismay, and which he said shed light on many of the problems being studied by the U. S. Commission for UNESCO.

The letter, received by the National Broadcasting Company from a listener in Denmark, said that the broadcasts from America had been a daily reminder of American friendship and interest in helping to reconstruct war-ridden Europe and create a society where freedom would be a reality. It said that the silence of the American broadcasts left the 14,000,000 Scandinavian friends to the mercy of "those other hard, cold and hateful voices from the East." It asked "Has America surrendered?"

General Sarnoff in commenting on the missive said:

"This moving letter from a foreign listener is a dramatic testimony that there is a war in the air today—a battle between truth and falsehood—a battle for the minds of men! American radio must not be silent in its fight for the truth; we must not retreat on the battlefield in space! In the interest of world peace we must help to make it possible for people everywhere to know the truth. Only then can they judge the words and acts of their own governments and leaders.

"Our prestige as a defender of truth must be expanded—not curtailed. It is vital that private enterprise and government alike recognize the challenge to cooperate with each other in the national interest, for international broadcasting does not belong exclusively in the domain of either. It is a task that calls for the brains and facilities of both industry and government, functioning in harmony to make the 'Voice of Peace' heard around the world."

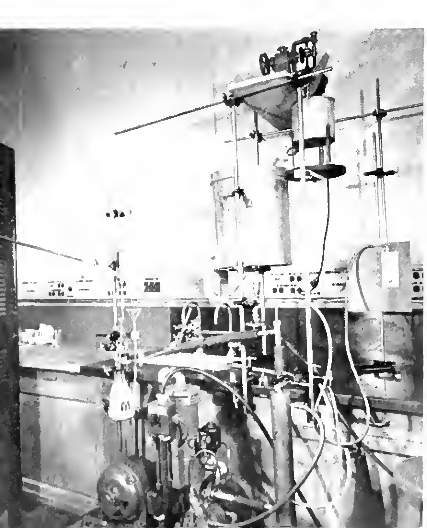
PASTEURIZING MILK BY RADIO

By Subjecting Fluid to Higher Temperatures for Shorter Period, Electronics Lowers Bacteria Count and Preserves Flavor.

PIONEERING in the development of radio heating processes, members of the reasearch staff of RCA Laboratories, Princeton, N. J., have succeeded in extending the usefulness of this new application of radio energy to a remarkable number of industries. Success has been achieved in sewing, riveting, welding, case-hardening and tempering; also in dehydrating vegetables, drying penicillin, purification of cereals, pre-heating plastics and baking plywood planes and boats, among other distinctive accomplishments.

This new science of radiothermics, a direct outgrowth of research in high frequency broadcasting, first received notice when it provided a means of speeding production lines during the war by completing in minutes industrial operations that had required hours or even days. Since then it has proved valuable in hastening output and reducing costs in peacetime manufacturing processes.

Study of the problem of milk pasteurization was undertaken by George H. Brown, C. N. Hoyler and R. A. Bierwirth after contact with experienced dairymen who felt that the revolutionary possibilities of radio heat might bring solution to difficulties which had plagued the milk industry for many years.



The investigation made use of previous experience, particularly that obtained at RCA Laboratories in applying radio-frequency heating to dry food products such as cereals and flour for the purpose of purification and the destruction of weevils and weevil eggs. In comparison with milk pasteurization, however, this process was simple and straightforward. Since the infesting objects usually contain more moisture than the bulk of material, selective heating takes place and the mean temperature of the food package need not reach excessive values. For instance, experiments conducted at the Laboratories revealed that a mean temperature of 140°F was sufficient to completely inactivate weevils and eggs in one-pound packages of cereal.

Long Treatment Affects Flavor

On the other hand, in conventional pasteurization of milk, the milk is normally heated to a temperature of 143°F and held at this temperature for 30 minutes. The milk is then cooled for storage or bottling with the bacteria content usually reduced to about 1 per cent of the starting value.

Dairymen explained that if times less than 30 minutes are used the bacteria content is notably greater, whereas a longer time results in a cooked flavor and an apparent reduction of cream volume.

Investigation also was made of flash pasteurization methods in which the milk is heated to 161° F and held for 16 seconds. In some of these experiments the milk is spread on a thin film of heated plates and then quickly pumped over cooling plates. In another process the milk is passed between two electrodes to which 60-cycle voltage is applied. Since the milk is a good conductor, current flows through the milk and generates heat.

EXPERIMENTAL PASTEURIZING SYSTEM ERECTED IN RCA LABORATORIES DURING RESEARCH ON THE ELECTRONIC TREATMENT OF MILK.

It appears that difficulties with the electrodes have kept this latter method from becoming popular. Nevertheless, this method indicated the advisability of heating by means of electric current to explore the effects to be encountered with temperatures far in excess of 161°F. It was felt that the use of radio-frequency power might make possible the heating of milk in continuous flow with the milk coming in contact only with glass.

Current Passes Through Milk

Seeking to learn the solution of fundamental problems connected with this procedure, a series of experiments were carried out. In the first of these, milk was pre-heated to 140°F and was then run through a long glass tube, ¼″ in diameter. Electrodes wrapped around the glass tube consisted of two pieces of copper foil, causing raido-frequency current to flow from one electrode through the glass to the milk stream and down the milk stream for a few inches. Temperature was measured by a thermocouple inserted below the second electrode.

These experiments showed that excellent pasteurization could be obtained in about 67/1000 of a second though it was not possible to achieve temperatures above 190°F. The tendency above this temperature was to form steam pockets with uneven flow.

Study indicated that this tendency probably was due to non-uniform flow in the tube, wherein the milk stream adjacent to the glass was slowed down by friction and thus raised to a higher temperature than the center of the stream.

In efforts to circumvent this effect, the tube was so arranged as to produce a free-falling stream between the electrodes. With this arrangement, the milk could be heated to 205°F without steaming or breaking.

Using the uniform flow arrangement, experiments were conducted in which bacteriological tests were found to be excellent. The pre-heating was accomplished by causing the milk to flow through tubing of

(Continued on page 31)

THE MAGNETRON

Research on One of War's Marvels, Heart of the Radar, Began at RCA in Early Thirties — Has Many Peacetime Uses.

By Dr. J. S. Donal, Jr.
RCA Laboratories,
Princeton, N. J.

OF the numerous developments in electronics that attracted public attention during the war, it is doubtful if any single instrument better typifies the significant advances in that field than the magnetron tube. Not only did this tube make possible the radar warning system credited with saving England in the critical days of the blitz but the numerous later forms of radar which proved invaluable to all branches of the armed services, owed their effectiveness in large part to the magnetron. The tube is expected to find an increasing number of peacetime applications especially in the fields of television, microwave relays, radio heating and of air navigational aid systems.

The magnetron differs radically in appearance from the common type of vacuum tube with which the public is familiar. Basically, it consists of a vacuum-tight cylindrical metal shell or block divided into a number of compartments or "cavities" symmetrically arranged around a central core. The center of the tube is hollowed out to accommodate an oxide coated cathode which serves as the source of electrons. It is the movement and control of these electrons in relation to the cavity entrances, as well as the number and size of the cavities that make possible the generation of high power at very high frequencies.

When the tube is operating, the electrons released from the heated cathode are forced by the electric and magnetic fields to travel in curved paths past openings leading to the cavities. The latter, accurately dimensioned for the desired frequency, act as resonant chambers from which the energy, given up by the electrons, can be withdrawn.

Although the magnetron gained its prominence as an invaluable military weapon, it is not a warborn product. Records show that research on magnetrons by RCA laboratories extends well back into the early 1930's. In 1932—this was eight years before England rushed models of its magnetron to this country for adaptation to large scale production—Dr. E. G. Linder of RCA's research staff had developed a magnetron which was used in our experiments with 10-centimeter radars from 1934 to 1937. This tube also was used in many of the earliest microwave signal generators.

First Tube Had Low Power

At that time, the power that could be handled by this 10-centimeter tube was limited to a few watts, but in 1936, G. R. Kilgore, later of the RCA Laboratories staff, succeeded in developing a magnetron which generated 100 watts of continuous-wave power at 600 megacycles, the equivalent of 50-centimeter waves.

The next objective of RCA scientists was the development of a magnetron that would deliver many kilowatts of power in exceedingly brief pulses. This was accomplished in 1941, using designs similar to those proposed earlier by RCA engineers and by English scientists and the staff of the Radiation Laboratory. This advanced magnetron produced 500 kilowatts of pulsed power at 3,000 megacycles (10-

RIGHT: SUB-ASSEMBLIES SHOWN HERE SIMPLIFY THE CONSTRUCTION OF MAGNETRONS AND ASSURE MORE RELIABLE OPERATION.

BELOW: THE OUTPUT OF THIS 1 KW MAGNETRON IS FREQUENCY MODULATED BY NINE SMALL ELECTRON GUNS WHICH SEND BEAMS OF ELECTRONS THROUGH THE TUBE'S CAVITIES.

centimeter waves). Impressive as this advance may appear, it was not considered remarkable at the time, since designs for still higher frequencies and power already were well understood.

However, these early tubes possessed one serious drawback. The frequency of the high-power pulses could not be held constant within desired limits.

The first magnetron to have its frequency stabilized by an external cavity, that is, a cavity separate and distinct from the cavities within the tube, was called the 2J41. It operated on 10,000 megacycles, at first rated at 5000 watts peak power, and was intended for service in new light-weight radar equipment. Work on this project was started in 1942 by groups in RCA Laboratories under Dr. V. K. Zworykin and the late B. J. Thompson. In 1943, the Armed Services requested that the tube design be changed to one suitable for use in an ultra-portable beacon project and asked RCA to undertake the development of tubes and equipment under a very high priority.

Tube and Circuit Groups set to work in Princeton, Lancaster, Pa., and Camden, N. J., in cooperation with the Radiation Laboratory of the Office of Scientific Research and Development, in Cambridge, Mass. Dr. B. B. Brown, R. R. Bush, C. L. Cuccia, and the writer adapted their earlier magnetron to the low peak power, high-duty requirements of the beacon project, working with the tube group in Lancaster, which was under the direction of Dr. Dayton Ulrey, E. E. Spitzer and C. P. Vogel.

The resulting tube was of radical design; it was the first cavity-type magnetron in which all parts were mounted on a plate called the "header" for ease in construction, for light weight and extreme rigidity. Versatility of the electrical design was shown by the fact that the original government request for 50 watts of stabilized peak power was raised progressively to 500 watts yet the tube met the final requirements without change in design.

Frequency Unaffected

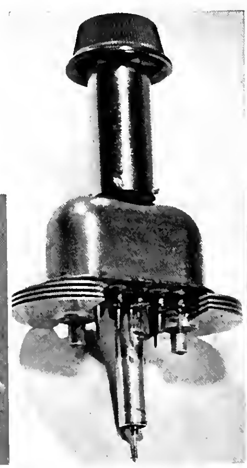
Not only was this tube tunable, but its frequency was practically unaffected by radio reflections from nearby objects and by extreme variations in temperatures such as those encountered at noon in the tropics and in winter night flying at high altitudes. The method of obtaining the maximum degree of stabilization was developed by L. E. Norton, of the RCA Laboratories, working under the direction of Dr. Irving Wolff. During both development and production periods, close cooperation was maintained with the men of the Radiation Laboratory, who contributed their experience to the initial development and to the production design of tube and stabilizer.

This valuable contribution by RCA was followed by others. During 1944, there was evidence of an increasing need for even more rigid control of the frequency of magnetrons. In addition, there was need for continuous-wave magnetrons which could be frequency modulated. A proposal by Dr. L. P. Smith and Carl Shulman of RCA Laboratories supplied the answer to both control and modulation problems.

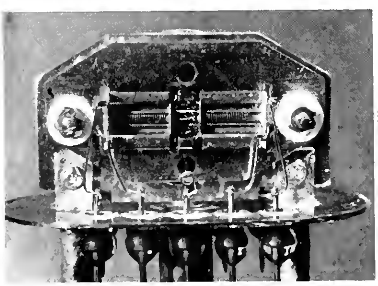
The first tube to be developed using the new method of frequency modulation and control was constructed by G. R. Kilgore, Carl Shulman and Drs. J. Kurshan and Rohn Truell of RCA Laboratories. This tube was designed for use in an FM radar project, undertaken for the Navy, which required 25 watts of continuous-wave power at 4000 megacycles. In this tube, employing the header construction of the 2J41, two tiny electron guns, built with watch-like precision, produced spiral electron beams which passed through two of the magnetron resonant cavities. These beams frequency-modulated the tube without affecting the power output. Improvement and further development of the tube is now going on in the Lancaster plant of the RCA Victor Division under the direction of Dr. B. B. Brown. Using this tube, it is expected that wide-band micro-wave relay systems will be feasible at powers many times

(*Continued on page 19*)

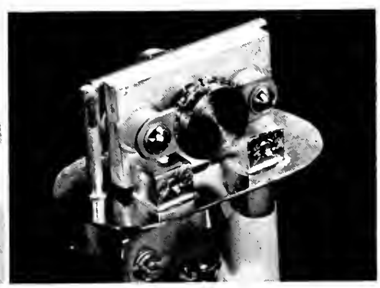
THIS 4,000 MEGACYCLE MAGNETRON CAN BE TUNED FROM THE OUTSIDE WITHOUT AFFECTING THE STABILITY OF THE TUBE.



THIS CONTINUOUS WAVE MAGNETRON OPERATING ON 4,000 MEGACYCLES IS FREQUENCY MODULATED BY BEAMS FROM TWO TINY ELECTRON GUNS.



THE TYPE 2J41 MAGNETRON WAS THE FIRST TO HAVE ITS FREQUENCY STABILIZED BY AN EXTERNAL CAVITY DISTINCT FROM THE CAVITIES WITHIN THE TUBE.



LEFT: GLADYS SWARTHOUT AND HER HUSBAND, FRANK CHAPMAN, LISTEN TO A PLAYBACK OF A RECORDING MADE AT HOME.

BELOW: A SPECIALLY BUILT RADIO-PHONOGRAPH IS ONE OF THE INSTRUMENTS IN THE SWARTHOUT STUDIO.

Noted Vocalist Studies Roles from Self-Made Recordings

Gladys Swarthout Installs Recording Apparatus to Aid Her in Preparing for Public Recitals.

WHEN Gladys Swarthout, one of America's best known mezzo-sopranos, and her husband, Frank Chapman, former concert tenor, had completed the conversion of a barn on their Connecticut estate into an attractive music studio, the first pieces of equipment to be installed in the new quarters were complete phonograph recording and reproducing units, made by RCA.

In assembling their layout, Miss Swarthout and Mr. Chapman first secured a turntable which was designed to operate at either 33 or 78-r.p.m., whether cutting a record or transcribing it. To obtain best results when taking programs off the air for re-recording, they then added a custom-built RCA Victor radio-phonograph. The next and final step was to install a loudspeaker system which would make the music from turntable, radio-phonograph or radio receiver available to listeners in a larger adjacent music room. This was accomplished by installing three cone speakers high on the music room wall, in such a way that the heavy-timbered walls of the building, acting as a natural baffle, would assure maximum quality of reproduction. When not in use, the speakers are concealed behind a framed painting.

Builds File of Recordings

Since 1942, when the installation was completed, Miss Swarthout has built up a file of several hundred glass-base acetate and lacquer recordings. They represent direct recordings made at a microphone in her studio, off-the-air recordings of her favorite radio programs, and re-recordings of certain musical selections which she wants to retain. She also uses the turntable and cutting stylus to record personal messages and greetings on small disks for mailing to friends.

According to Miss Swarthout, these recording facilities are one of her most valuable aids in preparing concert, radio, recording and operatic repertoires. After recording a selection by means of microphone and turntable, she is able to check on her own interpretation by listening to an immediate play-back. This convenience, she adds, is extremely valuable when studying a new composition.

The Magnetron

(Continued from page 18)

higher than those obtainable from presently available equipment.

A second application of the new method of frequency modulation and control was to a continuous-wave magnetron of much higher power but lower frequency. This tube, developed in RCA Laboratories by R. R. Bush, C. L. Cuccia, H. R. Hegbar and the writer, under the direction of Dr. L. P. Smith, was designed for a war project requiring the transmission of medium definition television pictures. Generating more than 1 kilowatt of continuous wave power, the tube is tunable by mechanical means from 720 to 900 megacycles.

Since magnetrons can now be frequency modulated, as well as frequency controlled to any desired degree of precision, they are expected to find wide use at the highest frequencies, for micro-wave relay and broadcasting purposes.

Metal Detectors in Industry

Electronic "Sleuths" discover Hidden Particles that Threaten to Damage Machinery and Contaminate Packaged Products.

By W. H. Bohlke
*Engineering Products Dept.,
RCA Victor Division*

DAY after day, electronics finds new ways to be useful in industry, emphasizing repeatedly the fact that equipment based upon the action of electron tubes can be made to perform many tasks better and more economically than any other medium. This versatility of electronics is nowhere better evidenced than in the roles now being played by RCA's Electronic Metal Detector as a "sleuth" in the detection of foreign metal particles in manufactured goods, and as a "sentry" to protect costly machinery.

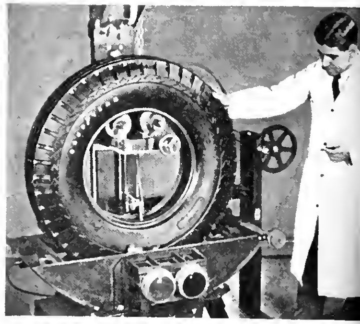
The development of RCA Electronic Metal Detectors has followed an interesting course. In 1933, the company developed a Gun Detector for use in penitentiaries for detecting concealed weapons, hacksaw blades and similar contraband arms. This was succeeded by a variation of the Gun Detector which was produced during the recent war for use at a government arsenal to inspect cartons for remaining bullets.

These early equipments were constructed of wood, but continued research, carried out during the war for rocket fuel inspection, finally led to the first Metal Detector made of metal. This notable refinement in design was the real forerunner of the stable, flexible and dependable Electronic Metal Detector now available to industry, for high speed, automatic inspection.

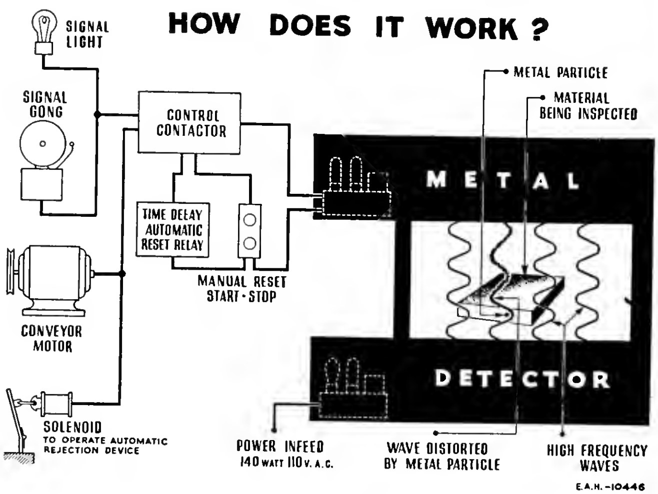
Before the RCA Electronic Metal Detector was perfected, many inspection procedures utilized the x-ray fluoroscope. This method has several drawbacks. It requires a dark room where the operator views the x-ray picture of the product; maintenance of the apparatus is expensive; personnel must be protected against leaking x-rays, and state and local regulations governing the operation of x-ray devices must be strictly met. Also, because of the tiresome nature of the work, operators of the fluoroscope system have to be relieved at frequent intervals. Electronic metal detection is not faced with these limitations.

Although a relatively new development in its present form, the Metal Detector already has been successfully adapted to the candy, food and tobacco fields, insuring finished products that are free from contaminating particles. In these and other fields, where it has been called upon to guard machinery, costly dies, etc., the Detector has soon paid for itself by preventing damage from "tramp" metal of any kind, hidden in the material being processed.

At the Philadelphia candy plant of Peter Paul, Inc., an RCA Metal Detector unit has been in operation 16 hours a day, five days a week, for 14 months, providing depend-



IN THIS TIRE-TESTING MACHINE, ELECTRONICS IS USED TO DETECT FLAWS IN THE STRUCTURE OF THE CASING.



THIS DIAGRAM SHOWS HOW THE DISTORTION OF RADIO WAVES CAUSED BY THE PRESENCE OF HIDDEN METAL PARTICLES IN PACKAGED GOODS, RINGS A GONG TO NOTIFY THE OPERATOR AND SHUTS DOWN THE MACHINE.

able, automatic inspection that simultaneously protects the consumer and the good name of the manufacturer. In this installation, the presence of "tramp" metal in a finished package would automatically ring a bell to notify a nearby employee and, at the same time, stop the belt conveyor. Manual reset is used but automatic rejection could also be applied if desired.

Advantages for Food Processors

The latest model Metal Detector, through its increased sensitivity, possesses special advantages for food and candy processors. This is proved by the fact that spherical steel particles smaller than this letter "o" can be readily detected. Moreover, the electronic units are housed in a safety-sealed compartment, and the entire Detector may be easily cleaned and even washed down when necessary. The latter features are, of course, very desirable for food and candy plant application.

An interesting variation in the use of electronics for inspection of products is a tire testing machine developed and patented by the Goodyear Tire & Rubber Company for testing tires for air spaces between cords. This machine embodies electronic and mechanical apparatus built by RCA. In operation, the lower portion of the tire is rotated in a wetting tank, the liquid acting as an efficient coupling means between Detector and controls. If the system detects a flaw in cord construction, a red lamp flashes as a warning to the operator.

When the product to be inspected is sufficiently transparent, such as a bottled soft drink, the combination of light beam and electron phototube can be used to advantage. Foreign objects in the liquid can be detected and the bottles automatically rejected from the conveyor. One equipment has been especially perfected for this purpose by RCA in cooperation with The Coca Cola Company. It is called the RCA Automatic Beverage Inspection Machine for Coca Cola and is now in production.

People interested in Metal Detectors often ask: why are they designed solely for ferrous and nonferrous metals, when pebbles, splinters and the like have been known to appear in products reaching the consumer. Frankly, a contamination detector that would do a 100% job for any and all foreign materials would not only tax the ingenuity of the industry's most brilliant engineers but the development expense would, in all likelihood, be so great that the cost of the application would preclude its economical use. It is certain, however, that devices of greater versatility will be forthcoming as industry becomes more aware of the substantial advantages to be derived from a wider use of such equipment.

Protects Quality and Reputation

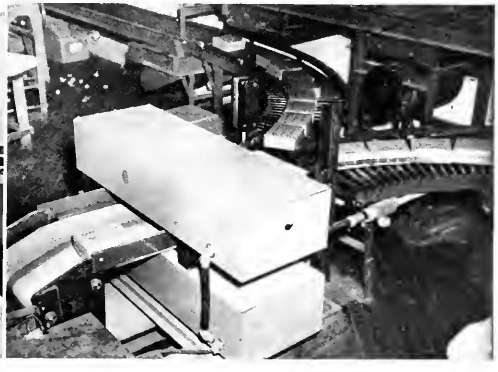
Besides being used to protect the quality and good name of a product, there are many instances where the Metal Detector has paid for itself in a short time by preventing damage to processing machinery. For instance, at the RCA Victor record plant at Camden, a Metal Detector, standing guard over the "biscuits" of vinylite plastic from which discs are pressed, saved over $1200 in a three-week test period by detecting "tramp" metal that would have caused severe damage to matrices or dies.

A similar installation at the National Automotive Fibre Company, Trenton, New Jersey, detected an imbedded broken knife blade during the first three hours of operation. Had the metal gone through the machinery unnoticed, it is estimated that damage to the calendar rolls would have cost $2,000 to repair.

The "protective" feature also has been found invaluable in the tobacco industry, where razor-sharp shredder knives, rotating at high speeds, can be wrecked by small undetected pieces of metal in the tobacco leaves. Pilot RCA Metal Detectors have been, or are being, installed at the factories of several leading cigarette manufacturers.

FOREIGN OBJECTS IN BOTTLED DRINKS ARE INSTANTLY DETECTED BY THIS ELECTRONIC BEVERAGE INSPECTOR WHICH AUTOMATICALLY REJECTS IMPERFECT PRODUCTS.

CARTONS OF CANDY ON A CONVEYOR PASS THROUGH THE ELECTRONIC METAL DETECTOR FOR FINAL INSPECTION BEFORE SHIPMENT TO CONSUMER.



DR. SERGE KOUSSEVITSKY AND THE FAMED BOSTON SYMPHONY ORCHESTRA REMAIN SILENT MIDWAY OF A SYMPHONIC SELECTION AS THEY LISTEN TO THE NEW "BERKSHIRE" MODEL (CENTER REAR) RECREATE THE SECOND HALF OF THE SAME SELECTION WITH FULL VOLUME AND UNIMPAIRED QUALITY.

Introducing the "Berkshire"

With Picturesque Tanglewood as the Setting, RCA Victor Displays and Demonstrates Its New Line of Custom-Built Combination Receivers.

WITH the picturesque Music Shed of the Berkshire Music Festival at Tanglewood, near Lenox, Massachusetts, as the setting, and with the famed Boston Symphony Orchestra under the baton of Dr. Serge Koussevitsky supplying the musical background, a new combination radio-television-phonograph providing sound reproduction hitherto unachieved in a home instrument was demonstrated this summer to more than 6,000 music lovers, music critics and newswriters.

The combination instrument, called the "Berkshire," one of four custom-built models developed by RCA Victor and RCA Laboratories, revealed its capabilities when the full-sized symphony orchestra, after presenting the first part of Beethoven's "Egmont" Overture, ceased playing and let the new receiver take over for the balance of the selection. So perfect was the match in tonal range and quality that critics in the audience found it difficult to distinguish between the "live" and the electronically reproduced portions. This recording had been prepared especially for the occasion by the 103-piece Boston Symphony Orchestra. By setting up a field recording unit in the Music Shed a few days before the demonstration, RCA Victor was able to duplicate on the record the exact acoustical conditions under which the comparative test was made on the day of the demonstration.

Unveiling of the "Berkshire" climaxed a dramatic stage presentation, "The March of Musical Fidelity" comprising a series of tableaux with orchestra, depicting significant milestones in recording and reproduction of music during the 37 years the Boston Symphony Orchestra has recorded for RCA Victor. Beginning with Edison's crude tin-foil covered cylinder and small horn, which was invented in 1877, the skits portrayed each outstanding development in sound reproduction, using actual working models of phonographs of the various periods to demonstrate the progress of the art.

Result of Long Development

The "Berkshire", it was announced, is the result of more than a year of intensive development, employing for the first time post-war applications of electronics in the engineering of sound.

The instruments incorporate a de luxe Victrola phonograph of unusual power, a radio which provides standard, frequency modulated broadcast and international short wave reception, including a motor-driven electric tuning mechanism, first perfected for use on military aircraft, and, in certain models, large screen projection television. The radio-phonograph chassis has 30 tubes, in addition to two rectifiers and two voltage regulators.

Among its unusual new and improved technical components, now making their initial appearance in this instrument, are a duo-cone loudspeaker and a new, extremely

CLOSE-UP VIEW OF THE "BERKSHIRE" MODEL USED IN THE TEST WITH THE BOSTON SYMPHONY ORCHESTRA.

efficient noise suppressor, both perfected by RCA Laboratories at Princeton, N. J. Every component of the new instrument is capable of reproducing sound with a frequency range from 30 to 15,000 cycles, the full scale of human hearing.

To promote the manufacture and sale of these special instruments, a new Consumer Custom Products Department has been formed by RCA Victor under the management of Miss Harriett H. Higginson. As head of the new enterprise, Miss Higginson, a fashion and merchandising expert, and a former executive of Montgomery Ward & Co., and Marshall Field, will direct the activities of designers, technicians and specialists.

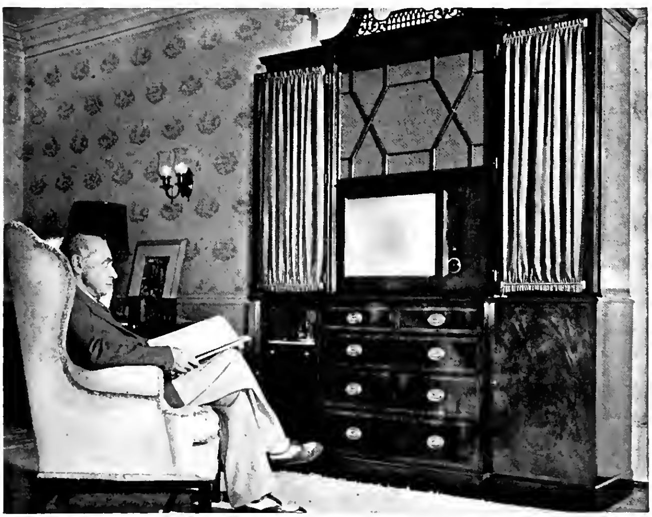
Contribute to Music Fund

As part of the company's arrangement with the Boston Symphony Orchestra, a contribution will be made to the Berkshire Music Center Scholarship Fund on sales for which the Music Center is responsible. Every instrument sold under this subscription plan will bear a silver plaque, identifying it as one of a "special edition", and inscribing, over Dr. Koussevitsky's signature, the purchaser as a benefactor of the scholarship fund.

Essentially a project for custom engineering of music into individual homes undergoing construction, the mechanical components of the Festival Series, of which "The Berkshire" is the first, will also be available in period designed cabinets ranging from a large traditional breakfront — a design by William Millington, associate of Baker Furniture, Inc. — to modern pieces designed by T. H. Robsjohn-Gibbings, New York. Lester Beall and John Vassos, well-known New York industrial designers, are associated in the project.

On the afternoon preceding the symphonic performance, scores of music critics and feature writers were given a preview of the Festival Series in the Chamber Music Hall on the Tanglewood grounds. Miss Higginson outlined the department which she heads; Marvin Hobbs, chief engineer of the Consumer Custom Products project explained the advanced technical features of the new line of instruments, and Dr. Harry F. Olson, of RCA Laboratories demonstrated the wide frequency range of the duo-cone loudspeakers used in the Festival series.

DR. SERGE KOUSSEVITSKY LISTENS TO RECORDINGS OF HIS ORCHESTRA ON "BREAKFRONT" MODEL OF THE "BERKSHIRE" LINE. MODEL HAS FM, AM AND TELEVISION.



Ingles Elected President of RCA Communications

MAJOR GENERAL H. C. INGLES.

Major General Harry C. Ingles (ret.) was elected President of RCA Communications, Inc., at the regular monthly meeting of the Board of Directors of Radio Corporation of America on September 5.

General Ingles is also a Director of Radio Corporation of America and of RCA Communications, Inc., having been elected on July 14, 1947.

NBC Salutes UN Week

More than two hundred folk dancers perfoming their routine in the sunken plaza of Radio City, New York, on September 14, signalized the opening of United Nations Week, sponsored jointly by the National Broadcasting Company, the American Association for the United Nations and the National Education Association. In their colorful native costumes, groups from many nations presented their traditional dances and then combined in ensemble to portray the special symbolism of the Week. Speakers included Mayor William O'Dwyer of New York and Andrew W. Cordier, executive assistant to Secretary General Lie of UN.

After the opening day, UN programs were presented three times daily from the Plaza.

ELECTRONIC TUBE-PAINTING

Electrified Mist of Enamel Covers Metal Tubes More Evenly with Worthwhile Savings in Material and Labor.

By the simple process of atomizing paint and then subjecting the minute droplets thus formed to an electrical charge of 80,000 volts, an electronic paint spraying machine at the RCA Tube plant in Harrison, N. J., applies the finishing coat of black enamel to 6,000 metal radio tubes every sixty minutes with a more uniform coating and a worthwhile saving in enamel. The only attendants required are two girls who load and unload the conveyors which carry the procession of tubes into the spraying chamber, through the later drying process and out onto the unloading platform. Formerly, the same tube output required the labor of six workers using wasteful hand-operated paint guns.

The machine operates on the well-known principle that an object carrying, for example, a charge of positive electricity, attracts another object or substance carrying a charge of negative electricity. In the electrostatic spraying method, the mist of paint particles is floated into the air between a grid of wires connected to a source of high voltage electricity. Each particle of paint thus becomes individually charged. When a metal radio tube, connected to ground, is passed through this mist, the paint droplets are attracted to the metal surface and deposited there as a continuous coating.

The paint wasted in the electronic process is slight. Any paint particles that elude the tubes drop into a pool of water below the conveyor belt, or are caught by a water curtain and then carried to the water chamber. The paint floats on the surface of the water and is removed when enough has been accumulated to warrant the operation. As a matter of fact, so little paint is retrieved in this way that it is seldom worth salvaging.

Handspraying Wasted Paint

In the earlier method of handspraying, a great amount of paint was sucked into the ventillating stack, but now the stack requires infrequent cleaning, thereby effecting another saving.

TWO WOMEN WORKERS EQUAL THE PRODUCTION OF SIX MEN WHEN ELECTRONS ARE EMPLOYED TO APPLY PAINT TO METAL TUBES.

A PARADE OF METAL TUBES PASSES UNDER A SPRAY OF ENAMEL WHICH IS SUBJECTED TO AN ELECTRICAL CHARGE OF 80,000 VOLTS.

Immediately after being subjected to the paint-mist, the tubes on the conveyor belt pass around a sprocket wheel, and thence through an air-drying shield for 30 or 40 seconds before entering the baking oven. The purpose of the shield is to keep off lint and dust until the tubes enter the oven.

The oven is approximately 30 feet long and 6 feet wide, and contains sixty infra-red lamps. By using heat generated by these lamps, the paint reaches the curing temperature more rapidly than when the heat is produced by ordinary means such as open flames. The tubes are in the oven eight minutes, subjected to a temperature range between 275° F. on the skirt and 325° F. on the shell.

The conveyor belt and its load of tubes makes four complete turns within the oven before emerging for a two-minute cooling-off period, eventually ending up at the unloading platform.

The black paint used in the majority of cases is a melamine modified urea-formaldehyde-enamel, and is processed in a special mixing room to insure proper viscosity.

RCA Income Increases In First Half of Year

The consolidated statement of income of the Radio Corporation of America and subsidiaries for the second quarter of 1947 and the first six months of the year, with comparative figures for the corresponding periods of 1946, issued by Brig. General David Sarnoff, President and Chairman of the Board of RCA, revealed that total gross income from all sources amounted to $154,333,872 in the first half of 1947, compared with $101,310,085 in the same period in 1946, an increase of $53,023,787.

Net income, after all charges and taxes, according to the statement was $8,825,912 for the first six months of 1947, compared with $5,666,299 in 1946, an increase of $3,159,613.

After payment of Preferred dividends, net earnings applicable to the Common stock for the first six months of 1947 were 52.2 cents per share, compared with 29.5 cents per share in the first half of 1946.

ABOVE: WITH AN ACCURACY OF ONE MILLIONTH SECOND, RCA ELECTRONIC INTERVAL COUNTERS ON TABLE MEASURE ELECTRON PULSES GENERATED BY THE FAINTEST STARLIGHT.

LEFT: A PHOTO-MULTIPLIER TUBE IS PLACED ON THE TELESCOPE WHERE IT RECEIVES THE FOCUSED IMAGE OF THE STAR BEING OBSERVED.

MEASURES LIGHT OF FAINTEST STAR

Method Uses Photo-Multiplier Tube and Electronic Counter

THE amount of light reaching the earth from the faintest stars can now be accurately measured with a new form of photometer which incorporates two units developed by the Radio Corporation of America, the photo-multiplier tube and the Electronic Time Interval Counter.

Details of the photometer, which was designed and constructed by William Blitzstein and I. M. Levitt of the Flower Observatory and the Franklin Institute Laboratories, were revealed recently to the Astronomical Society in Evanston, Illinois.

In the Levitt-Blitzstein photometer, the image of the star is focused through a telescope onto a photosensitive element of the multiplier tube. The light striking this element gives off pulses of electrons which are then directed onto the first of a series of surfaces called dynodes which generate secondary electrons. For every electron striking the first surface, two to five additional electrons are released. By repeating these steps through the nine elements of the photomultiplier tube, the final product is a million or more electrons for each electron which left the first sensitive surface.

Previous methods used by astronomers for this purpose utilized a device called a galvanometer but the instrument is inherently unstable and reacts slowly to changes in the intensity of light pulses. Astronomers have long realized that if the bursts of electron pulses could be counted, the light from the faintest stars could be measured with great accuracy. In the RCA Electronic Counter, developed recently by the RCA Engineering Products Department, scientists found the solution to this problem.

The Counter makes the computation completely automatic. After setting a predetermined time interval on the device, the astronomer merely pushes a button, which exposes the counter to the output of the photomultiplier for the desired time, say 10 to 100 seconds, with an accuracy of 1 millionth of a second. The number indicated on the counter at the end of this period is proportional to the light intensity of the star under observation.

Dr. Zworykin Addresses Foreign Science Groups

Carrying credentials naming him official representative of two of the outstanding science societies of the United States, Dr. V. K. Zworykin, Vice President and Technical Consultant of RCA Laboratories, Princeton, N.J., left New York on August 16 to attend important engineering conferences in Belgium, France and Italy, and to visit technical laboratories in England, Holland and Switzerland.

Recognized internationally as an authority on television and electron microscopy, Dr. Zworykin was invited to deliver three papers during his European trip. He represented the National Academy of Sciences at the Liege (Belgium) Congress, September 8, on the occasion of the centennial of the Association of Engineering Graduates of the University of Liege. He talked on "Applications of Electron Microscopy and Electron Diffraction to Metallurgy", a paper prepared in cooperation with Dr. E. G. Ramberg.

Later Dr. Zworykin addressed a conference of the French Society of Electrical Engineers at the Sorbonne, Paris, France, on the subject of "Progress in Television."

As representative of the National Academy of Sciences, the Institute of Physics, and Radio Corporation of America, Dr. Zworykin attended an international conference of radio engineers at Rome, Italy, organized by the Italian National Council of Research to commemorate the fiftieth anniversary of the invention of radio by Marconi. His address there also dealt with television, covering its latest advances.

PART OF RCA STAFF AT TELECOMMUNICATIONS CONFERENCE: STANDING—A. J. COSTIGAN, RADIOMARINE; MRS. JANE BROWN, SECRETARY; J. H. MULLER, COMMUNICATIONS; T. L. BARTLETT, FREQUENCY BUREAU. SEATED—ROGER NASH, COMMUNICATIONS; H. H. EDWARDS, COMMUNICATIONS; P. F. SILING AND J. P. VEATCH, FREQUENCY BUREAU.

World Conference on Radio

For Four Months, Delegations from 75 Governments and Representatives of Industry Have Been Revising the Basic Regulations of International Communications.

By Philip F. Siling

Engineer-in-Charge
RCA Frequency Bureau

THE first world conference on telecommunications since 1938 began at Atlantic City, N. J., May 12, 1947. The work of the three overlapping assemblies, viz., Radio, Plenipotentiary, and High Frequency Broadcasting, were concluded at the end of September. The progress of ten years in the communications art, including wartime developments, and the chaotic aftermath of the war in the regulation of radio, created the need for a complete overhaul of the basic international agreements, i.e., the International Telecommunication Convention of Madrid 1932, and the International Radio Regulations of Cairo 1938. The accumulated problems are capable of being resolved only with difficult and tedious work. Because of its interest in all phases of radio, including research, manufacturing and operations, RCA had a vital interest in substantially all phases of the conference proceedings.

The primary objective of the participation of RCA was to assist in securing for the United States maximum protection for its telecommunications services and in establishing the basis for cooperation among radio-operating agencies throughout the world. Our interests centered in the securing of world-wide agreement in the efficient use of the radio frequency spectrum so as to protect the frequencies used for world-wide communication by our operating subsidiaries and promote standardization of equipment in order to extend the market for RCA-manufactured equipment.

Further objectives included the effort to get agreement on our operating practices and methods, the protection of principles which bear on rates and the collection of charges, the establishment of suitable technical organizations, with provision for appropriate RCA representation, and the familiarization of our staff so that effective future work can be done in the registration of frequencies, clearing of interference to operating circuits and prosecution of technical studies for preparation of future conferences.

Representation is required from a competitive standpoint and the scale of our effort was approximately the same as that of other radio-operating companies.

To a very considerable extent, the requirements of industry determined the position taken by the United States in the negotiations. Consequently, a great amount of work was required within the United States delegation in establishing the position of industry and reaching a final United States position. RCA representatives, who had the status of technical advisers, also frequently represented the United States as spokesmen in the formal meetings of the Conferences.

Seventy-five Nations Represented

Some seventy-five governments had delegations attending these Conferences. The resolution of the problems presented could therefore be accomplished only through a series of compromises. Particularly in regard to frequency allocations, it was not sufficient to obtain favorable action by a majority, but in general it was necessary to obtain unanimous agreement in order to assure interference-free operation of the world's radio services. These factors suggest the very great effort that was required to get recognition of our policies in the final treaty documents.

It has been officially recognized by the representatives of our Government that RCA contributed substantially to the achievement of a favorable result, not only through direct participation in the preparatory work and in the Conference itself, but in furnishing a tremendous amount of information both from technical and practical operating standpoints, and in opening its plants and facilities to organized tours and visits for the foreign delegations. RCA, as leader in the telecommunications field, fostered educational work among the foreign delegates in various radio technical matters. For example, RCA provided an illustrated lecture relative to radio propagation work and explained and demonstrated the present status of television and its possibilities for future expansion. As a result of these educational efforts, the foreign delegations will carry home with them a high opinion of the work and personnel of RCA.

Assignments of Staff Members

Concerning the work of RCA staff members, carried out under the direction of the author, Colonel T. L. Bartlett, Coordinator of Aviation Activities, RCA Frequency Bureau, participated actively in the organization committees of both Plenipotentiary and Radio Conferences. These committees completely revised the structure of the International Telecommunications Union and set up an International Frequency Registration Board which will review all future frequency notifications to the end that new assignments will not cause harmful interference. C. E. Pfautz, Assistant to the Engineer-in-Charge of the RCA Frequency Bureau, and H. H. Edwards of RCA Communications, Inc., worked with the committee charged with the preparatory work of setting up a new International Frequency List based on sound engineering.

H. B. Martin, of Radiomarine Corporation of America; J. H. Muller, Assistant to the Chief Engineer, RCA Communications, Inc., and J. B. Coleman, Assistant Director of Engineering, RCA Victor Division, worked with the Technical Committee in setting up new technical standards to be followed by the radio industry in the future. Mr. Muller, together with Charles Sandbach of RCA Communications, Inc., followed the revision of the work of the Telecommunications Convention. A. J. Costigan, Vice President, Radiomarine Corporation, had a leading role in the important Operating Regulations Committee, which is revising the radio operating regulations for the world.

The writer devoted the major portion of his time to the important Allocations Committee, which determined the bands of frequencies available to the various services. He also helped on the Frequency List Committee. Frank M. Russell, Vice President, National Broadcasting Company, Inc., and W. S. Duttera, NBC Engineering Department, together with J. P. Veatch, Manager of the Washington office of the RCA Frequency Bureau and the writer, were active on the High Frequency Broadcasting Conference, preparing for the task of frequency assignments in this service. Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories Division, gave overall guidance in our work.

Frequencies Restricted

At the outset, we were confronted with an inevitable restriction on the number of frequencies available for the point-to-point and marine services. However, as the decisions of the Radio Conference begin to take definite form, the prospects for favorable results are good from the point of view of reaching the goal of maintaining the complements of frequencies essential for our operating purposes.

In protecting the interests of the Company with regard to the manufacture and sale of equipment, and in the advancement of the American system with respect to rates, practices and methods of operation, the outlook is entirely favorable. At the conclusion of nearly four months' work at Atlantic City, it can be stated with confidence that the position of RCA as a leader in the world telecommunications field has been fully maintained.

Television Makes Sports Fan of Toscanini

One of the new RCA table model television receivers installed in the home of Arturo Toscanini has made an enthusiastic sports follower of the noted NBC Symphony director. Prizefights, football and baseball, which were new to him, are now a regular part of the maestro's hours of relaxation. So avidly has he followed these televised events that in a space of a few months he has learned the fine points of the contests and the names of fighters and players. When he invites guests for dinner, he asks them to come early so that he will not miss the start of the telecasts.

RADIO IN LATIN AMERICA

Business and Government Leaders Below the Border Set Example in Modernizing Communications and Broadcast Services.

By Meade Brunet

Managing Director
RCA International Division

PROGRESSIVE business and government leaders in a dozen Latin American countries are setting an example for the rest of the world in streamlining and modernizing vital communication and broadcasting services.

Plans which had been curtailed for several years because of war-inflicted shortages of equipment and materials began crystalizing soon after V-J Day. Since then there have been steadily increasing demands upon United States manufacturers to supply means and methods with which to effect desired improvements.

Orders being filled by the Radio Corporation of America through RCA International Division distributors reflect the high degree of vision and progressive thinking prevalent in the good neighbor republics.

New RCA installations planned or completed in Brazil, for example, include three powerful radio broadcasting transmitters and a radio system of communication for Volta Redonda, the Brazilian government's $50,000,000 steel development enterprise. The radio transmitters met the recent Brazilian regulation requiring all clear-channel stations to operate on 50 kilowatts. The stations are: Radio Nacional, Radio Tupi and Radio Clube.

At Volta Redonda, destined to be the largest steel plant in Latin America, the management depends heavily upon radio communications to coordinate its production program. RCA radio transmitters and receivers have been installed at main points of the steel empire, not only linking each strategic unit with the operations center, but also connecting the center with the head offices in Rio de Janeiro.

The Volta Redonda and other Brazilian contracts were arranged by RCA Victor Radio, S. A., associate company of RCA in Rio Janeiro.

A $2,000,000 radio development project is under way in Havana, Cuba, with plans calling for the erection of a "Radiocentro"—similar in many respects to New York's Radio City. The project includes a modern broadcasting station with eight studios, echo chambers, recording rooms and a master control room, completely equipped by RCA. The same group also is installing the first RCA FM broadcasting transmitter in Cuba.

Mexican government and business leaders are also active. Completed recently by RCA, was the powerful station XERF in the border town of Villa Acuna, State of Coahuila. This station, costing in the neighborhood of $300,000 to build, is operating temporarily on 50,000 watts but its power may be increased to 150,000 watts. In addition to station XERF a number of other modern broadcasting stations have been installed in other parts of Mexico. They include stations XELG at Leon, XEAM in Matamoros, XEBT at Torreon and XEBS in Mexico City.

In Ciudad Trujillo, capital of the Dominican Republic, engineers have recently completed installation of an RCA 10-kilowatt station to be known as "La Voz del Yuna". It was purchased by Major J. Arismendi Trujillo, brother of the president of the Dominican Republic, who has also installed an RCA short wave station. A similar short wave transmitter has been erected by the Director General of Communications for the Republic.

President Raphael Trujillo has purchased Radiomarine radar and a complete shipboard installation of radiotelephone and radiotele-

(Continued on page 31)

BELOW: MODERN, AIR CONDITIONED HOME OF STATION WIAC IN SAN JUAN, PUERTO RICO.

ONE OF THE SEVERAL STUDIOS IN THE NEW BUILDING ERECTED BY WIAC.

C. E. MOORE (CENTER) POINTS OUT FEATURES OF RADIOMARINE'S 3.2-CENTIMETER RADAR TO TWO TECHNICIANS ATTENDING THE TRAINING SCHOOL.

MEMBERS OF A CLASS AT RADIOMARINE STUDY METHODS OF SERVICING AND MAINTAINING MODERN RADAR UNITS FOR SHIPBOARD USE.

SCHOOL FOR RADAR

Radiomarine Trains Company Technicians and Merchant Marine Officers to Operate and Maintain Modern Aids to Navigation.

WHEN it became evident early this year that the success of the first demonstration of Radiomarine's 3.2-centimeter radar on the Great Lakes would create a demand for many additional installations of these equipments, the company hastened to establish a school to train personnel in the installation, operation and servicing of the apparatus. Under the supervision of Charles E. Moore, Radiomarine engineer, a curriculum was arranged and a staff of specialized instructors assembled to teach the classes at company headquarters, 75 Varick Street, New York City.

The first classes were made up of experienced radio technicians and district managers selected from the company's 22 branch offices in this country and Canada, and from branch offices of the RCA International Division in Cuba, South America, Norway and Sweden.

The typical course, of two weeks duration, is divided into five main categories, each one taught by a specialist in that subject. Lectures which explain each part of the radar circuit are supplemented by laboratory exercises in which the trainees are directed to locate faults in the apparatus and return it to a workable condition. The final two days of the course are devoted to a written test and a discussion of the test papers.

After attending the daily sessions, students are given required home-reading assignments to supplement the lectures and laboratory work.

Factory-trained personnel of this type have installed a large part of the 100 radars delivered and put into operation by Radiomarine since the first of the year.

These training facilities also are offered to Merchant Marine Officers, who learn about the service in one of two ways. When incoming ships are met by a messenger from the American Seaman's Friend Society, the captain is given a copy of Radiomarine's Radar brochure. The messenger notes the Master's name and turns it in to Radiomarine. The latter then invites the captain to visit the Radar School for free instruction in the operation of the system and to view the radar in actual use.

This service to marine officers is further extended through an arrangement made with Commander Gilbert C. Fonda, Officer in Charge of the Radar-Loran School, of the U. S. Maritime Commission in New York. Before entering the Course at Varick Street, these Merchant Marine Officers are given lectures on the fundamentals of Radiomarine's Model CR-101 radar using an enlarged facsimile of the indicator unit and control panel installed in Commander Fonda's classrooms. This is followed by a one-day operational training course at the Radiomarine plant. Already many ship officers have completed the training.

Members of the school staff and the subjects they teach are: Melvin Meyer, Radar Receivers; William Turneau, Radar Antennas; Niles Barlow, Radar Transmitters; Richard Scanlon, Synchronizing Units and Edward Smith, Practical Aspects of Radar and Methods of Installation.

NEW TUBE DETECTS LEAKS IN VACUUMS

MICROSCOPIC leaks in the vacuum systems of cyclotrons, electron microscopes, refrigeration equipment, electron tubes, and vacuum stills can now be located quickly and simply by means of a new, portable leak locator developed by the Tube Department of the Radio Corporation of America. Operation of the unit depends on an ingenious tube of the ionization-gauge type which is sensitive only to hydrogen gas.

In operation, the gauge tube and the device under test are connected into a vacuum system and a fine jet of hydrogen played over the areas suspected of leakage. Any openings, no matter how small, will suck in hydrogen which quickly reaches the gauge tube. The latter features a small plate of palladium which when hot allows hydrogen but no other gases to pass through into the tube thereby creating a change in the operating characteristics of the tube. This change is indicated on a sensitive meter.

In several years of factory tests, the indicator has been successful in locating tiny leaks in many types of vacuum tubes. When a small unexhausted electron tube is tested, its exhaust tube is plugged directly into the leak detector before the air has been exhausted from the tube. A rotary vacuum pump is then used to establish a vacuum throughout the system, including the tube under test. Next, a hood is lowered over the tube and filled with hydrogen gas. If a leak is present in the tube, even though so minute that molecules of air can barely pass through, seepage of the hydrogen will show on the meter. This procedure merely demonstrates the presence of a leak. To locate the faulty spot exactly, the hood is removed and a fine jet of hydrogen played slowly over suspected areas until a movement of the meter marks the leak.

The leak detector weighs only 25 pounds complete and can be handled by non-technical personnel.

THIS DETECTOR USING NEW VACUUM GAUGE TUBE LOCATES LEAKS SO SMALL THAT MOLECULES OF AIR CAN SCARCELY PENETRATE THROUGH OPENINGS.

RCA has developed several other types of vacuum-gauge tubes of extreme sensitivity. They are used for measuring gas pressures and as protective devices in vacuum systems.

KEN R. DYKE

HARRY C. KOPF

JOHN H. MACDONALD

NBC MAKES CHANGES IN EXECUTIVE STAFF

REALIGNMENT of the executive organization of National Broadcasting Company, resulting in the naming of three administrative vice presidents and the promotion of other personnel, was announced August 1, by Niles Trammell, NBC president, following a meeting of the network's Board of Directors.

Harry C. Kopf, formerly vice president in charge of Sales, was appointed administrative vice president in charge of Network Sales, National Spot Sales, Owned and Operated Stations and Station Relations. George H. Frey was named director of Network Sales. James M. Gaines was named director of Owned and Operated Stations and will continue as manager of station WNBC.

Ken R. Dyke was appointed administrative vice president in charge of Program, Continuity Acceptance and Public Service Departments of the company. Mr. Dyke will continue in charge of Broadcast Standards and Practices.

John H. MacDonald, formerly vice president in charge of Finance, was appointed administrative vice president. Mr. MacDonald will have charge of finance and budget matters and in addition, will supervise the following departments: Treasurer's, Controller's, Personnel, General Service and Guest Relations.

I. E. Showerman, former manager of the Central Division, was elected vice president in charge of that Division.

Mr. Trammell also announced the retirement of two executives of the company—A. L. Ashby, vice president and general counsel, who will continue to act as an advisor to the company on legal matters, and Clarence L. Menser, vice president of Production and Program Departments. Henry Ladner was designated acting general counsel of NBC.

Radio in Latin America

(Continued from page 28)

graph equipment for his yacht.

In Peru the Compania Nacional de Telefonos (National Telephone Company) has embarked on a program of modernization which includes provision for radiotelephone service connecting five of the country's principal cities—Lima, Arequipa, Iquitos, Cuzco, and Piura. Used in this project will be the latest design RCA equipment including: six transmitters, twelve receivers, two control racks at each station, emergency power generating equipment, cage-type antennas and transmitting towers. Installation of three short-wave radio transmitters have been made recently aboard ships of the Peruvian Merchant Marine.

"Radio America", in Lima, is increasing its power to 10 k.w., another RCA installation.

The Ministry of National Defense of Venezuela has purchased Radiomarine equipment for 14 ships. Three of the ships are being equipped with transmitters and all are to be equipped with the latest radiotelephone apparatus.

Arrangements have been completed for installation of a new 5 k.w. broadcasting station and associated RCA FM broadcast transmitter in Barranquilla, Colombia, for the network "Emisores Unidas", managed by Raphael Roncallo. A 10-kilowatt RCA radio broadcasting transmitter was recently installed in the city of Medellin for station "Siglo Viente" and its companion station "La Voz de Antioquia."

In Puerto Rico, center of intense radio activity, engineers have completed installation of an RCA 10 k.w. medium frequency broadcast transmitter in San Juan for station WAPA, owned by Jose Ramon Quiñones.

In San Juan, WIAC has inaugurated an attractive new air-conditioned building, especially designed for modern broadcasting, and RCA equipped. The newspaper "El Mundo" of San Juan, is going on the air with an RCA 5 k.w. transmitter. From Ponce, the Puerto Rican American Broadcasting Corporation station WPAB will cover its market with new RCA 5 k.w. equipment.

One of the first stations in Latin America to streamline its facilities and step up its power was station CB 114 in Santiago de Chile.

The Argentine government-owned petroleum company, Yacimientos Petroliferos Fiscales, is installing complete RCA radio-telegraph units aboard seven of its oil tankers.

Pasteurizing Milk by Radio

(Continued from page 16)

pure tin which, in turn was submerged in a tank of warm water. The milk then flowed through the electrodes and was cooled by passing over a set of fins through which ice water was pumped.

When samples of the milk pasteurized by this method were tasted, however, it was discovered that there was a definite cooked flavor whenever the milk had been heated to 190°F or higher.

The importance of maintaining the flavor of milk in any pasteurizing process is well-known to dairy plant operators, and this defect of the process was recognized immediately by the scientists.

It was decided that the cooling time of approximately 5 seconds apparently was too long. More rapid cooling was, however, achieved by injecting the milk stream into a vacuum chamber. The heating time was maintained at 67/1000 of a second but the cooling time by this method was reduced to 2/10 of a second. The milk was cooled to 135°F by means of the vacuum expansion then the milk was poured over cooling fins and reduced to 40°F.

Samples for bacteriological tests were taken at the conclusion of the vacuum expansion, and cream volume samples were taken at the lower temperatures. Samples of milk which were tested showed no traces of cooked flavor at any temperature used. Even a sample taken at 205°F could not be differentiated from the raw milk.

Bacteria count was reduced to 100 as compared to 48,300 normally found in milk pasterurized by the conventional method at 143°F for 30 minutes. Bacillus coli was zero as compared to plus two in the conventional method.

Pasteurization by radio heat is so new that many questions remain as to the exact effect of the method, but perhaps the most striking and promising fact of all is that milk so treated keeps longer than pasteurized milk which we drink today.

While ordinary pasteurization kills most of the biological harmful bacteria found in milk, other nonharmful bacteria stay in the milk and cause it to sour. By eliminating these heat-resistant bacteria, progress has been made toward the development of a longer-keeping milk.

One of the chief limitations of the new process is that it can only be used to produce homogenized milk. However, with greater quantities of homogenized milk being sold today than ever before it is conceivable that its acceptance will be widespread in a few years.

Experiments worked out by RCA in cooperation with the Walker-Gordon Company and the Borden Company, large Eastern dairy products producers, provide for a continuous radiation treatment which promises a possible foreshortening of milk-processing operations. The experiments, however, have been limited to the laboratory and at the present time interest of milk producers is not deemed sufficient to warrant commercialization of the system.

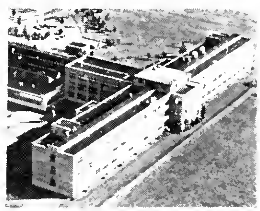
Your enjoyment climbs to new altitudes through radio and television achievements of RCA Laboratories.

More and more people will go sight-seeing by television as the number of stations and home receivers increases. Eventually, television networks will serve homes from coast to coast . . . bringing you the news as it happens . . . sports events . . . drama . . . vaudeville.

Many of the advances which have made possible these extended services of radio-electronics, in sound and sight, originated in research conducted by RCA Laboratories.

Recent RCA "firsts" include: ultra-sensitive television cameras that give startling clarity to all-electronic television . . . tiny tubes for compact, lightweight portable radios . . . "picture tube" screens for brilliant television reception.

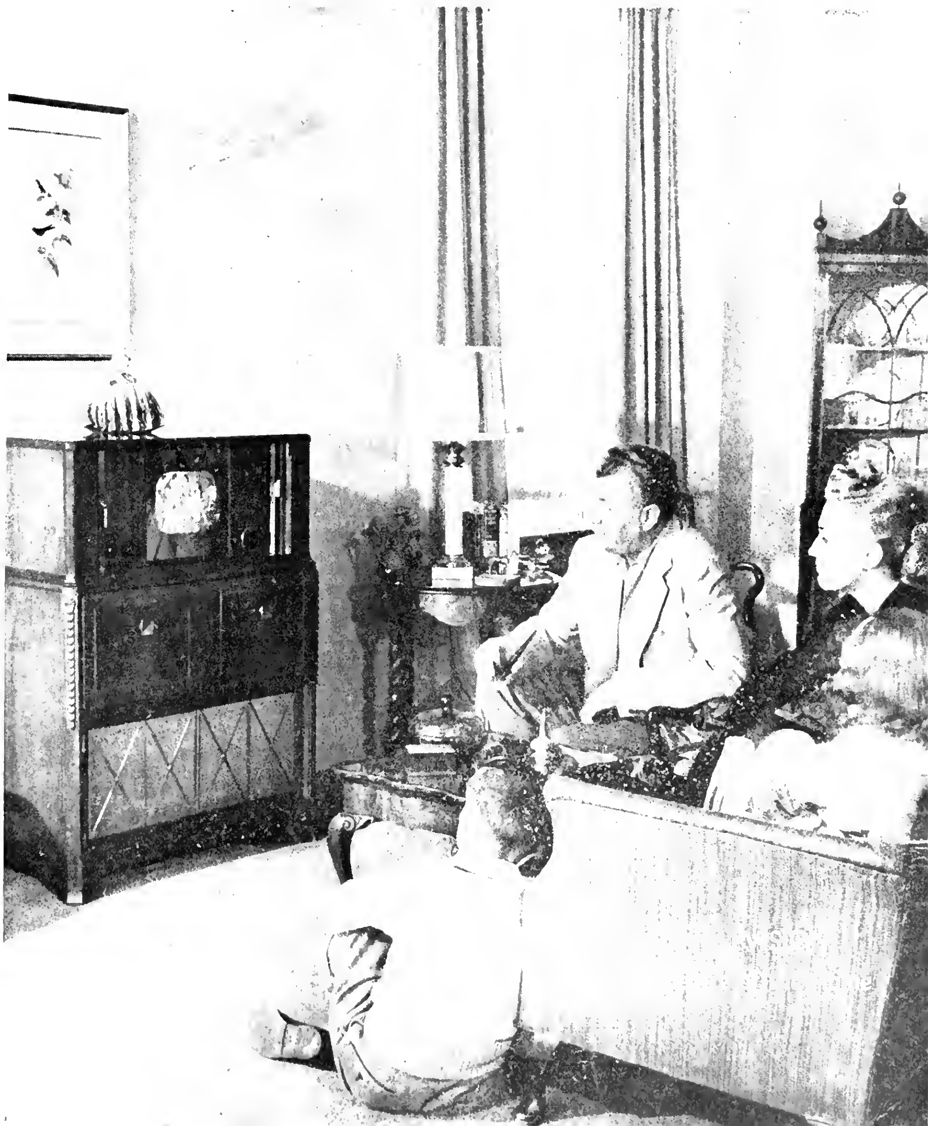
In other fields of radio-electronics, RCA has pioneered major achievements—including the electron microscope. Research by RCA Laboratories goes into every product bearing the name RCA or RCA Victor.



RCA Laboratories at Princeton, N. J., one of the world's centers of radio and electronic research. • When in New York City, see the radio-electronic wonders on display at RCA EXHIBITION HALL, 36 West 49th Street. Free admission. Radio Corporation of America, Radio City, New York 20.

RADIO CORPORATION of AMERICA

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING



ANUARY

At RCA Exhibition Hall, radio, television, and electronics are on parade in thrilling exhibits.

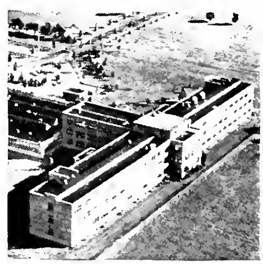
"World's Fair" of radio-electronic wonders...RCA Exhibition Hall

100,000 visitors every month—that's how people have responded to the new and fascinating RCA Exhibition Hall in Radio City, New York.

Like a "World's Fair," this is a place where you can watch, and even operate, many recent developments of RCA Laboratories. Television, radio, loran, the electron microscope, and other scientific achievements . . . you'll find them "on show," and thrilling to see.

For instance: step on a platform and televise yourself, see yourself in action on a television screen. Watch radio waves heat steel red-hot in a jiffy. Hear new RCA-Victor recordings. Take home a souvenir message from globe-encircling RCA Communications – see Radiomarine's radar and how the NBC Network operates to bring its "Parade of Stars" to your home.

Conveniently located in the heart of Radio City—at 40 West 49th Street—RCA Exhibition Hall is open 11 a. m. to 9 p. m. daily. Everyone is welcome, there is no admission charge. *Radio Corporation of America, RCA Building, Radio City, New York 20, N. Y.*



RCA Laboratories, Princeton, N. J., a great research center, and "birthplace" of many of the radio-electronic achievements shown at RCA Exhibition Hall. Research conducted here is reflected in the fine quality in any product bearing the names **RCA**, or **RCA Victor**.

RCA

RADIO CORPORATION of AMERICA

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

VOLUME 7 NUMBER 2 JANUARY 1948

COVER

As television receivers roll
off production lines in in-
creasing numbers, more and
more family groups are
added to those who already
rely upon television pro-
grams as an important
source of home entertain-
ment.

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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*

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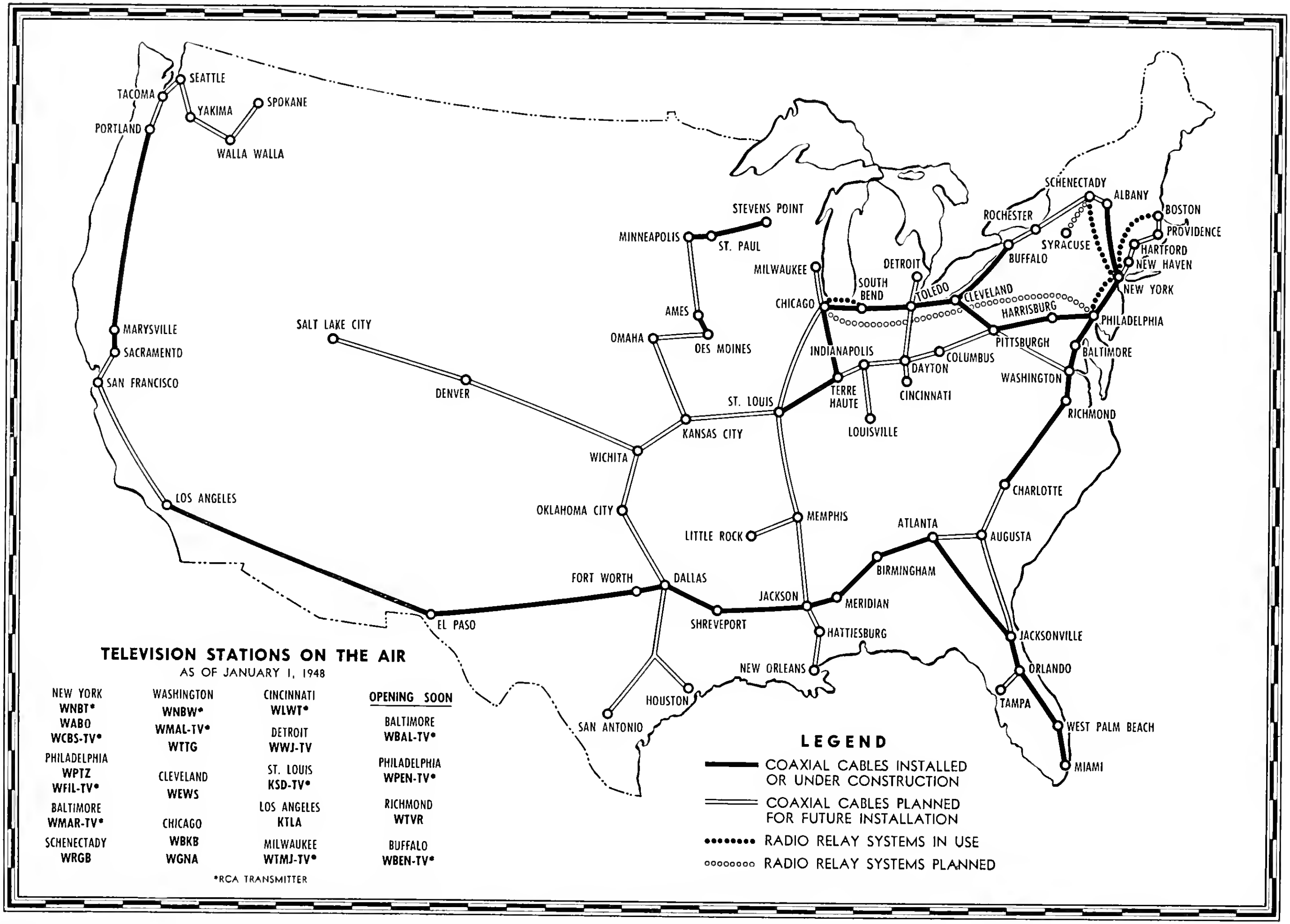


PRESENT AND PROPOSED TELEVISION NETWORKS OF RADIO RELAYS AND COAXIAL CABLES.

Radio Review... and a 1948 Preview

Television: A Fast Growing New Industry In The United States — Its Increasing Influence Becomes a Major Economic And Social Force.

by DAVID SARNOFF
President and Chairman of the Board Radio Corporation of America

TELEVISION, a fast growing new industry in the United States, is the spearhead of radio progress. So strong will be television's impact as a major economic and social force in 1948, that I believe it will make this new year one of the greatest in the history of radio, as a science, an art and an industry.

Scientifically, television reached a stage of development in 1947 where it provides highly satisfactory results. Favored by the American competitive system of private initiative and free enterprise, television in the United States leads the world in every phase of its development.

Industrially, television in 1947 established a firm base for accelerated manufacturing activities, and in the coming year production should expand substantially.

Economically, television—in addition to its importance in manufacturing and employment — is introducing new methods of merchandising and marketing. It is an advertising medium with an unparalleled appeal to a daily increasing audience.

Culturally, television is creating new art forms for the presentation of entertainment, education and news. Its possibilities in these fields are unlimited.

Progressive radio men — scientists, industrialists and broadcasters alike—now think in terms of both sound-and-sight; they plan in sound-and-sight. Television charts their future—it will be the dominant factor in the Radio of Tomorrow.

Political Conventions to be Telecast

The Republican and Democratic National Conventions and the presidential campaign in 1948 will be outstanding events on the air—in both sound and sight. The largest number of broadcasting stations ever assembled to cover national conventions will be linked with the microphones in Philadelphia where ace news commentators will be on duty to describe the proceedings for listeners around the world.

Television was one of the main reasons why Philadelphia, with three video stations capable of being linked by coaxial cable and radio relays with other cities for network operation, was chosen as the site of these political conclaves. Millions of people along the Atlantic Seaboard from the Potomac to the Adirondacks and New England, will be within viewing range. Television, as a new means of vote-getting, will go into action on a broad front. Before the polls close on the 1948 presidential election, television will reach substantial areas in at least twenty-one States having more than two-thirds of the national total of electoral votes.

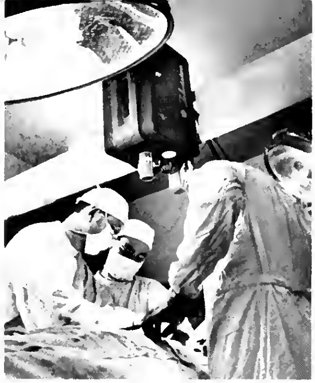
DAVID SARNOFF

Television is likely to do more to revolutionize politics than sound broadcasting did. Political candidates may have to adopt new techniques to benefit from visual radio; their dress, their smiles and gestures, all will be important. How they look, as well as what they say, may determine, to an appreciable extent, their popularity. The eyes of the public will be upon them.

Measuring Television's Growth

Factors creating the promising outlook for television in 1948 include: an increasing number of

TELEVISION PROGRAMS HAVE A UNIVERSAL APPEAL TO ALL MEMBERS OF THE FAMILY, WHATEVER THEIR AGES.



TELEVISION IS HERALDED AS THE "MEDICAL LECTURE HALL OF THE FUTURE", IN WHICH OPERATIONS CAN BE WATCHED AS SURGEONS EXPLAIN TECHNIQUES.

television stations throughout the country; a vastly enlarged audience; the establishment of cable and radio relay facilities linking stations into inter-city networks; the general improvement of programs; increased advertising support; and vigorous competition, as the new industry takes form on a nation-wide scale.

There are now 18 stations on the air with regular television programs. In 1948, it is estimated that there will be approximately 50 television stations in operation; there may be more.

A television network now links Washington, Baltimore, Philadelphia, New York and Schenectady. In November, a radio relay link was opened between Boston and New York, so that programs can be picked up along that route. Congress and the White House, through this television network, can on special occasions be viewed by hundreds of thousands of people throughout the East. Congress was televised for the first time on January 7, 1947, when President Truman addressed a joint session. He again was seen over a seven-station network in the first telecast from the White House on October 5. The World Series of 1947 was another "first" telecast. Such events together with football, basketball, hockey, parades, dramas of the Theatre Guild, and other programs of national interest, emphasize the value of a television receiver in the home.

Between 150,000 and 175,000 television receivers are in use. By the end of 1948, a total of approximately 750,000 is foreseen, and it may reach 1,000,000. By that time, it is estimated that the New York area will have 400,000 sets; figuring six viewers to each receiver, the New York audience will be about 2,400,000.

Based upon the progress to date, within a year television measured in consumer prices will approach the status of a $500,000,000-a-year industry, and it will grow in size with the years. For the first two years of commercial television — 1947 and 1948 — it is estimated that the American public will spend approximately four times as much for television receivers as it did for broadcast receivers during the first two years of sound broadcasting — 1921 and 1922.

Television is built upon the deep and firm foundations of sound broadcasting, which gradually will be fused with sight. It will be supported by advertising. Already those who have a television set in the home are responding to its tremendous appeal and to the service which it offers in entertainment, news and education. In ever-increasing numbers, people sitting comfortably at home are becoming eye-witnesses to news as it happens, to history as it is made. For example, the first royal wedding ever to be broadcast also was televised when Princess Elizabeth and Lieutenant Philip Mountbatten, Duke of Edinburgh, were wed on November 20. Throughout the London area, the event was telecast, and the films, flown across the Atlantic, were televised the next day in New York.

New Uses of Television

Opportunities for television extend into many fields aside from the home. It has tremendous educational possibilities in the school as well as for home extension courses. It brings the radio teacher into view, permits the use of demonstrations and illustrations, and gives the blackboard a new dimension.

Theater television too has great potentialities because it adds timeliness and heightens dramatic appeal. Several demonstrations of its effectiveness were made during 1947. Warner Bros. Pictures Inc., and Twentieth Century-Fox Film Corporation are cooperating with RCA Victor in a program of research to study the development and uses of large-screen television for the motion picture industry.

Industrial television is a field in which electronic "eyes" can aid in processes and production. Wherever sight is needed, or wherever the eye plays a part in industrial operations, entertainment, news, merchandising or advertising, television is ready to serve. Department store television will facilitate shopping tours as housewives look in and then phone their orders; the air will become a convenient show-window for an unprecedented number of buyers shopping in comfort, regardless of weather or time of day.

Twenty-seven Years of Progress

As television was being enthusiastically welcomed into the family circle, radio sound broadcasting celebrated its 27th year in 1947. More than 36,000,000 American homes are equipped with at least one radio receiver, and many of them have three or four. Five million automobiles carry radios and millions of portable sets are in use. Conservative estimates place the total of receiving sets in the United States at more than 65,000,000.

New broadcasting stations placed

PEOPLE AT HOME ARE BECOMING EYE-WITNESSES TO NEWS AS IT HAPPENS, TO POLITICS AS PRACTICED, TO SPORTS AS PLAYED, AND TO HISTORY AS IT IS MADE.

in service since V-J Day bring the total to well over 1,700, or almost twice the number in operation before the war. Construction permits and pending applications would raise the total above 2,000.

FM (frequency modulation) continues to demonstrate its value to the public and to the radio industry. Operating in the higher frequencies of the radio spectrum, FM is noted for its excellent tonal quality and offers comparative freedom from static and other interference.

More than 300 FM transmitters have gone on the air since World War II, and 700 construction permits have been issued or await action by the Federal Communications Commission. Further, FM has been adopted as the standard method of transmission and reception of the sound in television.

Industry-wide progress in FM broadcasting, however, has been slowed perceptibly by restrictions which forbid musical programs now broadcast by standard stations and networks to be transmitted simultaneously over FM stations. It is hoped that these restrictions may soon be removed. FM will then move ahead more rapidly.

New Records in Production

It is estimated that in 1947, more than 16,000,000 radio receivers and 185,000,000 electron tubes were manufactured by the radio industry as a whole, while the allied phonograph industry turned out millions of disks.

RCA EXHIBITION HALL, 36 WEST 49TH STREET IN RADIO CITY, NEW YORK, IS A MODERN "WORLD'S FAIR" OF RADIO.

TELEVISED DRAMAS, PLAYED BY STARS OF THE BROADWAY STAGE, BRING THE THEATRE DIRECT TO THE HOME.

These statistics, revealing new records in production, illustrate the tremendous industrial and commercial activities which thrive upon sound alone, providing employment to hundreds of thousands of persons and information as well as entertainment to all America. Now, with sight added to sound, the potentialities of radio service to the public are greatly multiplied.

International radio - telegraphy also has continued its advance. During 1947, many wartime developments were harnessed to commercial service with the result that world-wide radio is now rapidly becoming mechanized to handle traffic at increased speeds. Space pulses with radiograms and voices every hour of the day and night. So effectively does radio span the hemispheres that recently chess champions in New York played with experts in the Argentine, and at no time did it take longer than 21 seconds for the moves of each player to be known across the 5,400 miles. Again mindful of sound-and-sight, those present who watched the games looked ahead to the day when such contests would be played by television, the teams seeing each other and watching every move as clearly as if facing each other across the chessboard, rather than across the equatorial belt.

Another important advance is that of radar, which is proving highly effective in peace as a new aid to navigation. Shipboard radar apparatus is now being built on a production line basis. Radar is in service on vessels in the Atlantic, the Pacific and the Great Lakes, as well as on America's inland waterways.

Progress likewise has been made in perfecting the RCA air navigation and traffic control system known as teleran. Employing radar and television techniques, the complete teleran system will be demonstrated in operational flight tests conducted by the U. S. Army Air Forces at Washington, D. C., in the near future.

Meeting the Challenge of Speed

Ultrafax, a combination of television, radio relay and photography, represents another revolutionary advance in communications. Developed in RCA Laboratories, ultrafax can handle documents, letters, printed pages and messages at the rate of a million words a minute. It can transmit photographs, maps, and other illustrations at the rate of 30 pages a second. Speed, speed and more speed, is the challenge to electronics!

Through radio and the continued development of electron tubes to perform a myriad of tasks in communications and industry, scientists and engineers are successfully meeting each challenge that leads to new advances.

In radio, pioneering never ends; it continually calls for initiative, faith and exploration in unknown fields. The scientists and research men of the industry who throughout 1947 blazed new trails, true to the traditions of radio, are to be congratulated upon their achievements. Especially to be commended are workers on the production line through whose craftsmanship the finest radio and television apparatus in the world is made available to the American people. Further, through the efforts of manufacturers, engineers and broadcasters it is possible for the radio voice of America to travel afar and bespeak freedom, friendship and peace.

TREND IS TO "MINIATURES"

In Seven Years, Small Tube Performance Has Won Over Larger Counterparts in Television, FM and Other High-Frequency Services

By L. W. Teegarden

Vice President in Charge of Tube Department, RCA Victor Division

A "MINIATURE" revolution has taken place in the tube industry. Beginning in 1939 when the RCA Tube Department developed four "jeep-size" electron tubes for use in a novel "personal" radio, miniature tubes—in size no bigger than a child's thumb—have taken their place beside conventional receiving tubes in many categories of use, have opened up new possibilities in the design of electronic equipment, and are bringing exceptional efficiency to television, FM, and other high-frequency services.

Today, a large portion of the RCA Tube Department's production facilities is assigned to miniatures. In the Tube Department's Design Laboratories about 90 per cent of all new receiving-tube development is on miniatures—the result of insistent demand from designers and manufacturers of electronic equipment.

Fifty-seven miniature tube types, almost all of them RCA developments, are now offered commercially by the Tube Department.

Representing the strongest trend in the tube industry today, miniatures are confidently predicted to be the dominant receiving-tube class of the future.

Miniature tubes are small, rugged, dependable, and have excellent performance characteristics and life. They are manufactured at costs comparable with older types, and promise even lower manufacturing costs. In addition, the miniature structure having short, direct leads and, consequently, low electrical losses is capable of providing efficient performance at the ultra-high frequencies.

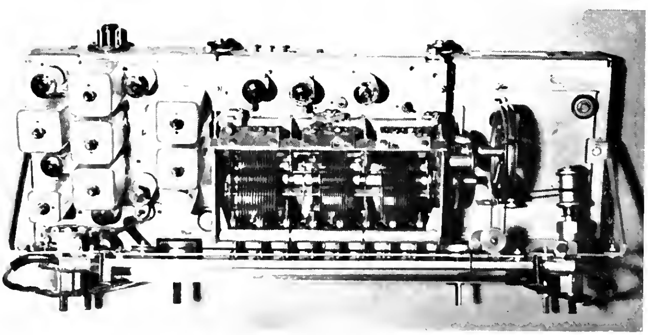
Waste Space in Tubes Eliminated

Miniature tubes owe their small size to a vigorous departure from traditional tube design. First, the size of the glass bulb was greatly reduced to eliminate all waste space inside the bulb. Second, the large phenolic base of conventional tubes was replaced in the miniature by a radically designed, new, glass-button stem with the wire leads from the electrodes inside the bulb extended through the glass-button to form the base pins. Produced by positioning the wire leads in a circle and melting glass rings down around them, the glass-button stem efficiently insulates the leads and forms a perfect seal for the tube.

MINIATURE TUBES MADE POSSIBLE THE COMPACT "PERSONAL" RADIO.

Though originally designed for use in small "personal' radios, miniatures arrived just in time for the greatest war of movement in history. Fifty million of the new small tubes saw service on land, sea, and in the air with every branch of the Armed Forces. The "handie-talkie", and "walkie-talkie'—tiny and efficient receiver-transmitters using miniatures—brought a new mobility to the infantry and paratroops. Miniatures were used in tank transmitters and receivers, in radio-equipped cars and trucks, in gun-directing mechanisms, aviation communication equipment, airborne and ship-borne radar, and guided missiles. Other equipments designed around miniature tubes included beacons which were dropped from aircraft to signal the way to targets and rendevous points, and mines controlled and activated by electronic equipment in warheads.

Subjected to the most gruelling tests and trials imaginable, the new tubes came through with an amazing record. Their remarkable performance is indicated by the experi-



ALL TUBES USED IN POPULAR CRESTWOOD COMBINATION RCA VICTROLA PHONOGRAPH, FM AND AM MODELS ARE MINIATURES.

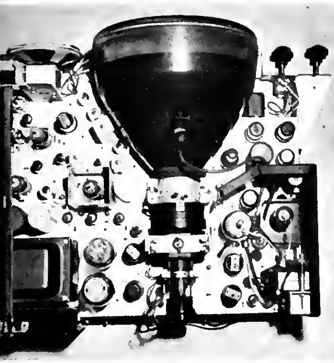
ence of one landing operation when a large number of walkie-talkie equipments saw continuous service for 45 days of combat. Tube failures were less than one tube per 100 sockets for the 45-day period.

With the ending of hostilities, a rosy peacetime future dawned for the miniature tube. A tremendous backlog of demand for new designs in home receivers had been built up, and a mass market eagerly awaited the new FM and television receivers.

In the Design Laboratories of the RCA Tube Department work began, and has since continued, on the development of suitable commercial counterparts of miniatures built for specific wartime equipment. In the two years since the ending of the war, acceptance of miniature tubes has exceeded all expectations as the combination of small size and excellent high-frequency characteristics dovetailed neatly with the requirements of electronics designers and manufacturers.

To the design of compact, portables and table-model radios, miniatures brought a new flexibility and efficiency. The possibilities for this type of receiver are illustrated by the RCA "personal" radio where the use of miniatures requires only one-fifth of the space necessary for the equivalent complement of conventional glass and metal tubes.

In the design of the new radio-phonograph combinations, many featuring FM, and in television receivers, the happy combination of small size and excellent high-frequency performance of miniature tube types has been of major importance. Greater flexibility in the design of AM-FM radio-phonograph combinations, is possible because of the smaller and more compact radio chassis design made possible by miniatures. Because of the extreme versatility of the new small tubes—which are the equal of conventional tubes at standard broadcast frequencies and superior in high-frequency operation—many home combination units use the same miniatures for both the AM and FM bands, permitting savings in receiver costs.



HALF OF THE 30 TUBES IN RCA TABLE MODEL TELEVISION RECEIVER ARE MINIATURES, RESULTING IN INCREASED EFFICIENCY OF OPERATION ON VERY HIGH FREQUENCIES, AND SAVING OF SPACE.

USE OF SMALL TUBES HAS GREATLY REDUCED THE DIMENSIONS OF AUTOMOBILE RADIOS AND IMPROVED THEIR PERFORMANCE IN BOTH PRIVATE CARS AND COMMERCIAL VEHICLES.

In the design of television receivers to operate in the new higher-frequency channels, miniature tubes are particularly suitable for uses such as radio-frequency amplifiers, converters, and oscillators. In addition, because of the large number of tubes required in a television receiver, the use of miniatures makes possible today's compact, table-model video set. One very popular television receiver, for example, uses 15 miniature tubes out of a total of 30.

Miniatures are especially appropriate for use in automobile radios because the small size of the tubes permits more compact and efficient design. For the same reason, and also because of their superior high-frequency performance, miniatures are used in mobile police communications equipment, and in electronic telephone equipment in taxicabs and other vehicles.

Widely Used in Aircraft Service

In aircraft service, miniatures are used in compact and lightweight receivers and transmitters, in navigation aids, altimeters, radar, and control devices.

Miniatures have been finding increasing use in industry. The small size and efficiency of miniature thyratrons, voltage regulators, as well as standard broadcast types of miniature tubes, work to advantage in important industrial applications.

Developed originally in 1939 by the RCA Tube Department to meet the need for small tubes which could be used in a compact, personal radio receiver small enough to be slipped into an overcoat pocket, miniature tubes have gone on to demonstrate a remarkable adaptability to general receiving-tube use. Revolutionary in their effect, miniatures promise higher performance and lower costs for tomorrow's electronic marvels.

CEMENTING CERAMICS INSULATION IN MINIATURE TUBE MANUFACTURE CALLS FOR STEADY HANDS AND KEEN EYESIGHT.

STYLING SELLS SETS

Successful Stylist Is Not the Impractical Dreamer But the Man Whose Ideas Appeal to Critical Eyes of Customers.

By H. M. Rundle,
Industrial Designer, RCA Victor Division.

THERE are many fantastic notions concerning the allegedly dreamy-eyed, fantasy-minded industrial designers whose responsibility it is to put the eye-appeal into merchandise. Actually, styling is hard work and a tough business —and it's just as much business as it is art, for its only justification is to provide the icing that sells the cake. The truly successful stylist is not the one who creates the most furore with his streamlined designs, but the one who, in cold dollars and cents, has increased his company's sales and profits by his work.

The Chinese have a proverb: "One Picture is Worth a Thousand Words!" That in a nutshell is the theme and success of industrial designing, for it is the visual attraction of merchandise that establishes the sales beach-head. The millions upon millions of words poured forth yearly by salesmen and advertising and promotion copy cannot compare with the eloquent sales talk of one well styled radio. It speaks for itself in a language the customer understands. Unless our RCA Victor radios present an eye-luring picture, our customers will never get close enough to the instruments to appreciate their technical and engineering excellence.

Merchandising is Important

Not too many years back, designing was a backrunner in industry, the product's afterthought. Today, however, there is an awakening in industry to the realization that the appearance of merchandising is no less important than the engineering. At one time, in the radio industry, the chassis was completed before any thought was given to the model's styling. And with the chassis components in the same relative positions they had been in for more than twenty years, the stylist had his sketching hand tied behind his back. He had little or no chance of styling anything fresh and different. Today, however, we try to begin with the model's styling and appearance, and there is smooth teamplay between styling and engineering to determine how the component parts can be merged into better looking and more functional radios.

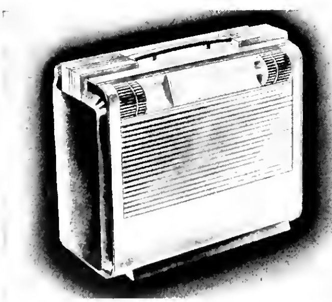
Sales Appeal of Good Design

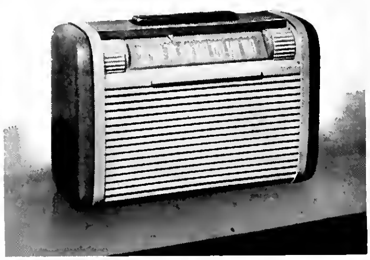
Another factor in earlier days was that there was no full realization of the real merchandising power of good design. Today, styling and product appearance write their own ticket, for they are a vital part of merchandising, and we know today that the public appreciates, wants, and will pay for styling. Mr. and Mrs. Consumer pay for it everyday in the clothes they wear, the cars they buy, their furniture, radios and other commodities.

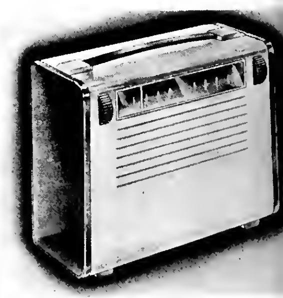
A typical example of this is the RCA Victor Globe Trotter portable. Our experiments with anodyzed aluminum convinced us that we had a strikingly novel medium for a radio set. Its cost was comparable to competitive cloth-covered woodcase merchandise. This RCA aluminum portable was definitely ahead of the market, and we felt that its dress-up justified an appreciably higher price. The Globe Trotter went on the market with our conviction that the buying public would appreciate and pay for its sound, functional good looks. It was a winner from the start, and in actual dollars has brought into the company's treasury more than three times as much as our best pre-war portable.

With radio manufacturers numbering in the hundreds, it is easy to see the important part styling plays in attracting the consumer to any particular manufacturer's mod-

THESE SIX ILLUSTRATIONS REPRESENT SUCCESSIVE STEPS IN STYLING THE POPULAR RCA "GLOBE TROTTER" PORTABLE RADIO. LEFT TO RIGHT: 1) ORIGINAL SKETCH SHOWING ENCLOSED DIAL AND "NO DOOR" IDEA; 2) FIRST COMPLETE MODEL MADE OF WOOD AND COVERED WITH CONVENTIONAL FABRIC; 3) WOOD HAS BEEN







els. Frankly speaking, the average layman does not immediately select his radio instrument on an engineering or technical basis. He is not equipped to do so.

In every major industry, including radio, there is a handful of top manufacturers, each proclaiming in its advertising and promotion, its particular instruments to be the finest in point of engineering. Certainly one has the edge over the others, but RCA Victor's Golden Throat, the Silent Sapphire, Eye Witness Television, and the other engineering miracles, though real and important features, are invisibles that must be demonstrated to establish their superiority. For this reason, the cabinet styling must be the invitation to the customer to test the engineering advantages in order to start the sales ball rolling.

Styling Provides Eye Appeal

That, then, is the object of industrial designing—to find the right ingredients to give a model a striking eye appeal. Artistic taste is a heredity-and-environment intangible. Each of us is influenced by background, upbringing, experiences, and surroundings, and no two tastes are exactly alike. The ingredients for successful styling come with experience and a never-lessening awareness of the constantly changing taste and design patterns.

To give you a picture of the stylist's problems and functions, let us trace step by step the birth of a new instrument to be added to the RCA Victor line. Management and Sales have decided, let us assume, to include a new table model radio in the line, and that information, together with general data as to engineering specifications, price range and so on, are forwarded to the styling department.

Design Must Be New

Starting from scratch, the stylist must come up with something fresh and different. It is not enough to make revisions on already accepted models. Furthermore, it is a complete waste of time to dream up creations so outstandingly different that they attract crowds of startled and perhaps admiring observers but few customers.

Personally, I believe that styling, after furnishing all the vital attributes of good taste, freshness and attractiveness, must also furnish a surprise element. I am convinced that more merchandise is sold on the customer's expressed or mental "Oh's and Ah's" and "My, isn't that smart looking!" than by salesmen's orations on technical advances. When I speak of surprise, I mean it not in the sense of shock, but in the sense of providing the buying public with something just a little bit different and unexpected, as with the "Personal" and "Globe Trotter" portables which start to play immediately when opened.

Model Begins on Sketch Board

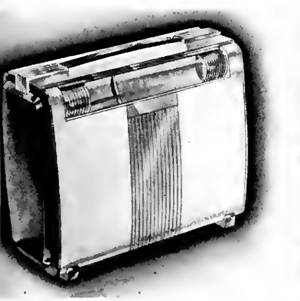
The hypothetical model whose development we started out to trace begins to take shape on the sketch boards, nebulously and doodle-like, with ideas being batted back and forth. Slowly, the doodling gives way to a series of quasi-definite ideas and sketches that finally evolve into finished sketches by the process of elimination and revision. There is no way to estimate the number of rough sketches that may be required before the modified and finished ones evolve. And always, the ideas are channelled by the technical and engineering specifications and the contemplated cost and price range. Normally, we would come up with two to seven variations of the model. These are submitted for consideration and approval to various administrative, sales, and merchandising executives. With their final approval, the sketches are ready for the mock-up or model stage.

First Models Are Complete

Our completely-equipped model shop turns out exact models of the designed cabinets, completely finished, even to the various wood finishes and decorative trim. Every detail must be included to give us a model representing exactly what we have in mind and to let us visualize what the customer will see. These mock-ups are expensive but the cost is paltry beside the returns from a winning model.

When the mock-up is ready, the real tearing-down process begins, for only with the three-dimensional mock-up do the hidden faults and blind spots appear. The model is studied from all angles and tastes, and given a meticulous going over. The changes to be made may be basic and drastic, or minor, but the

REPLACED BY ALUMINUM; 4) REVISED SKETCH WITH ENCLOSED DIAL RESTORED; 5) ACTUAL MODEL OF ALUMINUM PORTABLE SHOWING CHANGE IN SPEAKER LOUVRE, AND, 6) CURRENT VERSION OF "GLOBE TROTTER."



minor ones are no less important. The expression of good taste is a complete picture, with all components merging to form that picture. One small detail may throw the entire model out of balance.

There is no way to average the time that may elapse between the rough sketch board and the production line. Some models are inspired and cover the distance with no obstacles; others take more time. But time is not the important factor in a new model—perfection is. And we do not refer to perfection in the artistic sense alone. Styling is never completely free-handed, for it must always adhere to practical engineering and production requirements. The radio cabinet, for example, plays a vital role in the tone quality of an instrument. RCA Victor's exclusive Golden Throat Tone System is a product of balanced acoustical characteristics in speaker, amplifier and cabinet, each factor designed with the requirements of the other two in mind.

Styling Must Be Practical

Another reason that styling can never be free-handed dreaming is that it also must suit the conveniences of the customer. A cabinet door, for example, might, as a dream creation, swing open in a novel way, but the stylist must consider if it will cost the householder valuable living room space to allow space for that door when open. Nor will a model sell, no matter how strikingly styled, if, let us say, the tuning dials are inconveniently placed, or the hardware is not functionally efficient. Every detail of every exterior item must, of course, contribute to the appearance of the set, or it may become the "sore thumb" that will hinder sales. But equally important, items that are functional, such as knobs, hinges, drawer pulls, and handles, must retain absolute functional efficiency, an essential that can never be sacrificed for styling. Oftimes the design details are as hard to resolve as the main theme of a new model.

Stylists Follow Accepted Taste

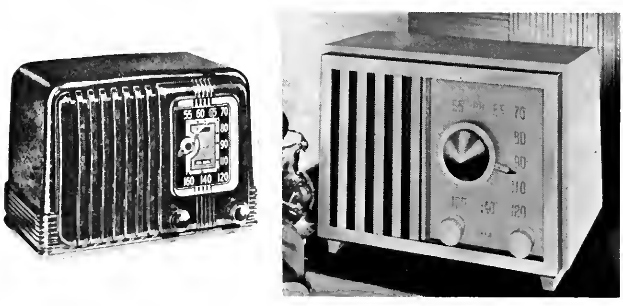
In the creative sense, the stylist is free, limited only by his own imagination and, naturally, the precepts of accepted taste. And in these days of constantly changing fashions, designs and interior decorations, the industrial designer must recognize the direction and set the pace; he cannot lag behind, for the only dated merchandise that will sell are food and antiques.

New style homes and apartments, technical advances producing new and varied materials to work with, exposure of millions of our potential customers to foreign tastes, designs, and patterns during the past war, new finishes, veneers, and bonding materials, and other influences of our ever-changing world, all contribute to present the stylist with a rapidly changing design pattern, with which he must keep pace to create radio merchandise that will be modern, inviting, and easily blended with home design.

No man can put his finger on public taste and know, irrefutably, that he is right. The best a stylist can do is estimate and gauge it to the best of his ability, aided vitally by his alertness to and knowledge of changing taste patterns. One ruthless satisfaction to the stylist in his work is that he does not have long to wait for customer verdicts.

The Chinese have another proverb: "What is good speaks loud; What is bad shouts!"

PRE-WAR TABLE MODEL AND ITS LATEST STYLIZED COUNTERPART, ILLUSTRATING THE TRANSFORMATION ACCOMPLISHED BY IMAGINATIVE STYLING. BOTH CABINETS HOUSE SIMILAR TYPE CHASSIS BUT ELIMINATION OF THE GINGERBREAD LINES, NEW TYPE DIAL AND TUNING NOW HAVE CREATED AN INSTRUMENT OF BEAUTY AND CONSUMER APPEAL.



HEADS INSTITUTES

MAJ. GENERAL GEORGE L. VAN DEUSEN, FORMER CHIEF OF THE ENGINEERING AND TECHNICAL SERVICE, OFFICE OF THE CHIEF SIGNAL OFFICER, AND COMMANDER OF THE EASTERN SIGNAL CORPS TRAINING CENTER AT FORT MONMOUTH, N. J., IS PRESIDENT AND A DIRECTOR OF RCA INSTITUTES, INC., OLDEST RADIO SCHOOL IN AMERICA.

CEREMONIES OPEN NEW BROADCAST FACILITIES

A modern broadcast studio erected in Paris for the convenience of foreign radio and press correspondents in communicating with the United States was opened recently for regular service by Radio France, with RCA Communications, Inc., cooperating in the ceremonies.

Prior to the completion of the new studio, on the Rue Montmartre in Paris, foreign correspondents using the Radio France-RCA program circuits had been limited to the use of the French Government's studios which were not always available on short notice. The Montmartre studio will be accessible 24 hours a day.

INSPECTOR F. A. BURNS EXPLAINS OPERATION OF TWO-WAY FM RADIO SYSTEM TO POLICE COMMISSIONER A. W. WALLANDER (RIGHT) AND OTHERS.

RADIO MESSAGES TO AND FROM PATROL CARS CRUISING THROUGHOUT BROOKLYN ARE HANDLED BY THESE DISPATCHERS AT POLICE HEADQUARTERS.

FM RADIO FOR POLICE

Extensive Two-Way System Installed by RCA in Brooklyn Includes 150 Vehicles which Cover Borough's 120 Square Miles

ONE of the country's most extensive FM two-way police communications systems was inaugurated in Brooklyn last November with New York's Mayor William O'Dwyer pressing the button which formally put into service the main short-wave transmitter at Brooklyn Police Headquarters and a fleet of approximately 150 radio equipped police cars and other department vehicles.

Manufactured and installed by RCA, the new system will increase the efficiency of policing one of America's most congested traffic areas, covering about 120 square miles and populated by more than three million people.

The installation of the station equipment and the design and construction of a special three-position control desk were under the direct supervision of Inspector Francis A. Burns, Acting Superintendent of Telegraph for the Police Department, with the assistance of Captain Wm. J. Kanz and Patrolman Herbert Bennet.

The new police radio station, which has been assigned call letters WRQP, operates on a frequency of 39.58 megacycles. Patrol car transmitters operated on two frequencies: 39.38 megacycles for cars cruising in the eastern portion of Brooklyn, and 37.22 megacycles for those in the western part. Operation on different frequencies permits cars in either section of the Borough to call headquarters at the same time, thereby making it possible for twice as many messages to be transmitted simultaneously by the mobile units as would be possible otherwise.

Three Operators on Duty

To help handle a large volume of messages, the Police Department designed a special despatcher's desk which permits three-position operation. The central position is outfitted as a master monitor control capable of receiving both east and west signals. The control position at the left side of the unit brings in messages from the western section only, while the right-hand position handles only calls from the patrol cars in the eastern section. This type of multiple operation eliminates the possibility of having one frequency unattended.

A self-starting electric clock is built into each control panel. When the control equipment is turned on, an indicator lamp illuminates the clock face. Another indicator lamp illuminates the small station call letter panel when the operating switch is placed in the "talk" position. The call letters are illuminated on all the positions at the same time, informing all operators that the transmitter is in operation and preventing more than one person from transmitting at a time. Each microphone is used with a paracoustic baffle which makes it highly directional, and this in turn helps eliminate most of the extraneous background noises, permitting the speaker's voice to come through very clearly. The microphone is attached to the control desk by a flexible mounting which makes it possible to vary the angle of the instrument to almost any position desired by the operator.

Provision is made in the control desk for making connections to normal telephone lines for receiving and calling through the regular telephone company equipment. The desk is also tied into the police telegraph bureau switchboard, where two additional positions duplicate all the control functions of the new control desk, making it possible to handle radio communications with the mobile police patrol cars from a total of five stations.

The police cars are equipped with RCA mobile 30-watt transmitters.

INSPECTOR BURNS (LEFT), R. A. FURLONG, L. W. SMITH AND AL JOSEPHSEN OF RCA STAND IN FRONT OF 250-WATT FM TRANSMITTER AT BROOKLYN POLICE HEADQUARTERS.

LARGE SCREEN TELEVISION

Pictures of High Quality, 18 by 24 Feet, Projected by Advanced Optical System Developed by RCA Engineers.

COMPLETION and successful testing of an advanced reflective optical system for an experimental large-screen television projector in the laboratories of the RCA Victor Division, brings closer to realization the dream of "theatre" television in which the resulting screen image would equal present-day movies in size and brilliance.

In technical papers presented recently by Ralph V. Little, Jr., and I. G. Maloff, both of the RCA Victor Division, before the 62nd Semi-Annual Convention of the Society of Motion Picture Engineers, it was revealed that a screen image 18 by 24 feet—larger than the average motion picture screen — has been achieved with the new optical system. In addition, a screen highlight brightness meeting the professional motion-picture standards of seven to fourteen foot-lamberts, set by the S.M.P.E., has been realized with the new system. The result is a life-like television picture which in highlight brightness, resolution, and tone gradation faithfully reproduce on the giant screen every picture element represented by the incoming video signal.

Three major elements combine to make up a large screen projection television system. The first is the projection kinescope, or cathode-ray picture tube, which translates the video signal into a pattern of light and shadows on the tube face. The second is the optical system which collects the light rays from the face of the picture tube and directs them to the screen, properly focused, to form an image of the desired size. Third, is the screen on which the picture is seen.

Largest Optical Unit of Its Type

RCA's new projector utilizes a 15-inch cathode-ray picture tube operating at 80,000 volts, and an optical system employing a 42-inch spherical mirror and a 36-inch aspherical correcting lens. This is the largest Schmidt-type optical system in the world with the exception of the 72-inch Schmidt telescope at Mt. Wilson, which is not yet in operation.

The projection distance, or "throw" of the new RCA equipment is 40 feet. Although this is not sufficient to permit mounting of the projector in the theatre's regular projection booth, a throw of this distance enables the relatively compact equipment to be installed in the balcony of some theatres. Ceiling mounts are also possibilities, according to some authorities in the field.

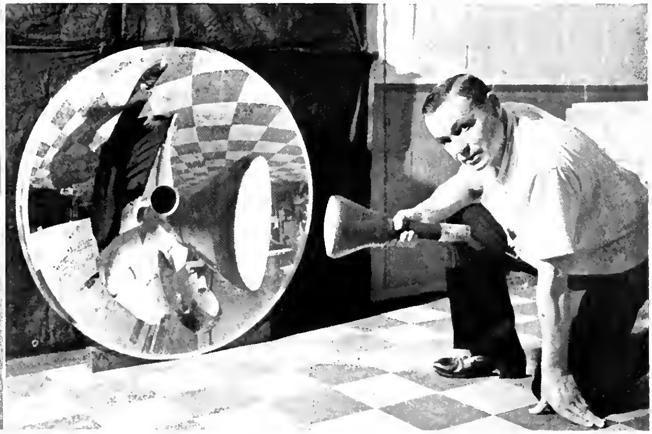
Construction of the large 42-inch mirror for the new optical system, accomplished at the Camden, N. J., plant of the RCA Victor Division, necessitated the development of special machines and new techniques. The 36-inch aspherical correcting lens used in the equipment to overcome optical effects introduced by the spherical mirror, is made of glass—an inherently costly process. However, it is expected that eventually these lenses may be molded from plastics as are the smaller correcting lenses for home projection-television receivers. In addition to costing only a few dollars each, these plastic lenses, which equal the optical properties of glass lenses, offer the added advantage of being practically unbreakable.

At present, the development of large-screen television is a race for ultimate perfection in a mass-entertainment medium that may revolutionize the theatre industry. Thus

LEFT: LARGE-SCREEN TELEVISION PROJECTOR WHICH PRODUCES CLEAR, BRIGHT PICTURES ON A THEATRE-SIZE SCREEN.

ABOVE: THE HIGH-INTENSITY CATHODE RAY TUBE OF THE LARGE-SCREEN PROJECTOR IS INSERTED IN PLACE BY OPENING A DOOR WHICH ALSO ACTS AS THE TUBE SUPPORT.

FRONT OF LARGE SCREEN TELEVISION PROJECTOR SHOWING CATHODE RAY TUBE AND THE 30-INCH SPHERICAL MIRROR IN REAR OF OPENING.



THE MAGNIFYING POWER OF THE SPHERICAL MIRROR IS ILLUSTRATED IN THIS PHOTOGRAPH. I. G. MALOFF, RCA ENGINEER, HOLDS THE HIGH INTENSITY CATHODE RAY TUBE WHICH IS A PART OF THE OPTICAL SYSTEM OF THE THEATRE-TYPE TELEVISION PROJECTOR.

far, most of the major developments in this exciting new field have emanated from RCA plants and laboratories. Already widely demonstrated and hailed for its performance is RCA's experimental "auditorium-type" large-screen television equipment, projecting a 48-square-foot image on a six-by-eight foot screen. Two of the auditorium-type equipments have already been delivered to Warner Brothers and 20th Century Fox, whose engineers are experimenting under joint research contracts with RCA, with a view to adapting the medium to the theatre industry.

Paul J. Larsen, chairman of the S.M.P.E. Committee on Television, has forecast television on theatre screens within two years, providing all elements of the film industry cooperate toward that objective. Other leaders have joined with Mr. Larsen in hailing the new medium as a vital factor in the future of the theatre industry.

EMPLOYEES MAKE DOLLS FOR HOSPITAL PATIENTS

Following an annual custom started nearly ten years ago, girl employees of the Executive Offices of RCA in Radio City dressed dolls, made stuffed animals, and compiled scrap books for presentation this Christmas to the child patients in Bellevue Hospital, New York City.

Miss Elva A. Endres, of the RCA Treasurer's Department, who has been in charge of this activity for several years, reported that 50 employees completed 82 dolls, 14 stuffed animals, 27 scrap books and 24 games for the 1947 holiday. Dr. Lauretta Bender, Senior Psychiatrist on the Bellevue staff, arranged for distribution at the hospital.

RADIOPHOTO STANDARDS

Uniformity in Machines and Methods of Transmission Would Insure Success in International Exchange of Pictures by Radio.

By S. H. Simpson, Jr., and R. E. Hammond

Program Transmission Service RCA Communications, Inc.

STANDARDIZATION seems to be necessary in our modern life. Imagine, for instance, how much nicer a Sunday on the highway would be if automobile bumpers were all the same height; and whoever thought so much argument would arise about fixing the length of women's skirts fourteen inches above the ground! In present day Radiophoto operations, too, standardization is a major objective.

Prior to World War II, RCA operated direct Radiophoto circuits between New York and London, Berlin, Moscow, and Buenos Aires, and from San Francisco to Tokyo. These circuits operated on standards recommended by the Cairo Conference in 1935.

During the war many additional direct Radiophoto circuits were established by commercial companies, foreign administrations and governments, by the U. S. Army, Navy, and the Office of War Information. Wartime urgency and production difficulties forestalled progress in standardization and consequently, many types of Radiophoto machines were pressed into use. These machines performed well on their own networks but not when teamed with each other. Therefore after the war, when these circuits were taken over by commercial companies, they found it necessary to operate with four or five types of machines in order to cooperate with points throughout the world.

Fundamentals of Radiophoto

To operate a worldwide Radiophoto service on an economical and efficient basis, all transmitting and receiving centers must conform to the most desirable standard of operation. With the ever increasing tempo of today's business there is a serious need for adherence to standard methods which permit faster exchange of Radiophotos and which will enable the wire networks of Europe to be tied in directly with those of the United States.

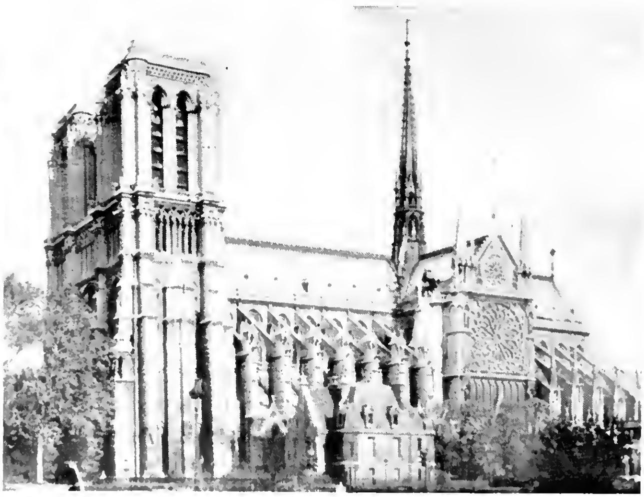
Before the problem of standardization in Radiophoto communications can be understood, it is helpful first to understand something about the fundamentals of picture transmission and also about radio circuits.

Basically, all picture transmission systems operate by breaking down the copy, which is to be transmitted, into small areas for transmission and then, after reception, building up these small areas to form an image of the original. In Radiophoto this is accomplished by mechanical means; in television, which is considerably faster, the process is performed electronically.

In Radiophoto the mechanism consists of a revolving cylinder and a scanner or recorder which traverses on a lead screw across the cylinder, like the tool holder on a lathe. In this manner the subject is scanned in a continuous spiral and the photoelectric cell in the scanner changes the light reflected from the subject into corresponding electrical currents. At the receiving end the same arrangement is used but the scanner is replaced by a pin-point of light which, as it is varied in brightness, exposes a photographic film or paper fastened on the rotating cylinder. One of the

PHOTOGRAPHS SENT BY THE EARLIER RADIOPHOTO SYSTEMS USED THE "VARIABLE DOT" METHOD OF TRANSMISSION, RESULTING IN THE HALF-TONE EFFECT SHOWN BELOW.

TODAY'S IMPROVED RCA RADIOFOTO SYSTEM PRODUCES THE MUCH FINER DETAILS AND GREATLY IMPROVED CONTRAST EVIDENT IN THIS ILLUSTRATION.



PRINCIPAL ELEMENTS OF THE MODERN RADIOPHOTO SYSTEM ARE THE ROTATING CYLINDER, THE LEAD SCREW (CENTER ROD OF THE THREE) AND THE SCANNING OR RECORDING HEAD IN THE BLACK BOX.

accompanying illustrations shows the elements of a Radiophoto machine — the rotating cylinder, the lead screw, and the carriage mounted on the lead screw which carries either a scanning or a recording head, depending on whether the equipment is for sending or receiving.

Once the copy to be transmitted is broken down into varying electrical currents the problem is to convey this intelligence over the radio circuit. In early systems the varying current from the scanner was used to control the length of a series of dots sent out by the transmitter. When the subject scanned was white, the dots were shortened to pin-points, and when the subject was black the dots were elongated until they almost overlapped. This Constant Frequency Variable Dot (CFVD) system, developed by RCA, produced a finished copy similar in appearance to the ordinary halftone used in newspaper reproduction and which, if viewed through a magnifying glass, would appear as a number of small dots of varying weight.

New System Evolved

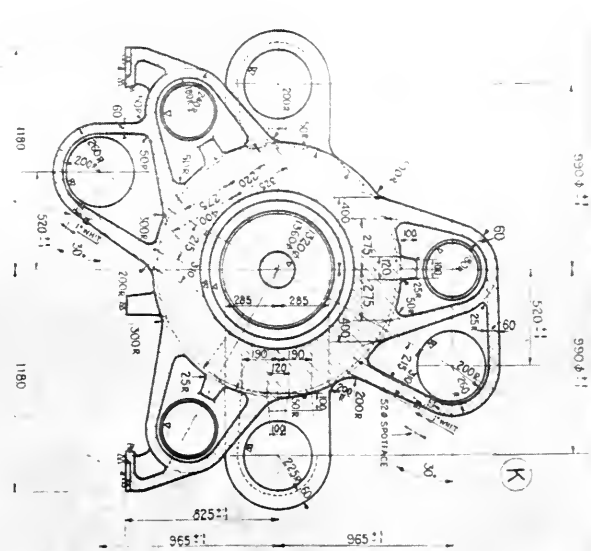
While this system gave fairly good results, there was much to be desired and with the improvement in radiophone circuits, a new system known as Sub-Carrier Frequency Modulation (SCFM) was developed. The operation of this system can be understood if we think of the transmitter as a telephone into which we might whistle tones of various pitch or frequency. When the scanner is on a white portion of the copy being transmitted, a relatively low pitch is being sent out on the radio circuit and when the scanner sees a black portion, the pitch rises. Shades between pure black and white are represented by an intermediate pitch. This varying pitch tone when received at the receiving station is used to control the brightness of the recording lamp focused on the film or paper rotating on the cyinder. The choice of the upper and lower pitch tones representing black and white and referred to as "limits" has been farily well standardized at 1500 cycles per second for white and 2300 for black. The 800-cycle difference is about the same as that used for frequency shift telegraph keying so that ultimately the same equipment can be adapted for both telegraph and Radiophoto transmissions.

One might think that in such a Radiophoto system the speed of handling might be increased by merely increasing the speed of the rotating cylinder. This is true, however, only to a certain extent for there is another factor known as keying speed which is definitely dependent upon the radio circuit. In general the greater the detail or intelligence, the higher the keying speed and the better the quality of the radio circuit required for its transmission.

For analysis we can consider that the picture being transmitted is composed of very small areas or squares, each square equal in width and height to the width of a scanning line or about 1/100 of an inch.

(Continued on page 31)

PRESENT RADIOPHOTO SYSTEMS CAN TRANSMIT AND REPRODUCE ILLUSTRATIONS SUCH AS THIS, RAPIDLY, CLEARLY AND WITHOUT DISTORTION.



SAMUEL RASHEVSKY, U. S. CHESS CHAMPION, STUDIES ONE OF THE MOVES IN THE MATCH WITH ARGENTINA WHICH WON THE GAME FOR HIM IN 34 PLAYS.

CHESS BY RADIO

Teams in New York and Buenos Aires Conduct Contest Over 5,400 Miles Using Automatic Tape-Relay Radio Circuits

MAKING use of a new type of automatic radio-telegraph service arranged by RCA Communications, Inc., chess teams of the United States and Argentina, separated by more than 5,400 miles, participated in an international match in which the moves of players on ten boards were reported back and forth instantaneously.

The match got under way November 7, between players of the Manhattan Chess Club, 100 Central Park South, and an Argentine team sponsored by the La Plata Jockey Club of Argentina, in Buenos Aires.

The event marked the first use in an international chess competition of the RCA technique of automatic teleprinter tape-relays, according to Maj. General H. C. Ingles President of RCA Communications.

He explained that the facilities set up in the Manhattan Chess Club and in the La Plata Jockey Club were capable of handling at least 400 messages an hour in each direction as the play progressed.

In the RCA teleprinter tape-relay system, a message is processed for transmission only once — at the point of origin — and all relays through intermediate offices are accomplished without manual reprocessing. This makes possible the unprecedented speeds of transmission.

At the New York end, messages were relayed from the chess club by teletypewriter to the RCA Communications Central Radio Office on Broad Street, where messages were received on tape for radio transmission directly to Buenos Aires. Picked up there by Transradio Argentina, the messages were automatically reconverted from perforated tape for delivery on a page printer at the La Plata Jockey Club. North-bound messages underwent a similar process.

The American team was headed by Samuel Rashevsky, United States champion, who faced G. Stahlberg, of the Argentine.

Other American players and their Argentine opponents were: I. I. Kashdan vs. M. Najdorf; A. S. Denker vs. Julio Bolbochan; I. A. Horowitz vs. H. Pilnik; A. Kevitz vs. H. Rosetto; A. S. Pinkus vs. C. H. Maderna; M. Pavey vs. Jacobo Bolbochan; G. Kramer vs. P. Michel; G. Shainswit vs. C. E. Guimard, and D. Byrne vs. J. Piazzini. Sidney F. Kenton Vice President of the Manhattan Chess Club, is captain of the American team.

EVERY MOVE OF THE AMERICAN TEAM WAS RELAYED INSTANTLY TO THE ARGENTINE CLUB OVER AN RCA TELEPRINTER TAPE-RELAY SYSTEM STARTING FROM THE MACHINE AT THE LEFT. INCOMING MESSAGES FROM BUENOS AIRES ARRIVED BY SIMILAR MEANS ON THE SECOND TELETYPEWRITER.

Television for Harbor Pilots

Installation Aboard the "New Jersey" is First to be made Permanent on Seagoing Vessel.

THE first permanent television installation on a seagoing vessel has been completed aboard the Pilot Boat *"New Jersey"* which roves the area off Ambrose Light on two-week stretches while serving as floating quarters for New York and New Jersey Harbor pilots assigned to guide incoming and outgoing ships.

The installation, consisting of one of the latest models of RCA Victor home television receivers and a specially constructed antenna, represents a high degree of success in the 50-year efforts of the pilots' organization to offset shipboard isolation and its accompanying monotony.

First came the addition of wireless, which made it possible for the pilots to communicate from ship to shore and with arriving and departing vessels. Then, a few years later, came radio broadcasting. Today, many of the pilots carry their private sets aboard to maintain contact with doing on land.

"Now with television," one of the pilots remarked enthusiastically, "we are able to see as well as hear what's going on."

While awaiting assignments to guide ships in and out of the harbor, it was explained, there are often as many as 35 pilots aboard the pilot boat. They divert themselves with card games, by relating tales of by-gone years and by listening to radio programs. The number aboard fluctuates as pilots of outgoing ships come aboard, and as pilots assigned to arriving vessels join the group.

Pilots Vote for Television Set

Purchase of a television receiver for the smoking lounge aboard the *"New Jersey"* was discussed for several weeks before being put to a vote of the membership of the United New York and New Jersey Pilots Association, according to Captain D. V. Jones, who arranged for the purchase. He said the proposal passed by an overwhelming majority since many of the pilots already had become television enthusiasts by having sets in their homes.

The installation was completed under the supervision of Robert Gray and Joseph Shuskus, of the RCA Service Company, Ford, N. J., after conducing tests in which good signals from the three television stations in New York were picked up aboard the pilot boat while it was cruising in the vicinity of Ambrose Light, some 20 miles from Manhattan.

To solve the problem of changing the ship's direct current power supply to alternating current for which the RCA set was designed, Gray and Shuskus installed a rotary converter. In addition, they made changes in the standard antenna layout to meet the special conditions of the shipboard installation.

The ability of the ship to circle to a 360-degree angle and to maneuver in any direction, it was noted, makes possible the pick-up of uninterrupted television signals from the three stations operating on Manhattan. All are received with equal sharpness.

Success of the installation aboard the *"New Jersey"* has led to speculation as to the eventual addition of television receivers by other craft plying the waters in range of television stations on the Atlantic Seaboard.

SCENE FROM THE TELEVISION VERSION OF "THE LATE GEORGE APLEY", BROADCAST BY WNBT FROM STUDIOS IN RADIO CITY.

NEW WIRE RECORDER PLAYS FOR 30 MINUTES USING CARTRIDGE WHICH SIMPLIFIES THE HANDLING OF THE SPOOLS OF WIRE CARRYING SPEECH OR MUSIC.

RECORDING SOUND ON WIRE

Design of New Instrument for Office and Home Permits Quick Change of Wire Spool and Accurately Controlled Playbacks with Tone of High Quality

A RADICALLY designed, lightweight wire recorder, which for the first time completely eliminates the complicated handling of the wire by utilizing a simple "plug-in" cartridge, is now being marketed by RCA. Not only is the instrument finding extensive use in business offices for many purposes, but also it provides the home with ideal, inexpensive means for recording favorite radio programs, family gatherings or the sounds of the baby's first words.

Housed in a streamlined, black plastic cabinet with disappearing carrying handle, the new recorder weighs less than 25 pounds with cartridge and microphone, and is simple enough to be operated by a youngster. Intended for use in offices, schools, studios, broadcast stations, homes, or wherever record of voices or music is desired, the recorder has only three simple controls, operates from any 110-volt A. C. power source, and reproduces both speech and music with excellent fidelity. An indicator light to show correct recording volume makes possible recordings of a professional quality, regardless of the skill of the user.

The "plug-in" cartridge, outstanding feature of the instrument, records up to half an hour of speech or music on its more than half-a-mile of stainless-steel-covered brass wire, and may be operated to permit immediate playback without tedious rewinding. The "immediate playback" feature of the record is made possible by the unusual design of the cartridge, which contains not one, but two lengths of permanent wire, wound on four spools. Untouched by human hands, the wires wind, unwind, and rewind themselves, permitting the operator to record a speech or musical selection of any length up to 30 minutes, and to return to the exact starting point on the wire for immediate playback.

Has Accurate Timing Device

Another innovation in a low-cost recorder, is a timing device calibrated in minutes and fractions of minutes which permits the user to determine the exact locations of recordings on the wire. This feature eliminates guesswork in finding recordings on the wire and permits several short recordings to be made without the danger of overlapping.

Still another advance in the RCA wire recorder is its automatic "erasing" feature. Without requiring a separate operaticn to "clean" previous material off the wire, the recorder automatically erases previous sounds as a new recording is being made.

Up to this time, a problem in wire recorders has been "wows" or wavering sounds due to the changing rate of speed with which the wire passes over the pickup, a condition created by the changing circumference of the spools as the layers of wire build up or decrease. Discarding the usual "take-up" spool method of driving the wire, RCA has introduced a feature new to low-cost wire recording equipment—an exclusive engineering design that passes the entire length of the wire over the electromagnetic pickup at a constant speed. This virtually eliminates "wows". In addition, by holding the wire firmly against the pickup, the RCA wire drive and cartridge design eliminates wire flutter and holds sliding to a minimum. In quality of sound, the recorder covers the dominant frequency range for music, viz., from 100 to 5000 cycles per second.

Offered as "Complete Package"

The new recorder is being offered as a "complete package", with all equipment for both recording and instantaneous playback included. In addition to the plug-in cartridge, the recorder-reproducer unit contains a three-watt high-gain amplifier, a constant-speed motor to drive the wire, a five-inch permanent-magnet speaker, and an electromagnetic unit. The RCA "Aerodynamic Microphone" which comes with the equipment, is complete with seven feet of cable and a plug for connection to the input jack of the record-reproducer. A connection is also provided for an external speaker for higher quality reproduction of music or for feeding the output of the emplifier to a larger auditorium-type speaker.

The ease of operation and high-fidelity features of the recorder make its usefulness practically unlimited in the educational field. Potential users include teachers of public speaking, speech correction, and foreign languages. Clergymen and other public-speakers will find the device ideal for rehearsing ser-

(Continued on page 31)

Electron Microscope Improved

Advances in Methods and Devices May Open Way to a More Detailed Study of Medical Problems.

IMPROVED methods and devices increasing the effectiveness of the RCA electron microscope as an aid to medical science, and opening the way for a more detailed study of cancer were described by research physicists of the Radio Corporation of America, at the annual meeting of the Electron Society of America, in Philadelphia on December 12.

Dr. James Hillier, of RCA Laboratories, Princeton, N. J., told of the experimental development of a new "double lens" providing an exceptionally high degree of light contrast in the photographing of viruses and internal structure of bacteria at electronic magnifications up to 200,000 times actual size.

"The enhancement of the detailed contrast is so great," said Dr. Hillier, "that information often can be obtained in thick specimens which ordinarily would give only a diffused blur on electron micrographs. As this work continues, it will have important bearing on the whole problem of virus infection, enzyme action and, for that matter, even the study of cancer."

In a paper presented jointly by Dr. Hillier and S. G. Ellis, also a member of the research staff of RCA Laboratories, the scientists reported development of what they described as a high magnification viewer and a deflection focusing system.

Magnifies Up to 300,000 Times

The viewer makes possible direct observations of electron microscope images at magnifications from 200,000 to 300,000 times the dimensions of specimens. It was explained that this high magnification gives the operator the opportunity to detect defects which might ultimately spoil the micrograph. Such things as broken membranes or other flaws in the specimen can thus be seen for the first time with this device.

The simplicity of the new deflection focusing system was emphasized by comparing it to a range-finder employed in a conventional camera. The electron microscope specimen is alternately illuminated from two directions with a result that if the instrument is out of focus the final image appears doubled; the two images being displaced in proportion to the amount that the instrument is out of focus. Thus, to focus with this system the operator merely adjusts the focusing control until the two images are accurately super-imposed.

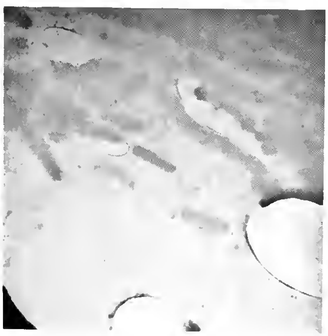
This new method of focusing, it was explained, facilitates the operation to such an extent that even an inexperienced operator can obtain good images. Coupled with the high magnification viewer, this system is said to virtually eliminate the possibility of a poor image.

A further improvement in techniques was disclosed in a paper presented by Dr. Hillier in conjunction with E. G. Ramberg. This employs what is described as "dark field illumination" providing a high degree of contrast through which it may be possible to see fine structures in viruses and molecules which by conventional methods appear only in outline.

The scientists reported that the dark field images are obtained by using scattered electrons from the image, rather than a direct electron beam which is prevented from reaching the image by the use of diaphrams. It was disclosed that an RCA microanalyzer is used in this work to measure with complete accuracy the velocity of electrons leaving the specimen.

MAGNIFICATIONS UP TO 300,000 TIMES THE ACTUAL SIZE OF SPECIMENS ARE NOW POSSIBLE WITH THE ELECTRON MICROSCOPE (LEFT).

MICROGRAPH OF BACTERIA AS THEY APPEAR IN LOW CONTRAST WHEN VIEWED THROUGH CONVENTIONAL LENS OF THE ELECTRON MICROSCOPE.



SAME AREA OF BACTERIA AS OBSERVED WITH NEW EXPERIMENTAL DOUBLE LENS UNDER DEVELOPMENT BY DR. HILLIER.

Television Finds Its Public

In a Brief Time, Receivers Have Become Established as the Prime Source of Entertainment, Not Only in Homes, but in Hotels, Youth Centers and Church Recreation Halls.

By Dan Halpin
Television Receiver Sales Manager
RCA Victor Division

ON Nov. 3, 1946, RCA Victor's first postwar television receivers were placed on sale.

This single event was the culmination of years of research and development. Most immediately behind it was a postwar year of fact-gathering and planning. Comprehensive surveys had been made. The public's taste, buying power, and eagerness for television were studied, and then decisions were made. The various units — design, engineering, manufacture, field test, merchandising, promotion — rolled into action. And when the production lines were turning out receivers and franchised dealers had samples, then the curtain was drawn on T-Day and RCA Victor television receivers were on the market.

It was only a matter of weeks before television's public began to take positive shape. Our predictions were confirmed then that the television receiver purchaser was not confined to the well-to-do who could afford it as a "novelty". Middle-class families took to television just as enthusiastically. With the introduction of lower-priced receivers, the home market broadened into an even wider income range.

The taverns, as had been indicated before the war, accepted television instantaneously, making programs available to another large segment of the public. Here was a low-cost extra attraction to offer customers, a means of bringing them sporting events and other entertainment. Hardly did a new television market area open before the entire tavern industry in that region was clamoring for television receivers.

Home Sales Unaffected

Some manufacturers veered away from the home television trade to service this market with receivers especially designed for such public places. RCA Victor maintained its policy of selling television receivers to all comers, without favor. Recognizing the American home as the largest market of all, this pioneer organization in television did not modify its receiver designs from those salable to and suiting the home or a home-like atmosphere. Yet, because of the brilliance and stability of images shown on our television receivers, a suprisingly large volume of the tavern television trade naturally accrued to RCA. With the introduction of the big-screen (20 x 15 inches) console Model 648PTK, it became apparent that an even larger percentage of new club, hotel, restaurant and tavern business would be obtained by our company.

One of the important considerations which influenced the television receiver prospect—home or tavern—to choose RCA Victor was the company's dramatic departure from tradition—a courageous merchandising innovation—the RCA Victor Television Owner's Policy. Under this policy, the standard antenna and accessories were supplied and both antenna and receiver were installed by factory-trained technicians. They had to be right; they had to give satisfactory performance. A full year's service and maintenance of the receiver was also included in the nominal, flat fee charged according to the model purchased. Should the picture tube or any other part of the receiver require replacement during the year, this, too, was covered by the policy without additional cost to the customer. With such assurance, even the most skeptical could select an RCA Victor television receiver with confidence; the busiest of public places was assured that it could have RCA service when and if necessary.

As the market began to take shape, a new and particularly grati-

SOCIAL CENTERS WERE QUICK TO RECOGNIZE THE VALUE OF TELEVISION SETS IN SUPPLYING A VARIETY OF EDUCATIONAL AND ENTERTAINMENT PROGRAMS.

CLEVELAND RADIO DEALERS ATTEND A DEMONSTRATION OF NEW RCA VICTOR TELEVISION RECEIVERS.

fying development appeared. Charitable, public welfare, civic, church, and veterans' organizations began to phone dealers and distributors, requesting information about television receivers. If this form of entertainment could attract such large masses to the taverns, they reasoned, why should it not work out to the same degree with boys' clubs, fraternal halls, parish halls, churches and synagogues, and other meeting places?

Developed Like Avalanche

Once it began, the idea developed into an avalanche. Veterans' organizations and religious, social, and civic groups were soon supplying hospital wards and sanitariums with television receivers to relieve the monotony of hospital life. Attendance at youth centers and boys' clubs, established to direct young people's energies into worthwhile activities, began to increase as these institutions installed television sets on which could be seen clean sports, decent entertainment, informative educational programs, and a variety of other fare designed to win audiences.

Greater attendance at parish houses and clubs followed installation of receivers. Fifty Philadelphia fire houses installed television. Many religious, charitable, and civic groups found that raffling off television receivers attracted as many quarters as raffling off automobiles —and at smaller investments.

In Red Bank, N. J., ten receivers were placed in local boys' clubs by the Rotary Club. The First Methodist Church of Camden was presented a table model receiver by a parishioner so that the young people could see television in that wholesome atmosphere. Many parish houses and even convents are having television sets installed.

Educational institutions, too, are becoming an active part of the television public. Recently we explored the use of television in educational institutions in cooperation with Notre Dame University, supplying receivers for use in conjunction with the transmitting facilities of television station WBKB, in Chicago. Following this study, Rev. Archibald McDowell, C.S.C., moderator of the Notre Dame Radio Club, released a very enthusiastic statement.

Television in Classroom

"Television can prove particularly effective in conveying visual information of a not-easily-repeated nature to numerous classes at once," he said. "This could apply, for example, when one particularly well informed guest lecturer in a popular subject is available and his material requires visual support for proper presentation. It could also be used for expensive laboratory demonstrations and explanations, or where the demonstration equipment is delicate. Television as a regular tool of the classroom could assure greater uniformity in teaching and testing students and prove particularly valuable in guiding students in laboratory work."

Father McDowell also predicted that television might be used as a

DOCTORS ATTENDING CONGRESS OF THE COLLEGE OF SURGEONS, WATCH AN OPERATION ON A TELEVISION SCREEN.

teaching instrument in reaching isolated audiences such as students confined to hospitals and groups in adult education centers and university extension courses. "Television as an educational and, hence, social force, cannot be overestimated," he concluded.

Television will eventually find its strength as an educational tool through pioneer explorations of this sort. But even today it is proving useful to schools through its normal intermingling of public service, educational, entertainment, and commercial programs. A school in Gloucester, N. J., installed an RCA Victor television receiver and told the pupils that those with the best marks and conduct each week would be invited to see the big football games. Who knows but that it may eventually replace the dunce cap and the rod as a means of stimulating good conduct in the little red schoolhouse!

Business establishments other than taverns have also been alert to the appeal of television and quick to take advantage of it.

Hotels Recognized Value Early

Hotels were among the early organizations to recognize the drawing power of television. The Statler chain, including the Pennsylvania Hotel in New York City, the New Yorker, also in New York, and dozens of others installed RCA receivers on their premises, with television sets going into club rooms and bars, restaurants, and even private suites. Guests registering at these hotels may request television equipped suites—and many do. Extra outlets were installed so that receivers could be moved from one location to another. Soon the hotels were advertising this extra service extensively through media reaching their most discriminating guests.

Country clubs and private clubs, likewise, have taken to television as an entertainment feature for members and as a means of stimulating interest in their cocktail lounges and main club rooms, with such service in many cases demanded by members.

Industrial plants are finding television a means of entertaining employees and visitors. That it has value as a public relations tool was dramatically demonstrated recently when retailers in a mid-western city refused to handle a food product which had been forced to increase its prices. The manufacturer sponsored the televising of a series of major local sporting events, and its sales representatives invited the recalcitrant retailers to visit their main plant and see the television programs on receivers installed there. The retailers and their families accepted the manufacturer's hospitality, met the company executives, toured the plant, saw the games, ate peanuts and crackerjacks and drank soda pop—and developed such good will toward the supplier that the buyers' strike was promptly terminated.

Television Placates Customers

A Chicago currency exchange found that customers waiting to cash checks or pay utility bills were more numerous than it could handle promptly without installing another cashier window. Customers grew impatient and left. Considerable business was lost. After putting in a television receiver, the currency exchange found the customers actually reluctant to leave.

Last July, with postwar television eight months old, a check-up was made to determine the percentage of our receivers going into verious types of "commercial" installations. We found that the national average then was 81.3 percent in private homes; 18.7 in public places. Local variations, however, were great. In Albany, 67.7 percent were in public places; in Brooklyn, despite what you may have heard about that much maligned borough, all but a mere 3.2 percent were in private homes. Since then, of course, as the number of receivers sold has increased, the percentage going into private residences has increased in proportion.

Television has found its public in homes, public places, hospitals, youth and adult social centers, business establishments, hotels, and churches. It has found its public and is serving that public well. And television's public, particularly that important segment reached through commercial-type installations, is repaying television for its service by stimulating a constantly widening circle of enthusiasts to bring the medium into their own homes.

Stuart Wm. Seeley

I.R.E. Award to Seeley For His Work in FM

Five RCA Engineers Elected to Fellowships in the Institute.

For his development "of ingenious circuits related to frequency modulation," Stuart Wm. Seeley, Manager of the RCA Industry Service Laboratory, has been named by the Board of Directors of the Institute of Radio Engineers to receive the Morris Liebman Memorial Prize for 1948. The Prize, which comprises the income from a donation by E. J. Simon, a Fellow of the Institute, in memory of Colonel Morris N. Liebman, who was killed in World War I, will be awarded Mr. Seeley at the annual I.R.E. banquet on March 24.

In making this announcement, the Board of Directors also revealed the names of five engineers associated with various divisions of the Radio Corporation of America who have been elected to Fellowships in the Institute. They are: J. B. Coleman, RCA Victor Division, Camden, N. J.; E. W. Herold and Dr. Albert Rose of RCA Laboratories, Princeton, N. J.; N. E. Lindenblad, RCA Laboratories, Port Jefferson, N. Y., and Robert E. Shelby, National Broadcasting Company, New York.

RCA AWARDS FELLOWSHIPS

Five Graduate Students Named By Education Committee to Receive Grants for 1947-1948

By F. H. Kirkpatrick
Educational Counselor
Radio Corporation of America

COLLEGES and universities, no longer afraid of science and the scientific method, have become the great centers for original research and investigation. They are all concerned with extending the experimental method. In spite of crowded conditions, inadequate equipment, and many other difficulties which beset our educational institutions, they hold the bright promise in terms of new developments and frontier studies in every science. Their graduates and research scholars represent the foundation stones upon which great scientific industries must rest. The unique strength of the colleges and universities is that they bring together the keenest and most competent of the young generation under circumstances which stimulate creative effort.

For the purpose of encouraging training of promising young students in American universities, particularly in the fields of radio and electronics, the Radio Corporation of America has made available a number of fellowships and scholarships. These were established by action of the Board of Directors, and the adminstration of the program was put in the hands of the RCA Education Committee. This Committee works under the chairmanship of Dr. James R. Angell, President Emeritus of Yale University, now Public Service Counselor of the National Broadcasting Company.

The National Research Council administers RCA Fellowships under grants made by RCA. The grants run from $1,600 to $2,100 — the exact amount being determined by the RCA Fellowship Board — for graduate work in electronics during the academic year. Added grants of not more than $600 for tuition, apparatus or extra expenses might be made to the institution where the Fellow works.

Five RCA Fellowships were awarded for the academic year of 1947-1948, and the following men are now in graduate study working toward the doctorate:

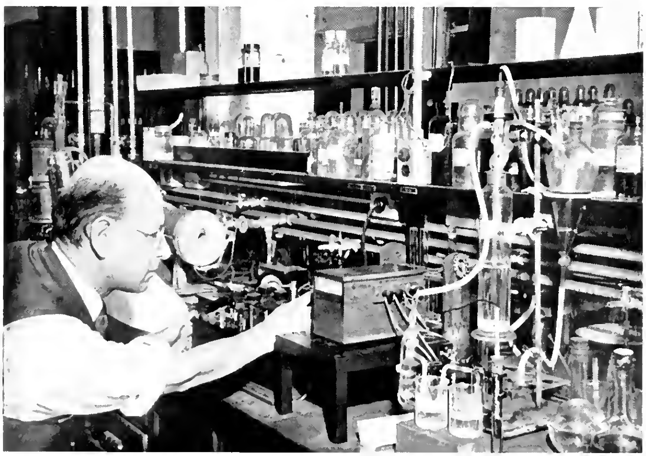
Arnold S. Epstein, B. S. in electrical engineering, Lehigh University: for continuation of graduate study at the University of Pennsylvania with special reference to selenium and other rectifiers as variable capacitors.

Willis W. Harman, B. S. in electrical engineering, University of Washington: for continuation of graduate study at Stanford University with special reference to the use of microwaves in certain cavity oscillators.

Arnold R. Moore, B. S. in chemistry, Polytechnic Institute of Brooklyn: for continuation of graduate study at Cornell University with special reference to electronic properties of semi-conductors.

Sol Raboy, A. B. in physics, Brooklyn College: for continuation of graduate study at Carnegie Institute of Technology with special reference to the properties of

COLLEGES AND UNIVERSITIES ARE GREAT CENTERS FOR ORIGINAL RESEARCH AND INVESTIGATION.



RCA FELLOWSHIPS HELP PROMISING YOUNG SCIENTISTS TO PREPARE FOR THEIR LIFE-ROLES AS RESEARCH SPECIALISTS IN RADIO-ELECTRONICS.

semi-conductors and their use as crystal counters.

H. Gunther Rudenberg, S. B. and M. A. in physics, Harvard University: for continuation of graduate study at Harvard University with special reference to operation and design of wide-band pulse amplifiers.

It is the purpose of RCA Fellowships to give special graduate training and experience to young men and women who have demonstrated marked ability in the general field of electronics, either as a branch of electrical engineering or as a part of the general field of physics. To be eligible, applicants must be citizens of the United States and must present evidence of skill and ability to do advanced work in electronics. Before beginning tenure on a Fellowship, they must have completed one year of graduate work in a university of recognized standing.

Study Electronic Problems

RCA Fellows are expected to continue work on scientific problems related to electronics, but the RCA Followship Board will consider applicants who wish to supplement mastery in one field by developing competence in a related field. Fellowships are awarded for study and research in this country, and the institution in which the Fellow works must be approved by the RCA Fellowship Board.

Members of the RCA Fellowship Board, appointed by the National Research Council, are:

F. E. Terman, Stanford University
L. P. Smith, Cornell University
Carl C. Chambers, University of Pennsylvania
W. G. Dow, University of Michigan
I. I. Rabi, Columbia University
R. C. Gibbs, National Research Council
F. M. Feiker, National Research Council

In addition to the young men selected under the sponsorship of the National Research Council, employees of all divisions of RCA are eligible for fellowship awards. An award was made this year to Mr. Harry J. Woll of the RCA Victor Division. Mr. Woll is doing advanced graduate study at the University of Pennsylvania and also plans to work for the doctorate.

RCA Scholarships were established for undergraduates in July, 1945. According to provisions governing the awards, a number of these scholarships are available for each academic year. Those eligible will include all students enrolled at colleges or universities specifically designated by the RCA Education Committee. Undergraduates in the field of the pure sciences, or in various branches of engineering, especially electrical, radio, and electronic engineering, are considered eligible as appointees.

Scholars in Nine Universities

Right now there are RCA Scholars in nine universities with their special interests centered upon a scientific career. These young men were selected by deans and faculty committees at their respective institutions on the basis of intellectual ability, academic achievement and scientific interest. They are:

John R. B. Whittlesey, at California Institute of Technology
John O. Kessler, at Columbia University
Francis F. Chen, at Harvard College
George C. Sponsler, at Princeton University
Ivan H. Sublette, at Purdue University
Nicholas L. Scheuer, at University of Minnesota
Myron E. Ferguson, at University of Washington
M. Berwyn Knight, at University of Wisconsin
Richard H. Genoud, at Yale University

RCA INCREASES COMMON DIVIDEND

At the conclusion of the regular meeting of the Board of Directors of the Radio Corporation of America held December 5 in New York, David Sarnoff, President and Chairman of the Board, announced that the following dividends had been declared:

On the outstanding shares of Common Stock, 30 cents per share, payable in cash on January 27, 1948, to holders of record of such stock at the close of business December 19, 1947. The previous dividend on the Common Stock has been 20 cents per share.

On the outstanding shares of First Preferred Stock, 87½ cents per share, for the period from October 1, 1947 to December 31, 1947, payable in cash on January 2, 1948, to holders of record of such stock at the close of business December 15, 1947.

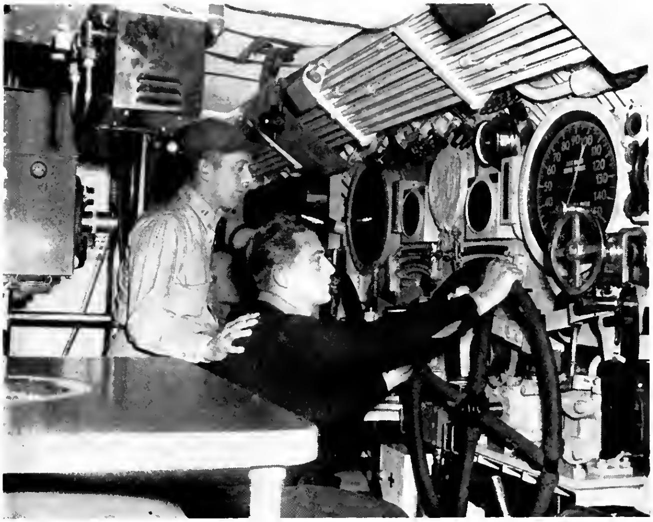
Royal Wedding Films On Air in Record Time

A new record in the transatlantic shipment and televising of motion picture films was set by the National Broadcasting Company on November 21 when its television network presented first pictures of the British royal wedding 29 hours after the films were taken. These were the first motion pictures of the wedding to be shown in this country. The previous record was set by NBC when it televised films of London's celebration of Memorial Day only 30 hours after the event occurred.

The wedding films were first televised at 1:10 p.m., on the 21st, a scant hour and 20 minutes after they had arrived by plane at LaGuardia Airport, and only 15 minutes after they were received at the NBC television studios in Radio City. The speed with which they were put on the air was made possible by the fact that they had already been processed for television before they left England. The showing of the films, most of which were made off the face of a television tube in the studios of the British Broadcasting Corporation, lasted 32 minutes.

Shown in the picture were highlights of the wedding celebration, including the colorful procession from Buckingham Palace down the Mall to Westminster Abbey, the recessional of the wedding party inside the Abbey, and the return of the royal couple to the Palace.

Copies of the pictures were made in New York and flown immediately to television stations KSD-TV, St. Louis, and WWJ-TV, Detroit.



THROUGH THIS TELECAST FROM A SUBMERGED SUBMARINE, THOUSANDS OF VIEWERS REALIZED FOR THE FIRST TIME, THE HIGH SKILL REQUIRED IN THE CREWS OF UNDERWATER CRAFT.

NAVY'S USE OF TELEVISION

Pictorial Reports to the Taxpayer and the Recruiting and Training of Personnel Can Be Made More Effective by Video Programs, Eiges Tells Naval Officers.

THROUGH the medium of television, the United States Navy can literally sail its fleets into the American home and give the American taxpayer an intimate, close up look at what his tax money is buying. This was the novel word-picture presented by Sydney H. Eiges, NBC vice president in charge of press, to a group of fifty high-ranking Naval officers enrolled in a public relations indoctrination course, in Washington.

Properly utilized in this and other ways, he added, television could become the most effective public relations tool available to the Navy.

"By television," Eiges said, "the Navy can take the American family into the depths of a battleship or submarine or into the crew quarters of a warplane and display the intricacies of their operation at first hand. By television, the Navy can transport millions of Americans, within the space of minutes, on a far-flung journey to Navy bases, docks, shipyards, hospitals and its other installations. In short, by television the Navy can show the American taxpayer and his legislative representatives what the Navy is, does and needs in a manner more vivid and graphic, more intimate and effective, than that afforded by any other means of communication."

Special Facilities Urged

The NBC executive not only urged the Navy to set up special facilities for the study of television but to do so as quickly as possible, making use of the programming facilities available on television stations currently operating in this country. In this latter connection, he advocated that the Navy avail itself of the services of major advertising agencies now pioneering in television, pointing out that in this way the Navy would benefit from the agencies' technical and creative know-how at minimum and maximum efficiency.

The Navy's own development of sea and air-borne television, which equips roving ships and planes with sensitive electronic eyes, will not only give it a major tactical advantage in future wars, but will enable it to observe and report back to its own personnel, the progress of future battles with the speed of ether waves, Eiges pointed out.

Television to Train Recruits

Further reviewing the Navy's own use of television, he mentioned the atom bomb explosion at Bikini where, through the eyes of television, navy personnel, in perfect safety, watched the explosion at close range. He also commented on the Navy's plans to use television for the training of recruits, and predicted that television appears certain to become one of the most effective means of recruiting additional personnel. Television, he said, will bring recruiting messages into American homes and into places of public assemblage ordinarily not reached in recruiting drives.

By utilizing television as a public relations tool, Eiges pointed out, the Navy could create sympathetic understanding for its aims and ideas, not only in the American home, but also in the halls of Congress when major legislation is pending.

Lancaster Tube Plant To Be Expanded in 1948

Production of television picture tubes at RCA's Lancaster, Pa., plant is to be materially increased through an expansion program involving more than a million dollars. The announcement, made at the year-end by L. W. Teegarden, Vice President in charge of the RCA Tube Department, stated that a large number of automatic tube-making machines would be installed in a new building having an area of 40,000 square feet.

D. Y. Smith, manager of the Lancaster plant, revealed that 1,600 people were employed in tube manufacture at the start of 1948, some of the processes being conducted on a two- and three-shift basis.

ADVENTURES IN MARKETING

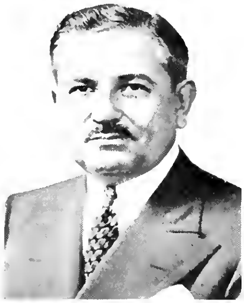
Successful Merchandising Calls for Faith in Products Manufactured, Ability to Produce Acceptable Goods, Frank M. Folsom, Executive Vice President of RCA Victor, Tells Harvard Students.

MARKETING, like so many other forms of human activity, calls for a large measure of faith — faith in the products we manufacture and faith in our ability to produce and sell them at prices the public can afford to pay.

Marketing is no coldly scientific process. Precise formulas and carefully conceived sales methods are helpful, but they do not provide the vision and the energy so vitally necessary to success in modern commerce. That is the contribution of individual leadership.

The human element in marketing is all-important. There is scarcely a successful business in America today that was not founded on the deep, underlying faith of one man, or a small group of men. American business has become great through private enterprise, initiative and freedom.

How this works is vividly illustrated by an episode in the life of David Sarnoff, President and Chairman of the Board of the Radio Corporation of America. As a young man, David Sarnoff worked for the Marconi Wireless Telegraph Company of America. In those days, radio was a new and not altogether certain means of transoceanic communication. In one or two isolated instances, purely as a scientific experiment, music had been transmitted by radio. But no one seemed to visualize the vast and varied services that radio could perform outside the magic of its dots and dashes.



FRANK M. FOLSOM

Executive Vice President in Charge of RCA Victor Division

But David Sarnoff was not an ordinary young worker in a new form of communications. He was enthralled by radio, with a boundless enthusiasm and faith in its future. He was endowed with great vision and a love for work.

The romance of wireless entranced him. Its service in such disasters as the sinking of the steamships *Republic* and the *Titanic* fired his imagination. Presently he saw something in radio far beyond a mere message service. If the invisible waves could carry dots and dashes, why should they not carry spoken words and music? Inspired by this idea, he made an epoch-making suggestion—a proposal that revolutionized radio communications. He wrote a memorandum to officials of the Marconi Wireless Company—and I would like to quote from it, as written in 1916, four years before broadcasting began as a service to the public. Said Mr. Sarnoff:

"I have in mind a plan of development which would make radio a household utility in the same sense as a piano or phonograph. The idea is to bring music into the house by wireless. . . . For example, a radio-telephone transmitter having a range say of 25 to 50 miles can be installed at a fixed point where instrumental or vocal music or both are produced. . . . The receiver can be designed in the form of a simple 'radio music box' and arranged for several different wavelengths, which should be changeable with the throwing of a single switch or pressing of a single button. . . . Purchasers could enjoy concerts, lectures and recitals; baseball scores could be transmitted.

"Should this plan materialize, it would seem reasonable to expect sales of 1,000,000 'radio music boxes' within a period of three years. Roughly estimating the selling price at $75 per set, $75,000,000 can be expected."

TELEVISION RECEIVERS WITH KINESCOPE PICTURE TUBES IN PLACE MOVE DOWN PRODUCTION LINES AT RCA VICTOR ON THEIR WAY TO THE TESTING CHAMBER, THE LAST STOP BEFORE SHIPMENT.

IT WAS EARLY RECOGNIZED THAT THE MASTER KEY TO SUCCESS IN THE PUBLIC ACCEPTANCE OF TELEVISION WOULD BE GOOD PROGRAMS.

David Sarnoff's estimate wasn't nearly as rough as he thought. The Radio Corporation of America was organized in 1919, and broadcasting, which began in the autumn of 1920, expanded like wildfire in 1921. RCA's sale of home radio receivers—from 1922 through 1924—amounted to $83,500,000!

Today, approximately 36 million, or 93 per cent of all homes in the United States have radio sets!

Today, the radio industry—with broadcasting as one of its major activities—contributes substantially more than one billion dollars a year to the national income. In 1946, the industry sold 15,000,000 radio sets and the rate of sales this year is higher.

Value of Research

So much for figures. Now I would like to stress the importance of scientific research. For no matter which field you enter, it is research that will keep your business alive and in step with progress. As a merchandiser, I can tell you from experience that research is the lifeblood of new products and services.

Never resist change or fear obsolescence, for they guarantee progress and improve service. So long as there are scientists, engineers and businessmen, there will be obsolescence. Otherwise, we would still be driving the horse-and-buggy, listening to the zither instead of the phonograph, sailing instead of flying, listening to the radio instead of seeing television. Therefore, welcome obsolescence, for on its mossy stones you can step forward with science, in business and the arts.

Radio a Constant Challenge

The continued flow of new devices, new chemicals, new textiles and new products generally, makes adventures in marketing exciting. In radio, for example, we learn something new every day; it is a constant challenge to brains and to the aggressive spirit. Long after you get your degrees, you will find that you must continue your studies if you are to keep pace with progress.

To give you some concrete examples of marketing activities, let me turn to the RCA Victor Division for some practical views of our operations in merchandising and distribution.

We pick up where scientific research leaves off. Like most other manufacturers, our marketing functions begin with development and product design, then carry on through market research and distribution. Under these broad classifications are grouped such activities as engineering and styling, market surveys and analysis, sales methods and policies.

As an illustration of the importance of product design in marketing, let me tell you of an important change in policy that is having significant results in the sale of radio sets. For many years prior to World War II, it was common practice throughout the radio industry to let the engineers design the chassis of new models and then ask the stylists to create cabinets to fit them. This practice was one of the reasons that put so many unattractive radio receiver cabinets into American homes.

Today, we first style the cabinet and then require the engineers to design a chassis to fit it. This reverse in procedure has resulted in outstanding advances in cabinet design, which, as any salesman knows, makes the job of merchandising that much easier.

RCA Victor is a strong believer in market research, in the benefits to merchandising of market surveys and analyses. But it accepts the results with caution. Faith in a new product can overcome precedents and open the way to new markets, even though it be a case of going where angels fear to tread. As we move along in this talk, I shall tell you about one merchandising achievement in radio that resulted from completely ignoring such a market survey.

Two-Step Distribution

Our organization is a careful student of distribution. It has to be, because of the diversity of its products. It makes use of all the various types of distribution, including direct sales, controlled outlets, factory-to-retailer, and factory-to-distributor-to-retail dealer—everything except mail order methods.

The bulk of our products, which include home radio, television and Victrola radio-phonograph instruments, phonograph records, and radio tubes, is handled by the factory-to-distributor-to-retail dealer method. This we call 2-step distribution. Our engineering products are sold directly to the user. Educational equipment is sold directly to the retail dealer with no intermediaries.

The distributors used by RCA Victor in our 2-step distribution are not merely warehousemen or jobbers. In effect they are factory representatives, and for this reason they get a higher percentage of profits than would be the usual case. All of our distributors are salesmen of the first order. They must be, because radio instruments require specialty selling. The salesman must know his product and be thoroughly familiar with the various ways of competing for the consumer dollar.

You may wonder why we favor 2-step distribution. It is more economical because it makes substantial savings in shipping costs. It relieves the manufacturer of the heavy financial burden of carrying his own inventory. It makes possible more even levels of production, thereby avoiding seasonal layoffs of employees. It does away with the necessity for the manufacturer to operate with a large, unwieldy sales staff, besides other important savings in selling costs.

There are those who argue against such a 2-step use of wholesale and retail outlets because, they say, it increases the cost of manufactured products to the consumer. RCA Victor has proved to itself, however, that this distribution method enables the production and sale of more goods than any other form. Most economists agree that national and even world prosperity are largely dependent upon the ability of manufacturers to produce and sell goods in ever-increasing quantities.

Another Form of Distribution

Another form of distribution—cooperative stores—is often pointed out as being more efficient. It may be in some instances, but I question its long range value. Cooperatives do little advertising. They do not stimulate a demand for goods. They do not promote new products or new services. So we do not believe that they produce the good results for our national economy that have come from more conventional and competitive ways of doing business.

Our company maintains a nationwide distributing organization. With three exceptions, the distributors are independent operators. They do not have an RCA Victor franchise but they have a letter of appointment with a suggested and recommended territory. In accordance with practice in the radio industry, our distributors handle no competitive brands of radio instruments.

To keep a careful check on trends in distributions and to pas new developments on to its independent distributors, RCA Victor operates one wholly-owned distributing company, functioning in three markets —Chicago, Detroit and Kansas City.

The manufacturing time cycles in radio are so long that our merchandise men must plan future activities well in advance. We must be able to foresee what the public will want to buy at least a year ahead. The potential sales of each product must be determined and a sales budget established to guide our manufacturing activities.

A New Exploit in Marketing

One of the greatest marketing exploits in radio occurred in 1940, when a group of RCA Victor merchandising men decided to ignore the results of a survey and market analysis.

As early as 1922, David Sarnoff had instructed the RCA research staff to keep in mind the development of an individual portable radio receiver—one small enough to be carried like a camera. In 1940, the creation of miniature vacuum tubes and batteries, made this possible. Our engineers and designers came up with what is now universally known as the "Personal Radio". Merely lifting the lid causes it to operate; its tone quality is excellent.

But the marketing of this camera-type radio receiver presented new problems. We had to sell at least 25,000 units to amortize the costs of plant tooling, and we had to price the set at approximately $20 retail.

No comparable radio product had ever been sold, so it was decided to run a market survey among dealers. The results were almost completely negative. Dealers agreed that the set was smartly styled, but they said that it "didn't look like $20," and that the public "wouldn't pay that much for it." It had only four tubes, whereas a five-tube table model receiver could be bought for as low as $9.95. As a result of the survey, we were led to believe that most radio dealers, being unaccustomed to this type of product, might not be the best outlets for it.

Merchandisers Held Faith

But the merchandising group at RCA Victor did not lose faith. Here is the way they looked at the "Personal Radio".

It was new and novel.

A demonstration created the desire to own one.

It had a new and smart style, and could be featured in the most fashionable stores. Name personalities would be proud to own and use one, and their name or initials could be engraved upon its jewel-box case.

As a gift item, it was a natural.

It appealed to the impulse buyer.

It was easy to use, convenient to carry.

So the enthusiasm of our merchandising group won!

A comprehensive program of manufacturer, distributor and dealer activity was developed to cover all phases of merchandising with intensive advertising, sales promotion, publicity and initial exploitation in the metropolitan New York market. A careful distribution of sets to radio artists, columnists, and leading stage and screen personalities resulted in an exceptionally fine reception. Lucky owners found themselves demonstrating the sets to their friends and acquaintances at home and in fashionable meeting places. Such ideas as the use of this set in the musical, "Walk with Music", playing on Broadway, resulted in extensive interest and comment. Magazine pictures revealed that one was on the President's desk in Washington.

Backed by a generous advertising budget, including full page advertisement in several New York papers, the sales campaign featured a broad scale tie-up at the New York World's Fair. Remarkably enough, less than half of the original advertising budget allocated for this campaign was used, yet the first 25,000 radios were sold out in the first thirty days. Retailers, who originally turned down the opportunity to buy, jumped on the band-wagon and the rush was on. With such acceptance, the question arose as to the next market to be opened. It appeared that the one additional major field where we could fully capitalize on the initial momentum generated by the New York campaign was Hollywood.

By that time, the early enthusiasm had generated into company-wide interest. RCA Victor executives were photographed in shirt sleeves loading the first freight cars for the Coast. The "red carpet" was out when the sets arrived in the West, and an intensive promotion campaign had been organized, in the best Hollywood manner. With the cooperation of the National Broadcasting Company and Warner Brothers, an exploitation campaign was started with practically every star on the Warner lot using this "Personal Radio" in still photographs for advertising and sales promotion.

Instead of selling only 25,000 "Personal Radios" during two summer months, we sold more than 225,000 in six months. Faith in the product, backed by the imagination and drive engendered by faith, turned the trick.

Television — A Merchandising Example

Now an even better example of modern merchandising can be found in television. Here again, the basic qualities of confidence and belief in an idea were the keys to success. In the late 'Twenties, Dr. V. K. Zworykin, now Vice President and Technical Consultant of RCA Laboratories, had joined the RCA staff of research engineers. One day, he went to David Sarnoff and told him about the iconoscope, or electronic "eye" of television.

Mr. Sarnoff listened intently for half and hour.

"It's too good to be true!" he exclaimed. "What will it cost to develop the idea?"

"Maybe about $100,000," answered Zworykin.

"All right," said Sarnoff. "It's worth it!"

Since that day, many millions of dollars have gone into continual research and technical development of television. Yet there was no advance guarantee that it would be practical for home use. But these two men—Sarnoff and Zworykin—had faith, and today their idea is well on its way to becoming one of America's major industries. I doubt if any new product, or service, has ever been brought out under more difficult circumstances than those that have beset the path of television.

Programs Key to Success

In the first place, the radio industry itself was divided as to the value of television as a new enterprise. Millions of dollars and extensive new facilities were needed, first for engineering research and development and, then, for manufacturing. Finally, as television neared readiness as a service to the public, rigid technical standards were established for its operation. And it was recognized that the master key to success in public acceptance would be good programs.

But these problems were only the beginning. No one had ever tried mass production of television receivers, which are many time more complicated than radio sets. Consumer likes and dislikes were unknown. The price of the first prewar television sets was high—$600—making difficult competition for the consumer dollar.

New sales methods had to be devised. Sales personnel and field service men for television did not exist. They had to be organized and trained. Manufacturers, distributors, and retail dealers had to learn from scratch how to handle this new product.

The broadcasters themselves were divided on the advisability of entering the new field. Relatively few television stations were on the air in the beginning, thus limiting the market for receivers. With few receivers, circulation was small and unattractive to advertisers. So, of necessity, program hours lacked variety and quality.

Nevertheless, television moved ahead in the years immediately preceding the outbreak of war in Europe. RCA, which pioneered the development of television, gained a limited, expensive but highly valuable, experience. Among other things, we learned that this new product required a marketing effort far different from anything in sound radio.

Commercial research on the public's reaction and its willingness to pay for television indicated that extensive expenditures would be necessary to introduce it to the American consumer.

The impact of television on other phases of our business, such as broadcasting, home radios and phonographs, theater-sound recording and equipment business — all presented interesting commercial problems. It was felt, however, that as a new service, television would not displace the motion picture, supplant sound broadcasting, or seriously injure the radio or phonograph record business.

Instead, it presented a new business opportunity requiring courage to overcome obstacles. For example, television as a service to the public was launched originally in 1939 at the opening of the New York World's Fair. Sales of receivers by dealers were slow. Programs were limited and many so-called experts said receivers couldn't be sold. So we sold them.

We supplemented our distributor-dealer activity in the New York market with a group of direct sales specialists, who went out and worked with our dealers. Programs were improved and, in 1940, our factory output was being sold in New York week after week. Advertising and promotion were increased and indications were that television was actually on its way.

War Ended Activities

But with the outbreak of war, our commercial activities in television ceased. However, our prewar television research and development were of extreme value in the war effort. RCA supplied more than 95 per cent of the television equipment used by our armed forces. When the war ended and we were able to resume peacetime operations, we found that our wartime scientific research and development were of great value in furthering the advance of television as a peacetime service to the public.

By November, 1946, our postwar plans were in operation and we soon began delivery of new television receivers to dealers and their customers. Our basic marketing philosophy was two-fold!

First, we determined to build a product so good that the public would be surprised by its quality. Second, we determined to see that our product moved off the dealers' floors into the hands of satisfied customers. Prewar technical and commercial "know-how", though limited, was of priceless value in our planning. We knew that properly made and sold, the public would buy RCA Victor Television.

One major point, however, remained—the natural reservation people might have to the purchase of a new, relatively high-priced radio-electronic instrument for the home. Antenna installation, wiring, service and maintenance had, theretofore, been done solely by dealers and radio service men. Television, as a new service, lacked the manpower to do this job efficiently on a broad scale. Even though we knew there were a few men qualified to do some of this work, we decided to provide a new solution.

Owner's Policy Introduced

The RCA Service Company, which for years has installed, serviced and maintained radio, sound and picture equipment in theaters and radio stations, provided a nucleus of television servicing manpower. Through this company, we developed what is called the RCA Victor Television Owner's Policy, whereby, with each set sold, we supply for a standard fee, the antenna and all necessary accessories, hardware, wire, etc., and install the antenna and receiver, plus a year's service and maintenance, including replacement of any part, if necessary.

The latter item was vitally important because the kinescope, or picture tube, alone retails for $49.50. The fee for the policy ranged from only $45.00 to approximately $90.00, according to the list price of the set.

Marketwise, all our distributors and 99 per cent of our dealers welcomed this plan.

Consumer demand has far exceeded our most optimistic expectations. As a result, we have recently doubled our production of television by opening additional plant facilities at Indianapolis.

Today, the FCC has authorized a total of 69 television stations, and 26 applications are pending. Already there are 14 stations on the air with regular television programs, and by the end of 1947, it is expected that there will be about 26 stations. In 1948, this number will show a substantial increase as transmitters become available.

Current Status of Television

By the end of 1947, it is estimated that there will be between 150,000 and 175,000 television receivers in the United States; by the end of 1948, about 750,000, and from there on the number will increase rapidly as mass production gets under way at an accelerated pace.

Television will be supported by advertising, for it is unsurpassed as an advertising medium having both eye and ear appeal. Therefore, the gradual fusion of sound broadcasting with television is destined to come, just as sight and sound joined in motion pictures.

Television also will become a coast-to-coast service, and possibly by 1950, there will be a nation-wide network in which stations will be linked by coaxial cable and automatic radio relay stations.

The additional applications of television are unlimited. It requires no stretch of the imagination to foresee how schools and colleges will use television, both in the classrooms and for extension courses. Several weeks ago, the Congress of the American College of Surgeons in New York watched surgical operations at the New York Hospital, while the members sat before television screens at the Waldorf-Astoria hotel. It was amazing how clearly the television camera pictured the operation and the movement of the doctor's hands as he explained his technique. Famous surgeons watched and commented that television might well provide the Medical Lecture Hall of the future.

Television, you can see, is not limited to entertainment. Some of you may be interested in manufacturing, and for you, industrial television, with its panoramic views of entire factories, of dangerous chemical processes, of mines, tunnels, and submarine operations, offers new opportunities in the modernization of industry. In manufacturing plants, television makes possible the centralization of inspection; the assembly line can be observed at one or at many points, thus facilitating visual control of distant operations. Increased coordination all along the line is facilitated; delivery of parts can be watched and properly timed, and the movement of the belt regulated for utmost efficiency. Industrial television and industrial electronics will offer new services.

We also foresee great possibilities for television in department stores. There the managers may sit at their desks, with an eye on the entire store. By pushing buttons, executives will watch the functioning of their organizations. Intra-store television will present dramatic visual displays of merchandise. Seated in comfortable viewing salons, which we call "telesites", shoppers will see fashion shows and the goods on sale in all department. Television will provide a display window to the entire nation; people will shop by television and then telephone their orders.

Future of Television

In my judgment, no other new American industry holds such a bright economic future as television. But with television will come new problems of obsolescence, new calls for merchandising genius, and new opportunities for trained business men to convert the products of science into practical services.

Television is the future of radio; it is a new tool for the alert and aggressive merchandiser. Now, in radio we have both sound and sight to market and to aid in marketing. Whether you enter the radio field, or some other industry or business, you will find radio and electronics ready to serve you and to help in marketing whatever product you sell from razors to radios, from sapphires to soap. Seeing is believing! And we are told that a picture is worth 10,000 words!

Radiophoto Standards

(Continued from page 15)

Thus if we are sending a checkerboard of squares this size, we would have a keying speed of about 500 or 600 cycles per second on a modern Radiophoto machine.

If we are to reproduce a sharp picture with good detail at the receiving end, each of the little squares transmitted must be received and recorded with the same overall time lag or they will tend to make the scanning lines appear staggered and reduce the quality in the final copy. However, propagation conditions on long transoceanic radio circuits are seldom such that the dots arrive with the same lag. This is because the radio signal is reflected several times between the earth and the ionosphere—an electrical mirror some sixty to a hundred miles above the earth. Furthermore, the length of this path continually varies so that some squares travel a longer or shorter time than the average. Also, there is sometimes more than one path the radio signal can take depending upon whether there are two, three, or four reflections on the circuit. Thus, squares leaving the transmitter at the same instant may travel different paths and arrive at the receiver with different amounts of delay causing the resultant to be larger than the original square and reducing the sharpness of the recorded copy.

We can now see that the three variables requiring standardization are the diameter of the cylinder, the fineness of the line advance, and the speed of cylinder rotation. The product of cylinder diameter and line advance can be expressed as the "index of cooperation". As long as the index of cooperation on any two machines is the same, the machines will match, but if the diameters of the cylinders are different there will be an enlargement or reduction in the transmission process.

Large Cylinder Preferable

In the CFVD system a large diameter cylinder was preferable to permit photographic reduction of the received copy to reduce the effect of the dot pattern and standardization was established on the 88 mm diameter cylinder. With the SCFM system, photographic reduction is not necessary and a smaller drum is desirable with a view toward reducing the keying speed.

Since European telephoto systems are standardized on a 66 mm. cylinder,—slightly less than 3 inches in diameter—the question arose as to the adoption of this size for Radiophoto. This cylinder, which accommodates 5 x 7 inch copy, was considered too small for the average Radiophoto material. Accordingly, a diameter of 70 mm. has been accepted as being the optimum size, since with a length of 300 mm. it will accommodate the standard American or European letterhead assuming there is some margin space on each side of the written matter.

As to choice of line advance, it is necessary to decide between speed of transmission and quality of detail for each is gained only at the sacrifice of the other. An effective compromise was arrived at by proposing a double standard of 3.97 and 5 lines per millimeter as an intermediary measure until further experience dictates which is the optimum.

More Standards in Prospect

Present radio circuit experience indicates that 60 revolutions per minute is the maximum for average conditions but under certain circumstances this may be increased to 90 or 100 r.p.m. Here again a double standard of 60- and 90-r.p.m. has been proposed as an interim measure. It is hoped that in the near future a machine having a cylinder diameter of 70 mm., a cylinder length of 300 mm., and a line advance of 5 lines per mm. will be accepted as standard for both Radiophoto and wireline use. This machine could then be run at slow speed for Radiophoto and at higher speeds on wirelines since a choice of cylinder rotational speeds is not difficult to provide.

RCA Restores Message Service to Germany

Radiotelegraph service between the United States and all parts of Germany has been restored, according to an announcement by Maj. General Harry C. Ingles, President of RCA Communications, Inc.

For the first time since the end of the war, he said, it is possible to exchange messages with the four zones occupied by American, British, French and Russian forces. Service was restored to some sections of the country soon after the occupation was begun in 1945, but it has been more than six years since all German cities could be served.

General Ingles said that the following rates would be effective for messages marked "VIA RCA": full-rate messages, 20 cents per word; deferred messages, 10 cents per word; night letters (minimum of 25 words), 8 1/3 cents per word.

Wire Recorder

(Continued from page 18)

mons and speeches; and physicians for recording psychiatric and other types of interviews. In business offices, the unit is ideal for recording conferences, especially where discussions are of a technical nature not easily handled by stenographers, and for recording sales talks which can then be mailed on the easily mailed plug-in cartridge for playback in distant branch offices.

In addition, a device called an induction transformer can be readily installed to permit the practical recording of telephone conversations. In this way, calls can be recorded in the absence of executives from their offices. The 100 percent accuracy of messages thus received is invaluable in contractual or financial matters transacted over the phone. The application also is useful to business men handicapped by deafness.

Other uses of the recorder include recording testimony of witnesses for court use; as a check on renditions by singers and instrumentalists; in commercial recording studios and in reporting newspaper on-the-spot interviews for newspapers.

1948

Television's Year

Television becomes a widening reality in 1948. An exciting promise is now an actual service to the American home. After twenty years of preparation, NBC Network Television is open for business.

When the Radio Corporation of America formed the National Broadcasting Company in 1926, its purpose was to broadcast better programs *in the public interest*—and that purpose continues to be its guiding policy.

Today, twenty-two years later, NBC has the most popular programs in radio. Outstanding in its contribution to the public welfare, the National Broadcasting Company has served the nation in war and in peace. Now, it has added a new service—Network Television—in the same spirit as that which first moved its parent company: public interest. NBC, in pioneering and developing this great new medium of information, news, entertainment, and education, is fully aware of its responsibility.

In 1948, NBC offers to the public the greatest medium of mass communication in the world—Network Television.

THE TELEVISION PICTURE LOOKS BRIGHT

NBC's TELEVISION NETWORK

In the East, four stations now make up the new NBC Television Network: WNBT, New York; WNBW, Washington; WPTZ, Philadelphia; and WRGB, Schenectady. WBAL-TV, Baltimore, and WBZ-TV, Boston, will be on the air shortly as NBC's fifth and sixth television affiliates.

In the Midwest, three NBC affiliates are independently engaged in telecasting operations: KSD-TV, St. Louis; WTMJ-TV, Milwaukee; and WWJ-TV, Detroit. It is anticipated that within the year these stations will be carrying network television programs originating in Chicago, where NBC will open its station. In addition, NBC will construct a station in Cleveland.

On the West Coast an NBC station is under construction in Los Angeles. It will serve as a focal point for the establishment of a western regional network.

The plan for 1948 and 1949: To add ever-increasing numbers of affiliates to these three regional networks, culminating in a coast-to-coast television network.

TELEVISION STATIONS

Today, nineteen stations are engaged in television operations throughout the country.

In addition to the stations now telecasting, fifty-four have received licenses and sixty-four more have applications pending.

Total: 137 stations in actual television operation, being constructed, or waiting for official approval from the Federal Communications Commission.

We confidently expect that the same NBC-affiliated stations which pioneered sound broadcasting will take the lead in bringing this great new medium of sight and sound to their communities.

THE TELEVISION AUDIENCE

One year ago there were 8,000 television receiving sets in the country. Today there are 170,000. Estimate for December, 1948: 750,000 sets.

With multiple viewers per set, NBC Network Television programs will be available to an audience of millions.

TELEVISION PROGRAMMING

Hundreds of thousands of viewers will remember these recent NBC Television programs among many others equally outstanding—

IN DRAMA . . .

Kraft Television Theater is the first regularly sponsored dramatic series on NBC Television.

The Theatre Guild series brings the greatest art of the New York theatre to viewers distant from Broadway.

On the American National Theatre and Academy series, comedy, drama, farce—the whole scale of the theatre—is brought to viewers as it is played.

IN SPORTS . . .

NBC Network Television has pioneered in bringing major sports events to its audience—from the exclusive broadcasts of the Joe Louis championship fights against Conn and Walcott to the World Series games of 1947. Today, one-quarter of NBC's current television schedule is devoted to sports.

IN SPECIAL EVENTS . . .

The Presidential Conventions in Philadelphia this coming summer will be comprehensively covered by mobile units of NBC's Television Network, bringing the faces and voices of political speakers into thousands of American homes. The campaigns that follow will receive equally emphatic coverage. Since the televising of President Roosevelt's speech at the World's Fair in 1939, special events television has risen from the status of a novelty to the position of a significant communications reality.

NBC's PROGRAM SCHEDULE . . .

In addition to extra hours for news and special events, a wide variety of programs can now be viewed on the new television network. Here is the current breakdown of each week's programming:

- 7 hours for women's programs
- 7 hours for sports events
- 3½ hours for variety shows
- 3 hours for dramatic presentations
- 3 hours for children's shows
- 2 hours for educational programs
- 1½ hours for quiz and round-table shows

Two months from now the number of telecast hours will jump from twenty-seven to thirty-five a week. Still more hours will be added as the number of receiving sets increases and more stations join the network.

TELEVISION AND THE AMERICAN ECONOMY

ADVERTISING

Like standard radio broadcasting, network television will depend for the expansion of its facilities and programs on advertising. As advertising has built the wide range of radio's broadcasting schedule, so it will make possible an increasing wealth of fine programs on television.

Today, 18 of the country's large advertisers are sponsoring NBC television programs—about half of them on the entire television network. Some two hundred other advertisers are currently sponsoring programs on the twenty-odd individual stations throughout the country.

ECONOMIC FORCE

It is NBC's belief that, within a few years, more than a quarter of a million people will be employed in the manufacturing and telecasting operations of the business alone. Available estimates point to television as a half-billion dollar business by the end of this year. This new industry will grow in size and service with the years.

THE FUTURE

NBC's new eastern television network is only the beginning. But it is the beginning of a *working reality*. 1947 marks the end of television's interim period. 1948 signifies the appearance of television as a new force in the United States. *The greatest means of mass communication in the world is with us.*

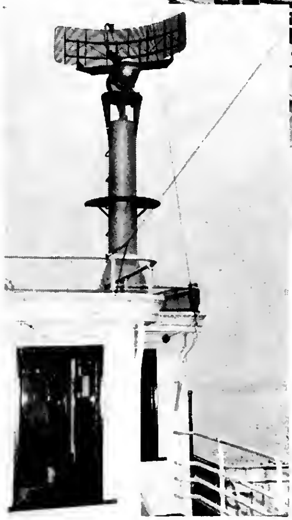
NBC Television

NATIONAL BROADCASTING COMPANY, 30 ROCKEFELLER PLAZA, NEW YORK

A Service of Radio Corporation of America

Aboard Georgian Bay Line Ships you'll see RADIOMARINE 3.2 CM RADAR

The S.S. South American, Great Lakes cruise ship, equipped with Radiomarine Radar.



Radiomarine Radar Antenna installed atop the pilot house.

Captain Richard A. Harreutt, explaining to a passenger how Radiomarine Radar aids navigators.

The S.S. North American and S.S. South American, lake cruisers of the Georgian Bay Line, provide an extra measure of safety for passengers, crew and ship with Radiomarine 3.2 cm Radar.

In fog, storms and darkness, in and out of heavily trafficked ports, Georgian Bay Line ships proceed on their 2100-mile round-trip pleasure cruise on the Great Lakes. With Radiomarine Radar aboard, the navigator sees clearly shore lines, other ships, entrances to locks, low-lying buoys and channel markers. Even when navigating a channel only 500 feet wide he sees water between the ship and the earthworks on the scope of a Radiomarine Radar.

Designed for Merchant Marine Service

From Radiomarine you get modern, postwar radar of advanced design and construction. Radar that meets the rigid all-weather requirements of present and future merchant vessels operating on the high seas, lakes or rivers.

We're in full production and making frequent installations. For prices and further information write: Radiomarine Corporation of America, Dept. 12-J, 75 Varick Street, New York 13, N. Y.

YOU GET THESE ADVANTAGES with Radiomarine Radar

- *12-inch viewing scope*
- *86 square inches of picture area*
- *clearer, larger, steadier pictures*
- *sharp definition between closely spaced and low-lying objects*
- *true or relative bearings*
- *range 80 yards to 50 miles*

RCA

RADIOMARINE CORPORATION of AMERICA

A SERVICE OF RADIO CORPORATION OF AMERICA

"Our American concept of radio is that it is of the people and for the people."

As the world grows smaller, the question of international communications and world understanding grows larger. The most important phase of this problem is *Freedom to Listen* and *Freedom to Look*—for all peoples of the world.

Radio, by its very nature, is a medium of mass communication; it is a carrier of intelligence. It delivers ideas with an impact that is powerful . . . Its essence is freedom—liberty of thought and of speech.

Radio should make a prisoner of no man and it should make no man its slave. No one should be forced to listen and no one compelled to refrain from listening. Always and everywhere, it should be the prerogative of every listener to turn his receiver on or off, of his own free will.

The principle of *Freedom to Listen* should be established for all peoples without restriction or fear. This is as important as *Freedom of Speech* and *Freedom of the Press.*

Television is on the way and moving steadily forward. Television fires the imagination, and the day is foreseen when we shall look around the earth from city to city, and nation to nation, as easily as we now listen to global broadcasts. Therefore, *Freedom to Look* is as important as *Freedom to Listen*, for the combination of these will be the radio of the future.

The "Voice of Peace" must speak around this planet and be heard by all people everywhere, no matter what their race, or creed, or political philosophies.*

David Sarnoff

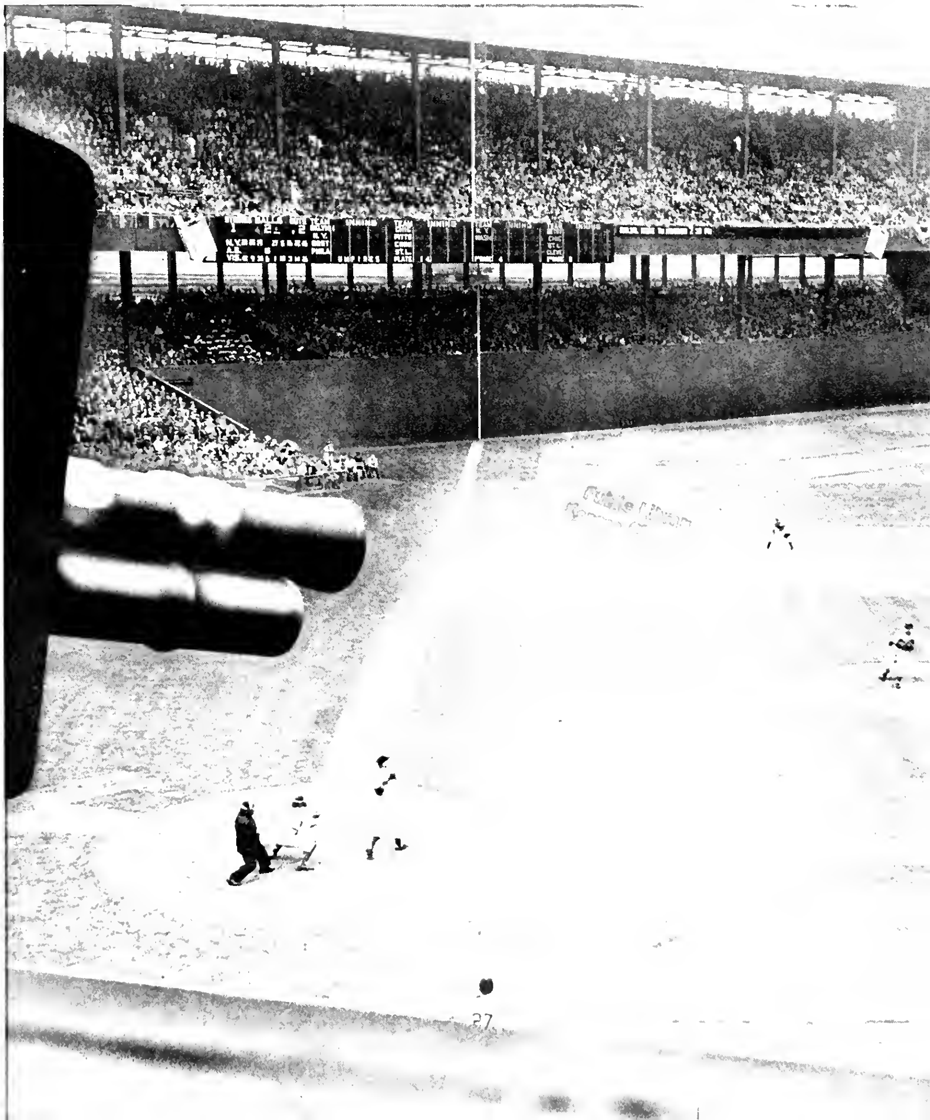
President and Chairman of the Board,
Radio Corporation of America.

**Excerpts from an address before the United States National Commission for UNESCO.*

RADIO CORPORATION of AMERICA

FREEDOM IS **EVERYBODY'S** BUSINESS

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



APRIL

RCA scientists—pioneers in radio-electronics—apply the "radio tube" to communications, science, industry, entertainment, and transportation.

This "magic lamp" makes Aladdin's look lazy

You will remember the fabulous lamp—and how it served its master, Aladdin. Serving you, today, is a real "magic lamp"... the electron tube.

You are familiar with these tubes in your radio, Victrola radio-phonograph or television set... but that is only a small part of the work they do. Using radio tubes, RCA Laboratories have helped to develop many new servants for man.

A partial list includes: all-electronic television, FM radio, portable radios, the electronic microscope, radio-heat, radar, Shoran, Teleran, and countless special "tools" for science, communications and commerce.

The electron microscope, helping in the fight against disease, magnifies bacteria more than 100,000 diameters, radar sees through fog and darkness, all-electronic television shows events taking place at a distance, radio-heat "glues" wood or plastics. Shoran locates points on the earth's surface with unbelievable accuracy. Teleran adds to the safety of air travel.

Constant advances in radio-electronics are a major objective at RCA Laboratories. Fully developed, these progressive developments are part of the instruments bearing the name RCA, or RCA Victor.

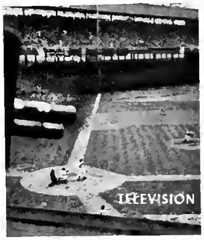
• • •

When in Radio City, New York, be sure to see the radio, television and electronic wonders on display at RCA Exhibition Hall, 36 West 49th Street. Admission is always free. Radio Corporation of America, RCA Building, Radio City, New York City 20, N. Y.

RADIO CORPORATION of AMERICA

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



:OVER

\n RCA Image Orthicon :amera is focused on a ılay in the opening game ıf the 1948 baseball season ıt the Polo Grounds, in New York. All home-games ıf the N. Y. Giants are elevised by NBC.

Services of RCA are:

RCA Laboratories Division

•

RCA Victor Division

•

RCA Communications, Inc.

•

iomarine Corporation of America

•

onal Broadcasting Company, Inc.

•

RCA Institutes, Inc.

•

RCA Service Company, Inc.

•

RCA International Division

VOLUME 7 NUMBER 3 APRIL 1948

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RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.
DAVID SARNOFF, *President and Chairman of the Board*
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.

MAESTRO ARTURO TOSCANINI DIRECTING THE NBC SYMPHONY IN THE HISTORY-MAKING TELECAST OF THE ALL-WAGNER CONCERT ON MARCH 20, OVER WNBT AND THE NBC TELEVISION NETWORK.

Television Opening New Era

General Sarnoff Declares Television Will Speed Understanding of Issues Confronting the Country and Vastly Change Political Strategy — He Says Race of Science Is On Throughout the World.

TELEVISION will vastly change political strategy in this country and open an era of "more enlightened public opinion," Brig. General David Sarnoff, President and Chairman of the Board, Radio Corporation of America, asserted in an address at an Edison Dinner sponsored by the Newcomen Society in Washington, D. C., on March 19. General Sarnoff paid tribute to the great inventor for discoveries of importance to the ultimate development and merging of sound and sight as a great new service to the people. He added that Edison's "inventions and his universal influence for good in the Industrial Age might well guide the world in the Atomic Age, for his ways were the ways of peace."

Outside of the field of science, it may not be generally known, General Sarnoff said, that Edison provided the clue which ultimately led to the development of the electron tube—basis of the vast radio-electronic industry and as important to modern radio and television as the electric lamp is to lighting.

Edison More than a Lamplighter

"Edison was more than a lamplighter who turned night into day," he continued. "His many inventions and discoveries helped to light wide areas of the human mind. Fortunately for the people of our time, the 'Edison Effect' was not confined to a glass bulb. He passed his discovery on to others and through their development of radio and television, the 'Edison Effect' has spread through the whole fabric of civilization."

Before many years have passed, the majority of the 37,000,000 American homes now equipped with radios will have television, he said, declaring:

BRIG. GENERAL DAVID SARNOFF

"We have but to recall the tremendous effect of radio broadcasting upon the social and political life of the nation to look forward to the profound effect which television is certain to have on domestic habits and politics.

"Since the advent of broadcasting the electorate from coast-to-coast has listened to each succeeding president; the people have learned to know each candidate and to judge his sincerity and personality by the timbre of his voice and the style of his speech.

"Now, as the 1948 presidential campaign approaches, television will enable political candidates to achieve even more intimate contact with the voters. Extensive plans are being made to televise the national political conventions that will be held this summer, in Philadelphia. Candidates now are being seen on the air along the Atlantic Seaboard from Washington to Boston and upstate New York.

"More Americans have seen President Truman by television in one evening, than saw Lincoln during his entire term in the White House. In 1861, the population of this country numbered 38,000,000. Today more than that number of people live within the areas already covered by television.

Candidates More in Spotlight

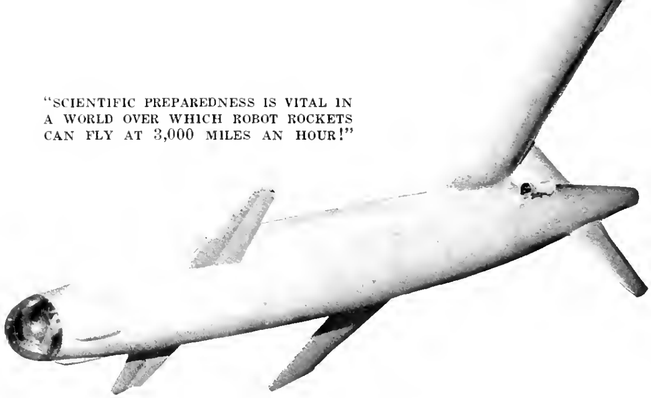
"As radio compelled political candidates to alter their time-worn techniques and tactics, so too will television vastly change political strategy. The candidate is more than ever in the spotlight. He cannot hide behind a microphone with his eyes cast down on the printed manuscript. No longer is he a disembodied orator. He must look into the television camera and speak to the people face to face. His appearance, his smile, his gestures, combine with the sound of his voice to complete the transmission of his personality—and it is that complete personality with which the voter will become acquainted."

To illustrate the latest prerequisite of a political aspirant, General Sarnoff told how the wife of a candidate, watching her husband await the television camera, suggested that he "smile and be photogenic." "You mean telegenic!" her husband exclaimed.

As time goes on, General Sarnoff stated, there will be less necessity for candidates to travel. In his opinion, television will take them "directly into every city and every home." He continued:

"Of even greater import, however, is the fact that television opens an era of more enlightened public opinion. The people will be more adequately informed on issues confronting the country. They will see their legislators in action. The logic of an argument is vastly more effective when it is presented by words and pictures than by words alone.

"Indeed, radio and television as vital economic and political factors in national life reveal how the inventor—the man of science—exerts a profound influence through the mysteries he shapes into servants for his fellowmen."



"SCIENTIFIC PREPAREDNESS IS VITAL IN A WORLD OVER WHICH ROBOT ROCKETS CAN FLY AT 3,000 MILES AN HOUR!"

Security Depends on Science

General Sarnoff, asserting that at no time in history has science been so woven into the pattern of everyday life, said:

"Every country is aware that to advance — yes, even to survive — it must cultivate science. Our national security depends upon science . . . scientific preparedness is vital in a world over which robot rockets can fly at 3,000 miles an hour!

"A few years ago, the headlines featuring military preparedness stressed 'a race of armaments.' But the bitter lessons of war have taught us that science in many instances overcomes armament. Throughout the world the race of science is on, and the pace is fast. A nation that is slow to meet this challenge imperils its security."

The Government is to be congratulated, he said, for the encouragement which it is giving to the advance of science through the scientific training of young men and women in colleges, universities and research institutions throughout the country. He remarked that if, out of the thousands of young men and women who are now pursuing scientific studies, there "emerges one Edison, then the millions of dollars being devoted to their training will be well worthwhile.

"Science in this era is public policy," declared General Sarnoff in conclusion. "It is Government policy, for technology is the backbone of our national security. It is fundamental to our domestic economy, our progess and prosperity. Our destiny is linked with young scientists and engineers. Edison's experience furnishes a lesson for these young pioneers; it teaches them to look for an 'effect' and to determine its practical use. It is in the universal effect of science created by such men of goodwill as Thomas Alva Edison that youth finds inspiration and our country gains strength."

"OUR DESTINY IS LINKED WITH YOUNG SCIENTISTS AND ENGINEERS"

IN RECOGNITION OF HIS CONTRIBUTIONS "TO THE DEVELOPMENT AND ADVANCEMENT OF TELEVISION AS A SERVICE TO THE PUBLIC AND AS A MEDIUM OF ADVERTISING," BRIG. GENERAL DAVID SARNOFF RECEIVED ONE OF THE ANNUAL ADVERTISING AWARDS OF 1947, SPONSORED BY ADVERTISING AND SELLING MAGAZINE. THE MEDAL, SHOWN ABOVE, WAS PRESENTED TO GENERAL SARNOFF AT THE WALDORF-ASTORIA HOTEL, MARCH 5, 1948.

SCENES SUCH AS THIS WILL BE PICKED UP BY TELEVISION CAMERAS AND VIEWED BY MILLIONS. BELOW: AN ENGINEER AT THIS BOARD WILL CONTROL THE 55 MICROPHONES LOCATED AMONG THE DELEGATIONS.

NBC Prepares for Conventions

Through Radio and Television, Political Conclaves at Philadelphia Will Set New Record in National Coverage

THROUGH the widespread service provided by radio and television, the two major political conventions, which are to be held in Philadelphia this summer, will reach the largest audience in radio history. Not only has the total of radio listeners reached an all-time high but this year, through the expansion of television and television networks, close to 2,000,000 video viewers on the East Coast will watch the full public activities of both parties on more than 200,000 sets in New York, Philadelphia, Washington, Baltimore, Schenectady and Boston. In addition, other thousands will see motion picture accounts of the gatherings as they are telecast by stations not yet linked in the East Coast network. Plans call for NBC to be on the air—providing television programs to its six East Coast affiliates—every minute of the public sessions at Convention Hall.

In radio, NBC will not attempt to cover all proceedings but will be constantly on the alert to switch from regularly scheduled broadcasts to Philadelphia when convention activities warrant the shift. It is expected that 30 to 40 hours of specially scheduled programming will originate in Philadelphia during the period of each conclave.

Network Booth is Nerve Center

According to George McElrath, director of NBC Engineering Operations, the nerve-center of NBC's radio coverage of the conventions will be the network booth located on the stage overlooking the convention proceedings. Additional facilities include studios in convention headquarters at the Bellevue Stratford Hotel, and in the offices of KYW, NBC's Philadelphia affiliate.

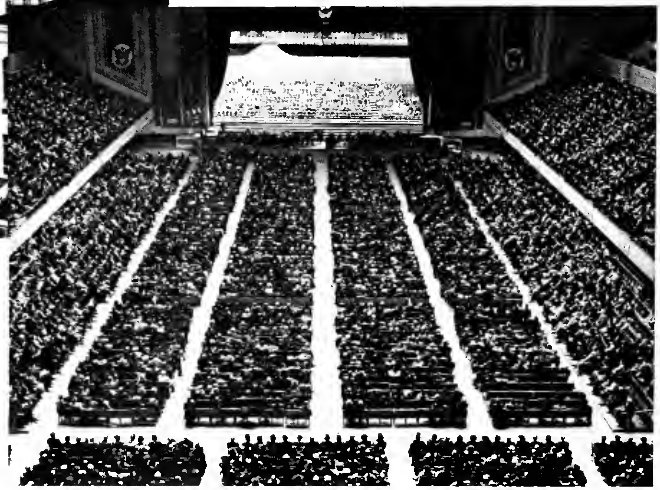
The stage booth will be ten by thirteen feet, only slightly larger than an RCA Building elevator, yet when the convention is in session, the room will house an engineer with his control equipment, the special events director and his assistant, a commentator, an announcer, telephone operator and switchboard, a short-wave engineer, a teletype machine for the latest news reports for use by the commentators, plus the director of Program Engineering. The booth will be mounted nineteen feet above the rear of the stage giving its occupants a clear view of the proceedings on the convention floor.

The telephone switchboard will be connected through five out-going lines to similar boards in the news rooms and offices at Convention Hall and the Bellevue Stratford Hotel, to the Traffic Director's location in the KYW studios, then through the main NBC telephone board in New York to the master control desk, Traffic Supervisor, news and special events desk, day and night program offices and the announcers' supervisor. This spider web of communication circuits will provide the Special Events Director in the NBC booth with immediate contact with all personnel assigned to convention operations in Philadelphia and to all the operational offices in New York involved in network operations. With these facilities, it will be possible for the director to shift program organizations instantly and to rearrange the national network for maximum coverage.

Controls 55 Microphones

Seated next to the chairman of the convention on the rostrum at the end of a narrow stage protruding from the main stage, will be an NBC engineer. His is a major role in the convention's proceedings, both on and off the air. Under the chairman's direction, the engineer will control 55 microphones

INTERIOR AND EXTERIOR VIEWS OF CONVENTION HALL IN PHILADELPHIA, FROM WHICH TELEVISION WILL CARRY THE ACTIVITIES OF THE TWO MAJOR POLITICAL CONVENTIONS IN JUNE AND JULY.



installed on the convention floor, one for the head of each delegation. Then, when the chairman announces from the rostrum: "I recognize the delegate from Arizona," the engineer will push the Arizona button, thereby automatically connecting the spokesman of that state's delegation with the public address system, sound broadcasting and television networks, sound movies and independent broadcasting stations. The floor microphone system will be installed by NBC and the cost shared by the four major networks as a service to the convention.

Microphones at Important Spots

In addition to the fixed microphones on floor and rostrum, others will be installed in the NBC booth and on the speakers' platform for commentators and announcers, and in front of the bandstand, for musical pickups. A parabola microphone in the gallery will be used to pick up demonstrations from the floor. Sound pickups will also be made available to television, sound newsreels and independent stations.

NBC is the only network organization with experience in televising political conventions, an advantage that will be invaluable during the heat of oratorical flights and the excitement of electioneering demonstrations.

The only other political convention to be televised on-the-spot was the Republican gathering in Philadelphia in 1940. That event, which marked the first use of the coaxial cable for networking a television program, was seen in New York, Philadelphia and Schenectady, by owners of approximately 5,000 sets.

In 1944, NBC filmed the highlight of the two conventions in Chicago and rushed the reels by planes to New York where, after processing, they were televised immediately over WNBT.

Assisting McElrath in convention plans and operations are Gerald Hastings, NBC Staff Engineer, who is designing layouts and supervising installations, and Thomas Phelan, NBC division engineer in New York, who will direct operations during the convention. Irving Eney, KYW's chief engineer, will supply control room and switching facilities.

William F. Brooks, NBC Vice President in charge of news and international relations, will supervise network activities at Philadelphia, assisted by Francis C. McCall, manager of operations, news department, and William R. McAndrew, assistant to the Vice President in charge of the Washington office.

Chicago Television Station To Go On Air Sept. 1

Television Station WNBQ, Chicago outlet of the National Broadcasting Company, will be on the air by Sept. 1, 1948, four months ahead of a previously announced schedule, according to I. E. Showerman, vice president in charge of the network's Central Division. When completed, WNBQ, together with WTMJ-TV (Milwaukee), KSD-TV (St. Louis) and WWJ-TV (Detroit), already in operation, will form the central regional television network. Other NBC-affiliated television stations in the midwest are expected to be in operation soon and will further extend the network.

WNBQ's transmitter will be located in the Chicago Civic Opera Building.

Originally listed as bearing the call letters WNBY, the station sign-off was changed, with permission of the FCC, because of the possibility of confusion created by the similarity between the projected call letters WNBY and those of WMBI, a local broadcasting station.

First Network Video Pact

KSTP-TV and NBC Sign Pioneer Contract Assuring Television Program Service to Twin City Viewers

THE first station affiliation contract in the history of television was signed March 17, by Frank E. Mullen, executive vice president of the National Broadcasting Company and Stanley E. Hubbard, president and general manager of Station KSTP-TV, St. Paul-Minneapolis. Under terms of the contract, both the NBC Television Feature Service —consisting of all unsponsored NBC Television network programs,—and television network sponsored programs were made available immediately. KSTP, parent station of the television outlet, is a pioneer member of the NBC sound broadcasting network.

"All the far-flung facilities of the NBC Television network will bring into the homes of St. Paul-Minneapolis the world's best television service," Hubbard said. "In extending the network to the Twin City area, we are supplementing our great sound broadcasting public service with the finest sight-and-sound programming that the country has to offer.

"Our network service will be supplemented by a complete programming of local features, and I have every assurance from the National Broadcasting Company that outstanding events from the territory surrounding Minneapolis and St. Paul will be shown from time to time on the network.

Will Provide Programs on Films

Mullen explained that in advance of interconnecting facilities to the midwest by radio relay or coaxial cable, NBC Television will provide a program service on film, as well as by script—and possibly with live talent, too—to KSTP-TV. When such connecting facilities become available, the station will receive the network programs direct from their origination point.

At the same time, Mullen also said that all NBC Television Feature Service programs will be made available to stations for cooperative sponsorship.

KSTP-TV is on the air now and expects to provide regular commercial program service before the end of April. Under the direction of Hubbard, one of the founders of KSTP and now president and general manager, KSTP maintains studios in both Minneapolis and St. Paul. In March, 1944, the station opened a new Minneapolis Radio City.

In addition to the five-station network which NBC is now operating on the East Coast, the company also is providing television service to four mid-western outlets. By mid-May the eastern network is scheduled to reach from Boston to Richmond, and before the end of the year, NBC's owned-and-operated television stations in Los Angeles and Chicago will be on the air. It is expected that Chicago will be interconnected with the East Coast network by January 1, 1949.

Many Television Sets On Farms

The importance of television service to the midwest area was emphasized by Mullen during a recent visit in Chicago. In announcing that the International Livestock Exposition, which is to be held in that city next fall, would be televised, he stated that a substantial number of the 750,000 or more television sets that are expected to be in use by the end of the year will be in farm homes.

Supplementing Mullen's statement, William Drips, NBC director of agriculture and agricultural television, said that the new medium will "revolutionize state-sponsored extension and educational work. Where today it requires literally thousands of experts to cover farm regions with up-to-the-minute methods, tomorrow the whole job can be done with one television demonstration, thus providing the present field staff with more time for other work."

FRANK E. MULLEN, NBC EXECUTIVE VICE PRESIDENT (LEFT) AND STANLEY E. HUBBARD SIGN CONTRACT WHICH MAKES NBC TELEVISION PROGRAMS AVAILABLE TO KSTP-TV, IN THE TWIN CITIES.

DIVIDEND DECLARED

Following the meeting of the Board of Directors of the Radio Corporation of America held on February 6, in New York, Brig. General David Sarnoff, President and Chairman of the Board, announced that a dividend of 87½ cents per share had been declared on the outstanding shares of $3.50 Cumulative First Preferred stock, for the period from January 1, 1948 to March 31, 1948.

Electron Microscope Progress

Review of Developments Since 1938 Reveals Expanding Versatility of Instrument as New Techniques are Mastered by Trained Technicians.

by Dr. James Hillier
RCA Laboratories Division,
Princeton, N. J.

IN introducing the electron microscope to fellow scientists, most of the early workers, including the writer, had difficulty restraining their enthusiasm over its research possibilities. Our estimates were based more on intuition and faith than on available scientific evidence. Today—less than ten years later—so numerous are the contributions of this instrument that it is difficult to select the most important one. This should provide some idea of the progress achieved.

Findings vital to life and industry are being made. New techniques and new advances in the electron microscope itself are extending its usefulness in probing unseen worlds far beyond the reach of the ordinary microscope. Knowledge being obtained is proving of immense value to medical research, particularly in the study of viruses. Many of the viruses can now be viewed for the first time in the history of medicine. In addition, it appears that electron microscopy will encounter few problems in chemistry, physics, biology, metallurgy, and geology that it cannot help to solve.

First Model Introduced in 1940

Only in America has there been uninterrupted production of electron microscopes since before World War II. These have been designed and built by the Radio Corporation of America, which introduced the first commercial model in 1940. Used extensively in war research, the instruments were continuously improved. Now more than 200 are employed in the United States, Britain, France, Holland, China, Russia and Latin America.

As soon as the RCA electron microscope had reached a point where sufficiently high magnification of specimens could be obtained, it was applied to the examination of various types of virus. For the most part the early work sought to determine the size and, later, the shapes of the viruses.

Since most of the smaller viruses are spherical, the chief contribution of the electron microscope at this time was the verification of shape and size. Afterward methods were devised to rearrange the patterns of groups of particles in order to continue the study of structure. Considerable attention has been given recently to the studies of tobacco mosaic virus particles. It had been known for some time that old purified solutions of tobacco mosaic viruses had particles which showed a wide range of length. On the other hand, some particles under special treatment were found to have uniform length. It is now established that the infective unit of the tobacco mosaic disease is a particle having a constant length.

Discover Bacteriophage Details

In studying the virus problem some interesting work has been done in connection with the infection of bacteria by bacteriophage. Electron microscopists have been able to ascertain the size and shape of the bacteriophages which could never before be established definitely by other methods. Identification of bacteriophage particles has thus become rather easy, and they are regarded as ideal subjects for electron microscope examination.

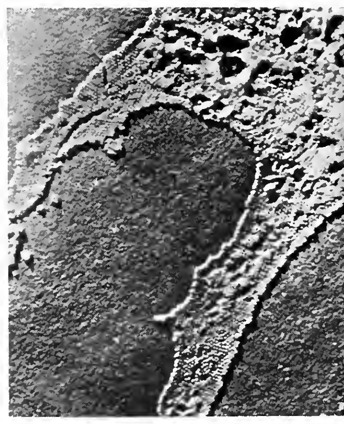
Concentrated efforts are being made to observe the mode of growth of bacteriophage particles in the bacterial cell because of the importance of this knowledge to medical research. Techniques for preparing bacterial specimens have been improved to an extent that it is now possible to examine the organisms at any definite time after infection and under conditions in which the specimen is not disturbed.

At this writing there appear to be no basic technical limitations preventing observation of the complete life history of the bacteriophage particles in the bacterial cell, and unless some unforeseen difficulty arises this important problem may be solved in the near future.

Improvements in devices and techniques have gradually increased the resolving power of the electron microscope to its present-day magnification of more than 200,000 diameters—which is in the order of 200 times that of the usual light microscope. While this is an effective power, the theoretical possibilities of magnification are by no means fully utilized.

One of the most important differences in the result provided by the electron microscope in comparison with the light microscope is found in the structure of images. In the light microscope the image exists

BEAN VIRUS MAGNIFIED 50,000 TIMES BY THE ELECTRON MICROSCOPE.



by virtue of the selective absorption and scattering power for light imposed by physical properties. In the electron microscope the situation is simpler. Electrons passing through the specimen are affected in varying degrees, according to the density and composition of various parts of the specimen. This leads to a more direct interpretation of the image.

Most Problems Within Range

Electron microscopy has made it possible to observe the structure of solids in a range of dimensions down to 10 Angstrom units, or the equivalent of about twenty-five millionths of an inch. It is unfortunate that such a simple statement, accurate though it may be, gives no suggestion of the true magnitude of the knowledge that electron microscopy can play in any science which concerns in some way the structure of solid materials. The fact is, in my opinion, that there appear to be few problems in chemistry, physics, metallurgy, mineralogy, geology, biology and medicine, among other sciences, in which the electron microscope cannot be used. It is obvious that the electron microscope has yet to play a widespread role in general science. But the reasons for this are quite clear.

The first deterrent to widespread use of the electron microscope is the lack of information among scientific workers who might make full use of its capabilities. A second shortcoming is that early difficulties encountered with the instrument and with some of the associated techniques have cause the more conservative research workers to wait until these difficulties have been overcome. One of the most important controlling factors in the general use of the electron microscope is the lack of suitable techniques for specimen preparation. Considerable progress, however, is being made to solve this latter problem.

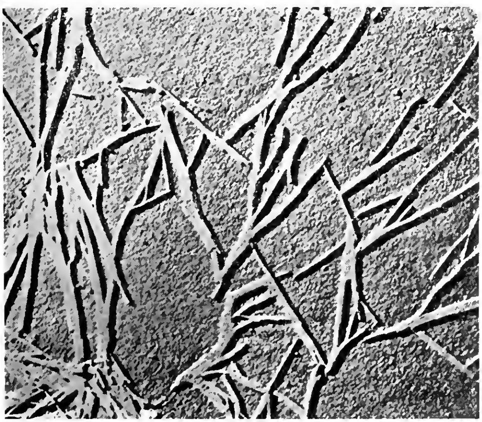
The study of external structure is being achieved by what is known as the replica technique, which is being applied successfully to metals, ceramics, parts of plants, colonies of bacteria, teeth, hair, skin and blood cells, among other specimens. Study of the internal structure of more delicate bacteriological materials has been achieved by slicing specimens to infinitesimal thinness. But problems remain due to the difficulty of preventing distortion in the tissue.

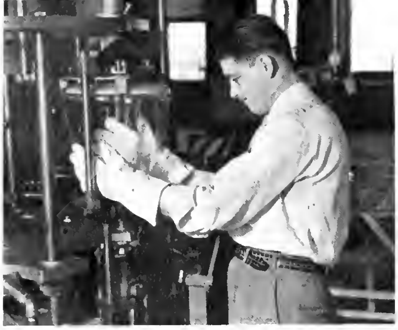
Shortage of trained personnel represents an extremely important factor in limiting the speed of growth in the use of the electron microscope. While this shortage has existed for several years in all fields of science, it has been particularly acute in this work. Most laboratories, while recognizing the need for an electron microscope to solve the many problems arising in research, have been aware that it would consume valuable time to teach their scientists the techniques of electron microscopy. At the present time the necessary training has been available only through actual experience with the instrument. It generally requires about two years. This situation may be remedied since a number of universities are conducting graduate courses in electron microscopy.

Trained Technicians Essential

The personnel of a well-organized electron microscope laboratory should include a trained microscopist and a technical assistant. The most successful electron microscopists today are individuals who have had education or experience equivalent to a doctorate degree or better in physics, stressing optics or light microscopy. It is extremely important that the microscopist have a thorough understanding of the general problems of the laboratory. It is obvious that the selection of the appropriate individual for this position is a step toward the successful utilization of the electron microscope by any laboratory.

THREE ENLARGEMENTS OF THE TOBACCO MOSAIC VIRUS AS PRODUCED BY THE ELECTRON MICROSCOPE. UPPER VIEW AT RIGHT BELOW SHOWS THE VIRUS ATTACKED BY ANTIBODIES. APPROXIMATE MAGNIFICATION IN ALL SPECIMENS, 45,000 TIMES.





ABOVE: A 12-INCH KINESCOPE GOES THROUGH A FINAL STEP IN ASSEMBLY AT RCA VICTOR PLANT. RIGHT: A BATTERY OF NBC TELEVISION CAMERAS FOCUS ON THE ACTIVITIES AT AN OUTDOOR SPECIAL EVENT.

of radio equipment. It had to be compact and light, yet withstand the rigors of high aviation speeds and severe changes in atmospheric conditions. These demands led to many revolutionary devices, prominent among them new types of miniature tubes, some as small as acorns. RCA, which originated the miniature tube, had used them in the pre-war camera-size "personal" radios, and to meet the demands of radar and other wartime equipment, RCA manufactured 20,000,000 of these tiny tubes from 1942 to the end of the war As a result of wartime experience in the practical application of these Liliputian tubes, many new uses are foreseen for them. They should bring to a world at peace new pocket-size radios, handie-talkies and walkie-talkies, and receiving sets as small as a package of cigarettes, or a lady's compact.

Some Radio Highlights of 1945

These are some of the highlights of radio in 1945—the radio that enabled the U. S. Army Signal Corps to send a nine-word radio teletypewriter message completely around the earth in 9½ seconds, surpassing the previous record of 3½ minutes.

In 1945, RCA Communications carried more than 200,000,000 words of international radiograms, over circuits linking the United States with 56 foreign nations. With thirty-five of these countries, radio program service is maintained, bringing overseas broadcasts to American listeners. This service multiplied five-fold during the war, with a 50 percent reduction in rates.

Radiophoto service to twelve overseas nations doubled during the war, again with a 50 percent rate reduction.

One by one, the radio stations of Europe and Asia, which were cut off from the United States during the war, have been restored to service. Radiograms are again the speediest messengers in international service. By the use of new error-proof high-speed 7-unit multiplex apparatus, perfected during the war, eight channels of communication are now used on a single radio frequency, offering an almost unlimited expansion in instantaneous world-wide communication.

Mariners, as well as the aviators, who sail and fly across a world at peace will find radar a new service that increases safety and speeds transport. Adapting radar, loran, the electronic depth-meter and new radiotelephone devices to peacetime use on ships of all sizes, the Radiomarine Corporation of America—a service of RCA—is adding them to its postwar line of marine radio and navigation apparatus, which includes direction finders, lifeboat sets and various types of communication transmitters and receivers. Practically all coastal stations have returned to commercial service.

Progress in Radio Developments

At the same time, experimentation in other radio fields has produced achievements that promise revolutionary help for American industry. New progress has been made in the application of heat generated by radio, and in the application of electronic devices to industrial operations that call for the utmost precision. Electrons have been put to work to accelerate processes, increase safety and provide automatic controls as well as counting and sorting. New wonders are promised in the use of supersonic vibrations and infra-red rays. Research in fluorescent materials has produced a greater variety and finer phosphors, with increased capacity for receiving and retaining electronic images—the basic functions that make television and radar possible.

The Year Ahead

Now let us look forward to 1946. Civilian radio production is under way. Home and automobile receivers again are coming into the market, along with the new and improved Victrola phonograph. With "the music you want when you want it," the phonograph steadily climbs in popularity. A new nonbreakable record, the most revolutionary development in phonograph records in forty-five years, has been introduced by RCA Victor to mark a new milestone in the recording and reproduction of music by the world's greatest artists.

Science has made television practical for the home. All elements of a satisfactory television system are available. Television networks are in prospect as automatic radio relay stations are being built to relay television from city to city. At the same time the coaxial cable, another artery of television, is being extended; already New York is linked with Washington by means of this new cable, and it is moving into the South toward Dallas, Texas. Gradually, radio relays and coaxial cables will grow out across the country to link coast with coast—and to provide a nationwide service of sight and sound.

Before nationwide television is possible, however, there must be hundreds of transmitters to supplement the nine commercial stations now on the air. These transmitters will begin to be generally available late in 1946 and by the end of 1947 considerable activity in television broadcasting may be expected.

Television will be widely utilized throughout commerce and industry. Department stores will use it so that the public may shop by television; through inter-store television, merchandise will be displayed throughout the stores at "telesite" salons. Gimbels - Philadelphia, in cooperation with RCA Victor, have demonstrated this idea with great success and have received public acclaim for a new service and convenience.

Uses of Radio in Industry

Industry too will find considerable use of radio sight as "eyes" in factories—the means of coordinating and controlling complicated manufacturing processes, observing and directing operations from start to finish. Industrial television will furnish the means for looking into chemical reaction chambers and other areas of production, dangerous or inaccessible to the human eye.

In the field of air navigation, RCA has devised a complete system for preventing collisions, controlling traffic, performing instrument approaches and in the general navigation of aircraft. Unique in its combination of television and radar techniques, this new system is called Teleran.

The miracle of radar and the advent of postwar television, make 1945 a year to be remembered as beginning the third cycle in the evolution of radio: First, there was wireless telegraphy; second, broadcasting of the human voice and music, and now the world enters the third cycle—the era of radio sight.

New Adventures in Exploration

America's men of science and its great industrial research centers, such as RCA Laboratories, brought true glory to the Nation in a war that called upon science to defeat the enemies that had sought in vain to pervert science to destroy civilization. The greatest and most efficient fighting forces ever assembled had science at their side on every battlefront. Victory gave to the United States the place of leadership in science among the older nations of the world, all of whom had cultivated science throughout the centuries.

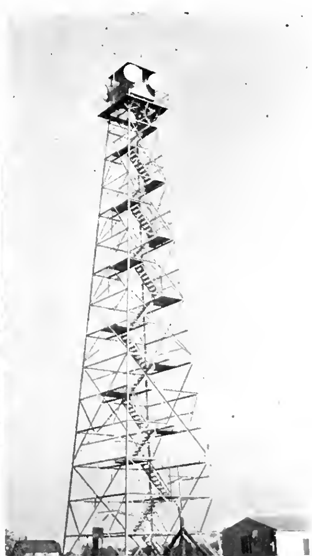
Opportunities for Youth

Today, American ingenuity is at the forefront. Here is the great opportunity for youth. Encouraged to pioneer in research and to follow science as a career, it will furnish the leadership to make this country unsurpassed in every realm of science — electricity or electronics, chemistry or physics, radio or atomic energy. America accepted the challenge of war. It now accepts the challenges of peace.

If a nation is to expand to gain new resources, comforts and freedom for its people, it must not neglect progress in science. Exploration today does not mean conquest of people, nor lust for territorial expansion. The rewards in science can be much richer and far more productive for mankind.

Science has given man a key to atomic energy, to radio-controlled rockets and to television-eyed pilotless planes. The fate of civilization depends upon the use to which man puts them. Our national security, our progress in peace and our future as a Nation depend upon science, which has lifted war and peace into a new dimension by the annihilation of Time and Space.

BELOW, LEFT TO RIGHT: ELEANOR STEBER, OPERATIC SOPRANO, DEMONSTRATES THE NEW RCA VICTOR UNBREAKABLE PLASTIC PHONOGRAPH RECORD; DR. ALBERT ROSE HOLDS THE IMAGE ORTHICON, THE NEW SUPERSENSITIVE TELEVISION CAMERA TUBE; ONE OF THE TOWERS IN THE RCA-WESTERN UNION MICROWAVE RELAY NETWORK WHICH HAS BEEN PLACED IN OPERATION BETWEEN NEW YORK AND PHILADELPHIA.



modulation," and the Institute's Morris Liebmann Memorial Prize for 1948 to Stuart Wm. Seeley "for his development of ingenious circuits related to frequency modulation."

150 FM Transmitters Delivered

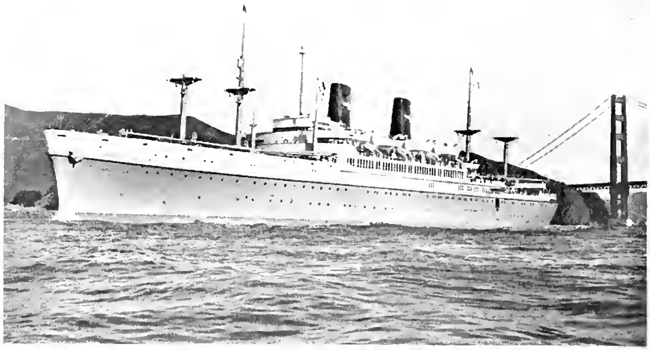
He disclosed that RCA, as one of the leading manufacturers of FM transmitters, receivers and studio equipment, has delivered more than 150 FM transmitters, and has received orders for 170 more. At the same time, it offers ten different models of home radio receiving sets containing FM.

Against such a record, indiscriminate charges that RCA, FCC and others have "retarded" FM, "opposed" FM, or have given it the "silent" treatment, fall by their own weight, Jolliffe declared.

On the Resolution—proposed on January 20, 1947, by Rep. William Lemke of North Dakota, to authorize and direct the Federal Communications Commission to assign a section of the 50 megacycle band to FM—it is the position of RCA and NBC that it should not be approved by Congress, Dr. Jolliffe stated. He pointed out that for more than 20 years it had been one of the basic functions of the FCC and its predecessor, the Federal Radio Commission, to allocate frequencies in the radio spectrum. He said that of all the duties performed by the Commission the allocation of frequencies is "one of the most complex tasks of Government," and declared: "In our opinion it would not be sound for Congress to take over that task."

RCA Was Pioneer in FM

In concluding his statement Dr. Jolliffe said, "RCA is interested in the fullest development of all radio services. It has led the development of broadcasting into a service that is a part of the very lives of our people. It was a pioneer in FM and it was a pioneer in television. We do not take a stand in favor of one of these services as against the other. We favor both. And we are convinced that the needs of both can be accommodated without a feud between the two. The two services can help each other to develop and grow."



THE PRESIDENT CLEVELAND LEAVES SAN FRANCISCO ON HER MAIDEN VOYAGE TO THE ORIENT, FULLY EQUIPPED WITH RCA RADIO AND ELECTRONIC DEVICES.

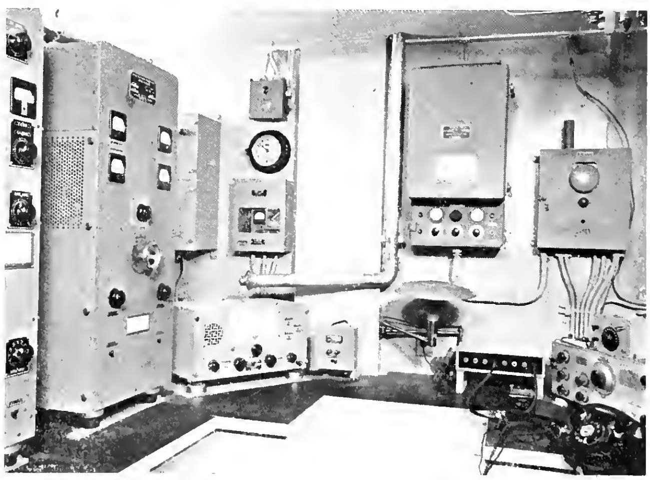
New Luxury Liner RCA-Equipped

Radio and electronic devices designed and installed by the Radiomarine Corporation of America are in use aboard the liner *President Cleveland*, America's largest postwar-built passenger ship now on her maiden voyage to the Orient from San Francisco.

The RCA installations include a loran long-range navigation receiver, a radio direction finder, an automatic radio alarm, an intermediate and low frequency receiver, and four types of radio transmitters.

The 23,500-ton luxury craft carries a type of RCA loran receiver which incorporates the best features of several devices used on airplanes and surface vessels during World War II.

The ship was outfitted at the Bethlehem-Alameda Shipyards in California for the Maritime Commission and the American President Lines.



ONE CORNER OF THE PRESIDENT CLEVELAND'S RADIO ROOM.

Programs by Documentation

New NBC Series Uses Modern Dramatic Techniques to Carry Nation's Problems to Citizens

IN carrying out its role as one of the most dependable mediums for informing the public on important issues, radio has experimented with numerous methods of presenting this educational information in an effective and painless manner. One way which has produced the desired results, while withstanding the closest scrutiny of critics, is the documentary program, an approach which forms the framework of the new program series, "Living — 1948," produced by the NBC public Affairs and Education Staff. The purpose of the series is to arouse listeners to intelligent action on subjects or trends affecting their daily lives and the nation's welfare.

Each "Living — 1948" drama-document is an amalgam of music, drama, narrative, human interest, attractively proportioned to attract large segments of the listening public.

Among the subjects treated are:

"Silver Cords and Apron Strings," an examination of the increasing influence of women in American life.

"Of Rats and Men," a look at the problem of the nation's 150,000,000 rats that are consuming enough grain to feed half of hungry Europe.

"From a Gentleman in Mufti," a dramatization of General Eisenhower's final report as Army chief of staff.

"Broken Homes," a view of one facet of the divorce problem.

"They Rolled Away the Stone," a discussion of the relation between folk music and disaster.

"The Mental Health of the Nation," presented as a psychiatrist's-eye view of the situation.

The American Institute of Public Opinion and its director, Dr. George Gallup, are cooperating with NBC in over-all planning of "Living — 1948" and in certain phases of research. Occasionally, Gallup appears on the program to contribute pertinent facts and figures.

Critics Approve Documentaries

Radio critics generally have approved the new drama-document series. Newspapers and trade journals have greeted it with phrases like "fascinating radio fare," "exciting and at times wonderful radio," and "a surprisingly thorough job."

Variety not only called the series a "big-time excursion into public service programming," but added that "The network has set itself a lofty and ambitious goal in this series—an over-all documentation of the problems facing Americans as citizens in a democracy. It's a tall order; as tall, in fact, as anything being attempted in contemporary radio."

The *New York World Telegram* critic wrote in a full column review: "Its ambitious aim is to mirror the moment; to hold up for inspection the historical present. The first installment, 'Signs of Our Times,' was in the nature of a prelude, and it did a surprisingly thorough job of sketching a background —the temper of the times—against which the series will be projected."

The *New York Daily News* calls the series "fascinating radio fare." The *New York Morning Telegraph* said, "This is nothing less, it appears, than an attempt to encompass the whole sum and substance of human experience, an effort to find out what way we're heading, to point out the signs of the times, and to post warnings and advices along the way."

Ben Grauer, one of NBC's best-known announcers is narrator for the series.

Music for "Living—1948" is under the direction of Milton Katims, who has won distinction both as conductor and violist.

Veteran Staff Handles Series

The NBC Public Affairs staff producing the documentary series includes Wade Arnold, supervisor; Jane Tiffany Wagner, technical advisor; James Harvey, director; Lou Hazam, scriptwriter, and Nancyann Woodard, research specialist.

Arnold, Omaha-born, is a graduate of Knox College with a wide and varied background in journalism and as a scriptwriter, teacher and producer.

Mrs. Wagner has been supervisor for many important NBC programs, particularly "Home Is What You Make It."

A graduate of McGill University, James Harvey joined NBC in New York in 1945. Since then he has directed many of the network's major programs, including "Your United Nations," and "Home Is What You Make it."

The idea for "Living—1948" was conceived by Ken R. Dyke, NBC Administrative Vice President in Charge of Programs.

MILTON KATIMS (LEFT) ORCHESTRA CONDUCTOR; PROGRAM DIRECTOR JAMES HARVEY AND NARRATOR BEN GRAUER DISCUSS A FORTHCOMING PRODUCTION IN THE SERIES OF "LIVING-1948" DOCUMENTARY BROADCASTS.

Science at New Crossroads

New Era of Invention Foreseen By President of RCA in Boston University Address — He Envisages Capsules of Nuclear Energy Making Possible Pocket-Size Radio and Television Sets.

MERE specks of radioactive material from nuclear fission may serve as the power for radio and television receiving sets, as well as for broadcasting stations in the future, David Sarnoff, President and Chairman of the Board, Radio Corporation of America, declared at Boston University during Founders' Day ceremonies, on March 12. The honorary degree of Doctor of Commercial Science was conferred upon General Sarnoff.

In an address entitled "Science at New Crossroads," he said that the potentialities for scientific development and beneficent use of atomic energy are unlimited.

"A miniature power supply in capsule form may make possible radio receivers no larger than a wrist watch, and tiny television sets to be carried in the pocket like a camera," he declared. "When this day comes, people also may carry pocket-size radiophones that will enable them to communicate with home or office, no matter where they are."

Although these fascinating possibilities are not just "around the corner," General Sarnoff pointed out, we shall see these promises fulfilled if the world is at peace and science is unfettered. Beyond today's horizon, he said, automobiles, tractors, airplanes, locomotives and ships also may be powered by small capsules of nuclear energy.

Opportunities in New Era

"So clear are our opportunities in this new era—if we intelligently accept the challenge," declared General Sarnoff, "that they promise to dwarf the wonders we have witnessed in the past fifty years. Yes, in the past five centuries! Inescapably, the future of the world and of civilization is linked with atomic energy. When science releases that power, and society learns how to control it properly, it will start a universal chain reaction that is bound to affect significantly the political, social and economic life of people everywhere."

Changes are destined to come in the Atomic Age, he said, that will make the revolutions caused by steam, electricity and electronics seem simple by comparison.

"Atomic energy is not merely a new laboratory domain of the scientist," he continued. "It will spread into many phases of our life; into the human body and the home, as well as into industry. Therefore, every citizen should be interested in it; every student should learn all he can about this great new force and educators should impart to the public mind the importance of the atom and its possibilities. An informed and active public opinion by freedom-loving people can help to direct the new forces of science toward peace and prosperity.

"Science is at new crossroads. We, the people, stand there, too. Humanity and the destiny of future generations depend on the turn we take at this crucial fork in the road of Time."

General Sarnoff sounded a warning, asserting that mankind has reached the point where it cannot afford "the costly consequences of skepticism and indifference" with respect to inventions and discoveries of science, lest such a discovery as atomic energy be turned to evil rather than constructive purpose.

"The big black headlines, which in 1945 introduced the world at large to atomic energy," he said, "remain vivid in the memory of all of us. While war raged, this new force came upon the world packed in a bomb that blasted and shattered two cities. Atomic energy at the outset was linked with death and destruction. Its potentialities for good were overshadowed by the terror that it struck.

SCIENTISTS AT RCA LABORATORIES REMOVE A VIAL OF NUCLEAR MATERIAL FROM A SHIPPING CONTAINER FOR USE IN RESEARCH PROJECTS.

PRESIDENT SARNOFF SPEAKING AT FOUNDERS' DAY CEREMONIES, BOSTON UNIVERSITY.

"Since the fighting ceased, thousands of scientists have been devoting their talents to harnessing atomic energy for the peaceful purposes of health, agriculture, transportation and industry. All of us wish to see these purposes fulfilled. But more than wishing is required. Laymen, too, must keep themselves informed on this important subject and reflect their interest in a manner that compels attention. Knowledge will increase the power of the public to speed progress on the political and social level as well as in the laboratory."

Stressing the fact that our opportunities to succeed as individuals and to advance as a nation were often found in tiny clues, hidden amid simple surroundings, General Sarnoff asserted: "The steam engine was born in a tea kettle; the airplane came out of a bicycle shop; the automobile first sputtered and moved in a small carriage factory, and broadcasting started from an amateur station in a private garage."

Each of these inventions was, at the outset, confronted by skepticism, he continued, adding:

"The public was indifferent and a long period of time elapsed between their introduction and their popular acceptance. This span has been shortened greatly by the new implements of science and the modern means of exploitation. But the former indifference must not be replaced by another apathy—a lack of concern by the public as to the use made of new inventions and discoveries. There is danger in either attitude and more so today than ever.

Alert Public Opinion Needed

"Failure to appreciate the significance of inventions may retard our technical progress and threaten our National Security. And failure to guard against the evil use of technological developments may destroy our capacity for social progress. We need an informed and alert public opinion to stand guard against both dangers."

For fifty years, the basic inventions related to electricity and electronics have been passing through a process of evolution, he said, declaring that, at the moment, we are busy with basic improvements and new applications, while science seemingly tries to catch up with itself.

"In radio and television," he said, "the electron is the new and magic force. In aviation, it is jet propulsion; in medicine, it is penicillin and streptomycin. Like the original discoveries and inventions in these fields, each is a new key to further developments which will make our present-day conceptions of science seem as crude as the first feeble wireless signal, or the first short flight of the airplane."

Science Has Changed Itself

General Sarnoff emphasized that science is no longer the exclusive province of lone scholars or inventors. He explained it this way:

"Science, while changing the world, has changed itself. It has accumulated knowledge so vast as to be beyond assimilation by a single human mind.

"Where one scientist toiled alone fifty years ago, hundreds work together today in cooperative effort. Research institutions of education and industry have brought them together and provided them with matchless facilities for exploring the unknown, for creating the new and improving the old.

"Upon the foundations created by the pioneers of science, now stand splendidly equipped research laboratories. Within them are assembled men of ideas who use the tools of science to broaden and extend the trails blazed by pioneers and to open new horizons. These laboratories hold the promise of the future; they are the bulwarks of our national security, for war has taught us that science is a nation's greatest fortification, as well as the fountainhead of its progress and its research for enduring peace."

GEORGE McELRATH, DIRECTOR OF NBC ENGINEERING OPERATIONS POINTS OUT FEATURES OF "RADIO MIKE" AS JARRETT L. HATHAWAY, WHO HELPED IN ITS DEVELOPMENT, LOOKS ON.

Midget Broadcasting Station

New "Radio Mike" Weighs Less than Six Pounds but Can Transmit Signals Over Distance of Several Miles

OF the wide assortment of equipment now being assembled to make it possible for millions to see and hear the two major political conventions in Philadelphia this June and July, a favorite of NBC engineers is the new "radio mike," a midget broadcasting station complete from microphone to antenna. According to George McElrath, director of NBC engineering operations, the present unit is an outgrowth of a transmitter developed by the National Broadcasting Company in 1935 called the "Beermug," so named because of its shape. The new unit includes the features of a high-quality microphone and a high-quality transmitting station. Including its four tubes and batteries it weighs less than six pounds and is no larger than the smallest models of portable radio receivers. During the conventions, commentators will carry radio mikes around the floor of Philadelphia's Convention Hall for interviews and close-up descriptions of activities. It weighs 5 pounds 11 ounces complete, and measures only 4¼"x3⅛"x9¾" high. It is a complete miniature radio transmitter, including built-in microphone, audio and radio amplifiers, antenna, and power supply.

In field tests carried out during the last stages of its development, the little unit lived up to the expectations of its designers. One test was made over a distance of 3½ miles, from a point across the Hudson River to the Empire State tower. Observers reported that the received signal was of broadcast quality. In another try-out, the transmitter was carried inside a steel building and up five flights in an elevator. A receiver located across the street received the transmitted signal at all times even from within the elevator.

Radio Mike Helps in Interviews

Since its introduction, the radio mike has proved a valuable tool to radio and television broadcasters. If facilitates sidewalk interviews, interviews with sports participants, and in some cases actual broadcasting of sporting events by contestants. Championship trotting races have been broadcast directly from sulkies, and in one instance, one of these miniature transmitters was strapped on a jockey in a race, permitting him to broadcast his own version of the thrilling drive around the turn and down the stretch. Another especially valuable application of the radio mike is in connection with the broadcasting of a disaster where time or distance prohibits the use of conventional microphones with their connecting cables.

The radio mike is the result of long experimentation and research by the development group of the NBC Engineering Department, under the direction of George M. Nixon, group manager, and his assistant, Jarrett L. Hathaway.

Most Powerful FM Signals Radiated in Camden Tests

The most powerful FM signals ever radiated in this country in the new FM channels, measured at over 300 kilowatts of effective power, were successfully employed for the first time during test broadcasts conducted at Camden, N. J.

The tests were carried out over RCA's experimental FM station, W2SXR, by feeding the output of the new RCA 50-kw FM transmitter, first commercial transmitter of this power to be designed for operation in the 88-108 megacycle band, to a four-section Pylon antenna, which multiplies the effective power six times. The transmitter actually fed 60 kilowatts of power into the antenna, producing a radiated signal with an effective power of 360 kilowatts.

A combination of the RCA 50-kw FM transmitter and the four-section Pylon antenna, located on an elevated site, engineers disclosed, would provide coverage of an area up to 200 miles in radius, making possible the expansion of FM service to distant rural communities. Even wider coverage could be obtained, it was pointed out, by using an eight-section Pylon antenna with the 50-kw transmitter. This antenna, with its power gain of twelve, would provide 600 kilowatts of effective radiated power.

The four-section Pylon antenna was installed on the roof of the RCA transmitter assembly building, immediately above the 50-kw transmitter used in the tests, and the necessary RCA audio facilities, including transcription turntable, microphones, amplifiers, and transmitter control rack, were set up and used within a few yards of the transmitter.

Two-Way Radios for Taxis

System Installed in Camden Cabs Speeds Up Service to Public and Increases Income of Fleet

TWO-WAY radio service between taxicabs and headquarters of the Camden, N. J., Yellow Cab Company was inaugurated recently, following the completion of an initial installation of RCA equipment by engineers of Raymond Rosen and Company, RCA distributors in that area. The system, in effect, makes each cruising car its own "electronic cabstand."

According to Clewell Sykes, President of the Yellow Cab Company, service to the public is materially improved under the new system by making it possible to route cabs with maximum dispatch and efficiency to locations where they are wanted.

The improved service, the company reports, already has had a beneficial effect on its relations with patrons. As many as 25 letters have been received from riders in one day, expressing approval of the time-savings made possible by the fast action on calls telephoned to the cab office.

In other ways, too, the system has proved its value in public service. A woman rider discovered after reaching her destination that she had left her bag, containing a sum of money, in the taxi. The dispatcher's office made contact with the driver who searched the cab, found the missing property and restored it to the owner. The entire procedure was completed in five minutes. Another driver happened on a holdup and notified the dispatcher, who was the first to relay the facts to the police. Accidents observed on the highways have been reported to the proper authorities in the same manner.

With the new radio system in operation, the dispatcher can maintain constant communication with the fleet of cabs cruising greater Camden and surrounding communities, representing 250,000 people. While only 16 cars of the fleet are now using the system, records show that they are handling nearly half of all calls.

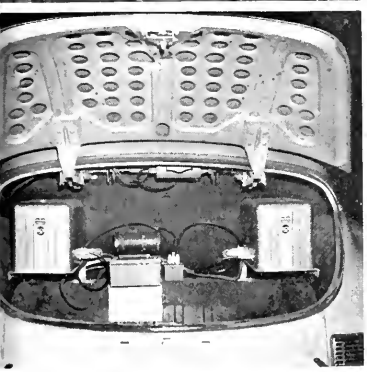
Transmitter on 12-Story Building

Dispatcher's calls are broadcast from an RCA transmitter on the 12-story Wilson Building, at Broadway and Cooper Street. The broadcast control equipment is located in the dispatcher's office.

Camden is the fourth community in which the Rosen firm has completed taxicab installations of RCA two-way radio equipment in recent months. The others are Philadelphia, Darby (Pa.), and Baltimore.

MAIN CONTROL DESK WHICH HANDLES ALL CALLS TO AND FROM TAXICABS.

THE DRIVER LIFTS A SMALL HAND-MICROPHONE TO ESTABLISH CONTACT WITH THE DISPATCHING OFFICE.



TRANSMITTER, RECEIVER AND POWER SUPPLY ARE PLACED IN THE CAB'S REAR COMPARTMENT WHERE INSPECTION MAY BE MADE QUICKLY.

LETTERING ON THE SIDES OF EACH RADIO-EQUIPPED TAXI CALLS ATTENTION TO THE EXTRA-SERVICE PROVIDED BY THE TWO-WAY SYSTEM.

1,500 Students in Institutes

Large Enrollment, with Veterans in Majority, Requires Faculty of Nearly Sixty Expert Instructors

By George L. Van Deusen

President
RCA Institutes, Inc.

THIRTY-FIVE years ago in the early days of "wireless" the American Marconi Company opened a school in New York for the training of operators. Incorporated later as RCA Institutes, this school has continued to lead the field in the training of operators and technicians in all branches of radio. From a small beginning it has grown into an institution with nearly sixty instructors in its faculty, and with a student enrollment of approximately 1,500. Three-fourths of the present student body are veterans of World War II receiving instruction at Government expense under the "G.I. Bill of Rights".

The close association of RCA Institutes with all the manifold activities of RCA has made it possible for this school to keep abreast of scientific progress and to offer a variety of courses which meet the needs of young men entering the industry. Its Board of Directors, headed by Brig. General David Sarnoff, is composed of men who have been closely identified for years with the various phases of modern radio. A Board of Technical Advisers, of which Dr. Alfred N. Goldsmith is Chairman, includes senior engineers from the various members of the RCA family, each being familiar with the special technical problems of his own company or division.

Move to New Building

The rapid expansion of RCA Institutes in recent years has made it necessary to seek larger and more suitable quarters. On April 4, the Institutes moved to 350 West Fourth Street, New York City. Two floors of a modern mercantile building have been altered and equipped to meet the special needs of the school. More than twenty lecture and laboratory rooms are available. The laboratories are designed for maximum convenience, while the equipment is installed for effective teaching and to familarize students with representative types of equipment in industry. Separate laboratories are provided for instruction in the following subjects:

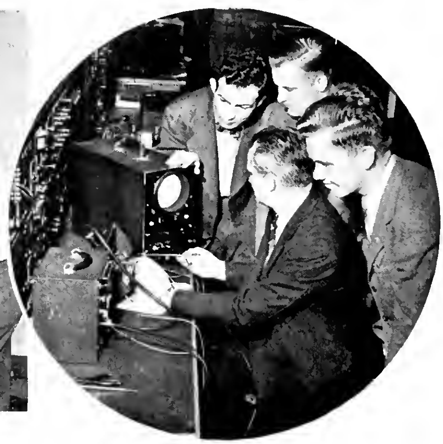
> Physics, radio physics, electrical technology, transmitters, receivers, ultra-high frequencies, audio and video circuits, television, telegraph code and drafting.

Normally, all courses are given to both day and evening students. Day classes meet every week-day except Saturdays and holidays. Evening students attend classes an average of 2½ evenings per week.

The courses now offered by the Institutes are the following: V-3 (Radio Servicing) Course. This is a three term (nine months) course for day students. It is designed to turn out a competent service man on all types of radio receivers including television. The first term is devoted to a study of radio, physics and mathematics, the second term to radio receivers, and the third term to the installation and servicing of television and FM receivers.

AN INSTRUCTOR OUTLINES AN EXPERIMENT IN THE INSTITUTES' AUDIO-VIDEO LABORATORY.

STUDENTS WATCH THE DEMONSTRATION OF A PIECE OF TEST EQUIPMENT.



A GROUP STUDIES THE FUNDAMENTAL UNITS OF A SMALL RADIO TRANSMITTER.

The V-5 (Radio Operators) Course is the modern counterpart of the original "Wireless Operators' Course" in which many of today's leaders in the radio industry began their successful careers. Also a three-term course, the first and second terms being identical with the V-3 Course. The final term is devoted to the study of basic and CW transmitter circuits and the laws and procedures governing CW operating.

The V-4 Course in the International Morse Code is offered to those who wish to improve their code speed or to learn the code independently of other instruction. Code practice is also a part of the V-5 Course.

Qualifies Student as Technician

The V-6 (Radio Broadcasting, Sound) Course runs for four terms (twelve months). It extends the field of training beyond that of the serviceman with a view to qualifying the graduate as a radio laboratory aid or as an operator or technician in radio communication or broadcasting. The first three terms are the same as in the V-5 Course; the fourth term covers AM and FM transmission, studio and pick-up equipment, broadcasting laws and operating procedure.

The V-7 Course adds the operation of radio television broadcasting equipment to the subjects covered in V-6 and requires six terms. The fifth term is devoted to television receiver circuits; the sixth to television transmitters, remote pick-up and relay equipment.

The T-3 (Advanced Technology) Course is the most advanced course offered by the Institutes. It is intended to prepare the student for entrance to one of the many branches of electrical communications, such as a studio or transmitter technician with a radio broadcasting company, testing or field servicing, research or laboratory work, transmitter or receiver operating in radio communications, as well as other positions in which a comprehensive knowledge of electrical communications is required. Satisfactory completion of a four year high school course is a prerequisite in order that the average student may cover the wide range of this course in two years of day classes. Receiving training during the first year in mathematics, physics and electrical technology, the student progresses in his second year to the application of these fundamentals to the more specialized techniques of audio, video and radio frequencies.

High School Refresher Course

For the prospective student who lacks the prerequisites for entrance to the Advanced Technology Course, the T-1 (Technology Preparatory) Course is available. Since only one term is devoted to this course it is designed for the graduate of a four year high school course who needs certain additional or refresher training in high school mathematics and physics.

Although RCA Institutes makes no promises as to employment after graduation, the school assists its graduates in contacting prospective employers. The qualifications of its graduates are brought periodically to the attention of the radio industry. All reputable companies are invited to interview prospective graduates with a view to filling positions in their organizations.

RCA Institutes, while proud of its record, its present staff and its facilities, promises no easy road to advancement and is not seeking students who expect one. Rather, it is looking for men who recognize that proper preparation and hard work are essential to success in any occupation.

Twenty RCA Radar Units Purchased by Coast Guard

PURCHASE by the United States Coast Guard of twenty 3.2-centimeter shipboard radar units for installation on patrol cutters was announced recently by Walter A. Buck, President of the Radiomarine Corporation of America.

The installations consist of standard Radiomarine commercial radar models, with the addition of special accessories specified by the Coast Guard for use in experimental work destined to develop a new radar beacon system for the benefit of ships' navigators.

Included in the equipment is an RCA radar beacon unit to retune the shipboard radar receivers so that they can receive radar beacon signals from special transmitters located ashore or aboard lightships. This unit is designed to help the Coast Guard obtain good factual experience on radar beacon reception.

Equipped with 12-inch Scope

In addition to the 3.2-centimeter super-high-frequency band which provides a high resolution in range and bearing, Mr. Buck reported, the RCA radar units are equipped with a standard 12-inch viewing scope, an echo box to create artificial targets for testing purposes, and a variable range marker which electronically calculates and registers on a dial the exact range of a selected target from 0.2 to 20 nautical miles from the radar-equipped ship.

These radar units have operating ranges of 1½, 5, 15 and 50 miles, as well as close-in ranges as low as 80 yards, Mr. Buck said. The high-frequency beam hugs the surface of the water and picks up buoys or other small objects so that a clear and detailed scope picture of the surrounding area results.

Television - a Powerful Tool in Modern Education

Universities and Public School Systems Study Ways to Use New Medium Effectively

By William H. Knowles

General Manager
Educational Sales Dept.
RCA Victor Division

TELEVISION is potentially one of the most effective educational tools yet developed. Young as it is, this dramatic medium of sight and sound has already proved itself to be an instrument which can contribute to the educational and cultural elevation of the American public.

Many leading universities have already initiated exploration of television as an educational agency. School systems, broadcasters, civic bodies, and eminent individuals in educational circles have made valuable contributions to our knowledge of how to use television most effectively as a teaching implement. Nevertheless, the study has only begun.

Educators are thinking more and more of television in terms of its application to the school field at the present time, not in terms of a teaching tool available only for future generations. A year ago, it would have been in the realm of prophecy to discuss television programs for classroom reception and for extra-curricular viewing, because only a few centers of the nation had television service. Today there are twenty-six television broadcasting stations on the air. It is expected that this figure will be more than doubled by the end of the year. By the end of 1950, most of the major cities in the United States should be linked by television.

The American public has demonstrated beyond doubt its desire for television. The adventure and entertainment provided by television, and its educational and social aspects have securely captured the public imagination. Educators are quick to realize that educational programs effectively planned for television offer tremendous potentialities for reaching and teaching both juveniles and adults.

The television audience not only is growing rapidly in size but viewers are giving close attention to what is seen and heard on the programs. This attentiveness is an important factor to the educator, particularly since a large proportion of daytime audiences will be made up of school-age viewers.

Educational Aspects Twofold

Speaking generally, educational applications of television fall into two major categories. One is extra-curricular or enrichment program material; the other is "in-school" or self-originated programs.

As to the extra-curricular type of program, educators can confidently look to broadcasters to supply public service programs featuring major events of national importance — the opening of Congress, Presidential pronouncements such as President Truman's recently televised "State of the Nation" message, and the National Presidential Conventions which will be telecast this summer. These programs will be televised because of their general interest to viewers of all ages. They offer timeliness, a sense of actuality, a first-hand view of history in the making. They can greatly augment and enrich the student's classroom study of history, economics, national affairs, and other topics.

Public service programs of educational interest to both home listeners and in-school audiences can also be expected. Two important new programs of this type have just been inaugurated by station WFIL-TV, Philadelphia. One is a series of telecasts explaining how the teaching of music is carried on in schools. Another is a science program demonstrating what the Board of Education is doing to train students for careers in science, including, among others, the fields of physics, plastics, chemistry and mechanics.

The primary objective of these programs is to demonstrate to parents how instruction proceeds in the classroom. As television facilities are extended within public and parochial school systems, the series is expected to be made available for in-school, classroom use in the instruction of students.

School Use Expands Rapidly

Use of television by schools and colleges is expanding rapidly. Temple University in Philadelphia with its Television Forum is believed to be the first university discussion program to be televised on a regular schedule. This program, featuring members of the University Debate Council, is presented weekly on an evening spot and is relayed to Baltimore and Washington.

In cooperation with WFIL-TV, Temple University also recently put on a model Republican Convention staged by Philadelphia secondary school students under the auspices of the Civic Forum League. The mock convention gave television audiences an idea of what is in store next summer when the two national conventions are held in Philadelphia.

In Chicago, a popular half-hour juvenile program called "Junior Jamboree" is being aired over station WBKB. In Detroit, the school system sponsors a discussion program, "Young Ideas", among high school students over station WWJ-TV. Over New Jersey's new station WATV, in Newark, the school sys-

(Continued on Page 21)

TOSCANINI TELEVISED

Music Critics Acclaim First Television Performance of Maestro and NBC Symphony as Revealing Great Possibilities of New Medium—More than 300,000 Televiewers "Attended" All-Wagnerian Concert and Performance of "Beethoven's Ninth"

ACCLAIMED by the television audience and music critics alike as revealing the great possibilities in telecast presentations of musical performances, Arturo Toscanini and the NBC Symphony Orchestra were televised for the first time on March 20 in Radio City, New York. A television audience estimated at more than 300,000 persons along the Eastern Seaboard, from Washington to upstate New York, saw as well as heard the all-Wagner concert. So great was the response that, Maestro Toscanini and the NBC Symphony were televised again, two weeks later, during their performance of Beethoven's Ninth.

In introducing the program to the television audience, Brig. General David Sarnoff, President and Chairman of the Board of Radio Corporation of America, said:

"Tonight, for the first time in our history, we are televising the great music of Wagner, the great interpretive genius of Toscanini and the skilled playing of his gifted artists in the orchestra. Never before, in the history of the world, was such a triumph possible. This represents the realization of a dream; a dream we have dreamed for 25 years or more. And so tonight, the magic of science combines with the glory of the arts to bring to countless people in their own homes, over the wings of the radio waves, this program of great music and all it means. What a joy it is that this can be done while our beloved Maestro Toscanini is still a young man!

"It seems to me significant that, while the atmosphere throughout the world is clouded with anxiety, the radio wave can pierce this fog and speak to people everywhere in the universal language of music.

"Those of us who have been privileged to attend in person these concerts at this studio, may be interested to know that the total number of people who have attended over the entire period of the last ten years represents less than ten per cent of the number of people who will be able to see and hear Maestro Toscanini and the NBC Symphony Orchestra during the following one hour. And this is only the beginning!"

Three Television Cameras Used

Fully aware of the difficult problems facing them, NBC's engineering staff had made extensive tests before putting the first of those historic program on the air. Favorable positions for two RCA Image Orthicon cameras were selected in the auditorium balcony. Another was placed on the right side of the stage behind the tympani section. Each camera was equipped with special lenses to bring closeup views of the Maestro in action. Additional floodlights and spotlights were installed to give sharp contrast to all members of the orchestra.

Much of the success of the event as a television feature was credited to the ocntrol-room engineers and production men for their skill in directing the cameras. Following the score closely, they brought into focus individual groups of musicians as the latter took up one theme and then another. And finally, in a scene which proved to be one of the inspired highlights of the visual program, the engineers superimposed a closeup of Toscanini on a view of the full orchestra thereby illustrating impressively how the Maestro conveys his dynamic leadership to the musicians.

For the first time, also, television made it possible for many thousands who had never seen him before to witness the mannerisms of the 81-year-old conductor. They saw his ever-changing facial expressions during important passages of the music and the expressive gestures of his hands and baton as he drew the desired interpretations from his men. They gained the impression of a musical genius wholly absorbed in his work, yet relaxed and natural in his occasional moments of repose.

Music and radio critics were enthusiastic in their praise of the two television programs.

Said Olin Downes, music critic of The *New York Times.:*

". . . television has a great and wonderful task to do. It will bring music by visual as well as audible means nearer to people than has ever happened before in history. This will apply to all species of musical performance, and develop more intimacy between the interpreter and the listener than would otherwise be possible."

To support his belief that music as an art should not be "disassociated from other phenomena, visual as well as auditory, sensory or cerebral of existence," Mr. Downes added a quotation from an American poet: "The seen is proved by the unseen and the unseen is proved by the seen."

Jack Gould, The *Times*' radio editor, called the Wagnerian concert the "finest program yet offered by television, a superb and exciting demonstration of the medium's potentialities as an original art form. As if by magic, television suddenly and truly came of age."

John Crosby, radio critic of the *New York Herald Tribune,* wrote: "This all-Wagner program was an exciting and satisfying performance not only as a concert but as television."

In the *N. Y. Daily News*, Ben Gross, radio columnist, said that the program "combined imaginative touches with musically sensitive perception. But, above everything else, Toscanini showed himself to be a great television actor. His face mirrored every mood of the music."

Television in Education

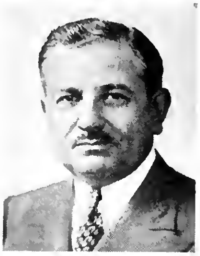
(Continued from Page 20)

tem plans to put on a "Junior Town Meeting of the Air".

American University in Washington, New York University, Syracuse University, Yale University, and others are planning educational telecasts. Catholic University in Washington already has had dramatic plays televised over the NBC television network.

Brand Names are Trusted

Consumers' Faith in Established Trade-Marked Products Will Remain Unshaken, Folsom Says, Only as Long as Products Maintain Reputation for Excellence.



By Frank M. Folsom

Executive Vice President in Charge of RCA Victor Division

Excerpts from Address by Mr. Folsom at Symposium Conducted by Brand Names Foundation.

FAITH is not an intangible thing. It is something tangible, something definite and concrete, whether it be faith in brand name product, brand name advertising or in a religious concept, in democracy, in free enterprise. Faith is belief. It is the fruit of our experience and knowledge.

Consumers' faith in brand name products is based on favorable experience with those products and services. Only by maintaining that favorable experience can we hope to maintain the brand name buying habit in the American public. Only by continuing that favorable experience enjoyed by consumers can we hope to reinforce America's faith in brand names and brand name advertising.

Test Shows Brand-Name Power

Last year, Lit Brothers of Philadelphia advertised a sale of "famous make" mattresses. Forty-eight Simmons mattresses were displayed. Half of them bore the Simmons label. From the rest, the Simmons label was removed and a fictitious label, "Dreamland" was substituted. Both were priced at $39.50 and both given equal display prominence. At the end of the day, 23 Simmons mattresses were sold compared with six Dreamlands. The next week, the store cut the price of the Dreamlands to $34.50, five dollars less than the Simmons-labelled mattresses. In the first four hours, customers bought 32 Simmonses against four Dreamlands. The Dreamlands were then marked down to $29.50. Before the store closed, 14 more Simmons were sold as against 13 more Dreamlands at ten dollars less for exactly the same product. Here is a clear-cut demonstration of the American consumer's faith in brand name products.

Let me give two other instances. Immediately after the war ended, quantities of unknown brand radio sets hit the market. Because of the pent-up consumer demand, sales were good. But, as soon as brand name sets began to flow into the stores, the unknowns backed up drastically and dealers who had stocked up on them scrambled to unload.

Faith Built Battery Market

For a final illustration I would like to mention RCA's experience with radio batteries. Up to two years ago, RCA had never sold batteries. But because we were in the radio business, it seemed logical for us to enter this allied field. We did so, and we packaged the product to feature prominently the well-known RCA brand name. In two short years we were doing excellent business in batteries. Although it was a new product, consumer faith in the RCA brand name created high acceptance for the batteries.

Our country's founding fathers, and Americans ever since, established and embraced the democratic form of government because of a strong and unswerving belief that it does the greatest good for its citizens. So long as that form of government continues to do that job, then America's faith in democracy will remain strong and unshakable. But if, for any reason, it should cease doing that job, then and only then will the American public think of casting democracy aside for a form of government that will. Our answer to those few voices who would change our form of government is to see to it that democracy continues to work for the greatest good. In this way, America's faith in democracy will be reinforced.

Similarly, we accept the principle of a free enterprise system because it has demonstrated that its fruit is the greatest good for the greatest number of people. Under the free enterprise system, our country has made tremendous strides economically and socially, and today what has been termed the American way of life is indeed the envy of people around the world. The free enterprise system is a force for good, and America will continue to embrace it as long as it achieves good.

The American public's faith in brand name products and in advertising will remain firm and unshakeable just as long as they stand the test of experience, that they are as good as we say they are. Quality and value—these are the cornerstones upon which brand name products firmly rest. The brand name products we manufacture today have a heritage that in most instances go beyond our own span of years. As manufacturers we are entrusted with the responsibility of maintaining and advancing that product heritage.

Expands Radar and Radio Service in Gulf Area

Radar and radio service has been expanded in the Gulf of Mexico area by the Radiomarine Corporation of America through the opening of a new service station at 239 Tartar Street, Pasadena, Texas. According to George F. Shecklen, Executive Vice President of Radiomarine, this latest addition to the Company's chain of twenty-three service stations in the Gulf and Mississippi areas is equipped to provide installation, maintenance and inspection of all types of radiotelegraph, radiotelephone, direction finder, radar and loran marine apparatus.

The new station is ideally situated in the heart of the Gulf shipping area, midway between the oil refineries at Baytown and the freight warehouses at Houston, to serve tankers, cargo vessels and rivercraft.

River Pilots Laud Radiophone

Mississippi Boat Captains Broadcast Comments of RCA Service Over National Network

INTERVIEWS by radiotelephone with river captains aboard vessels on the Mississippi and two of its tributaries have demonstrated to a coast-to-coast audience of the Mutual Broadcasting System the importance of the new 1000-watt transmitter and companion receivers at the St. Louis, Missouri, station of the Radiomarine Corporation of America.

The special broadcast, recorded for the network at the RCA station, brought to listeners the voices of skippers as far away from St. Louis as Greenville, Mississippi, 700 miles down the river. It revealed not only the tremendous range of the new facilities, but showed dramatically how radiotelephone service has ended the hazardous isolation of craft plying America's inland waterways in storms and darkness.

Radio Operations on River

Announcer Jack Bennett, of KWK, St. Louis, started the program by interviewing Robert Ugel, Radiomarine Service Engineer, who described how the radiotelephone system was assisting river operations.

"Before the development of the radiotelephone," said Mr. Ugel, "vessels on the Mississippi and other rivers often encountered serious communications difficulties, particularly in bad weather. For instance, to make an urgent telephone call it was necessary to find a landing, dock the vessel, and go ashore. But with radiotelephone it now is possible for the captain to pick up his telephone aboard ship and call us here at St. Louis. We are able to connect him with any telephone operator in the United States."

The announcer inquired as to the range of Radiomarine's new facilities with respect to service on the Mississippi and its tributaries. Mr. Ugel replied that the St. Louis station readily communicated with vessels as far distant as St. Paul, Pittsburgh, and New Orleans.

Ship-to-Shore Calls Made Easily

"If you are aboard a vessel anywhere on the inland waterways and you desire to talk to someone in Kansas City, for example," Mr. Ugel explained, "you would call us by radiotelephone, using the proper wavelength, and give us only the telephone number of the party you wished to contact, and we would be able to connect you directly by landline to the Kansas City operator. On the other hand, persons on land can contact those aboard river vessels in two ways—either by telegraph or direct telephone. By telephone it is only necessary to contact your long-distance operator and ask for the St. Louis marine operator. We do the rest."

Among the skippers interviewed were Capt. Marks, of the *Huck Finn*, proceeding up the Illinois River some 182 miles north of the mouth; Chuck Lester, of the *Sohio Fleetwing* (a Standard Oil Company of Ohio vessel), proceeding north about 190 miles from St. Louis; Capt. Warner, of the *F. B. Warner*, about 104 miles from Cincinnati; and Capt. Striegal, of the *Elisha Woods*, proceeding south from Greenville.

The interview with Capt. Marks was typical of those with river captains. A portion of it follows:

ANNOUNCER: Ladies and gentlemen, we are about to talk to a man out on the Illinois River. Captain Marks, of the *Huck Finn*. How are you, Captain?

MARKS: Oh, just fine, how's yourself?

ANNOUNCER: How are you receiv- us, Captain?

MARKS: Very good.

ANNOUNCER: Tell us, Captain, where are you?

MARKS: 182 miles north of the mouth of the Illinois River.

ANNOUNCER: How is the weather up there?

MARKS: Pretty warm today. It's about 50 degrees, ice is melting.

ANNOUNCER: Where is your home?

MARKS: My home is in the little town of Evanston, Illinois.

ANNOUNCER: Where are you bound for now?

MARKS: We are bound for Peoria . . . with three oil barges.

ANNOUNCER: Are they breaking the ice up there?

MARKS: Yes, the channel still has ice—approximately 4″.

ANNOUNCER: How long have you been using radiotelephone communications on the river?

MARKS: Well, this is kind of a new experience to me. I have used it about two months.

ANNOUNCER: What is your opinion of radiotelephone as a means of communication on the rivers?

MARKS: I believe it is the best means of communication that we have; it is a great thing.

ROBERT UGEL, RADIOMARINE SERVICE ENGINEER (LEFT) IS INTERVIEWED BY KWK ANNOUNCER JACK BENNETT ON THE IMPORTANCE OF RADIOTELEPHONES IN RIVER OPERATIONS.

RCA Review Ends 2nd Year

Magazine Regains Pre-War Standing in Electronic Field, Supplemented by Publication of Important Books on FM, Television, and Patent Procedure

IN the two years that have passed since the RCA Review Department was established as a part of the RCA Laboratories Division, Princeton, N. J., the publication has regained the position it held before World War II as a widely accepted and authoritative technical journal of radio and electronics research and engineering. In addition, the department has expanded its activities to include the publication and distribution of volumes on Television, FM, Patent Procedure and several indexes. Publication of the *Review* was suspended in 1942 when distribution of technical information was restricted by wartime security regulations.

The basic purpose of the *RCA Review* is in line with the policy of the Radio Corporation of America, for, since its formation in 1919, the Corporation has supported the principle that research and engineering knowledge and techniques must be shared if their full worth and usefulness are to be eventually realized. Furthermore, the establishment by RCA of a "technical publishing company" within its own ranks is an extension of the active support which has been given to professional societies and their technical journals.

RCA Review Started in 1936

When it was first established, twelve years ago, *RCA Review* was published by RCA Institutes Technical Press as one of the activities of RCA Institutes, Inc., the oldest radio and electronics school in the country. From 1936 until publication ceased temporarily in 1942, twenty-four issues of the journal had appeared. Papers in these six annual volumes were written by RCA scientists, engineers and executives and covered such subjects as television, broadcasting, electron tubes, communications, acoustics, antennas, electron optics, facsimile, wave propagation, measurements and tests, circuits and components, and special equipment, together with papers in physics, mathematics, chemistry and other fields which relate closely to radio and electronics.

In the same pre-war period, four volumes of the RCA Technical Book Series also were published. These were: *Television*, Volumes I (1936) and II (1937); *Radio Facsimile*, Volume I (1938) and *Radio at Ultra-high Frequencies*, Volume I (1940). These books, for the most part, consisted of reprints of papers published in various technical journals, and the compilations met with wide acceptance as valuable reference works.

Activities Moved to Princeton

In 1945, the activities of *RCA Review* were shifted to Princeton. George M. K. Baker (Lt. Comdr., U.S.N. (Ret.) was appointed Manager of the new department and Editor of *RCA Review*. In March 1946, the first post-war issue was published. Within a short time, the acquisition of a paid subscription list double that of pre-war years testified to the fact that the *Review* had resumed its status as one of the leading technical journals, being extensively referenced, abstracted and quoted by indexing services and other technical journals.

Early in 1947, the first two post-war volumes of the RCA Technical Book Series were available—*Television*, Volume III (covering the period of development from 1938 to 1941) and Volume IV (1942-1946). The third volume in this Book Series —*Frequency Modulation*, Volume I (1936-1947) — has just appeared, and additional volumes are already in the formative stage.

In the fall of 1947, the RCA Review Department inaugurated a new RCA Engineering Book Series to provide material less technical than that contained in the Technical Books. Subjects of the Engineering Books are to be selected on the basis of interest and value to scientists and engineers. The first volume—*Patent Notes For Engineers*,—written by C. D. Tuska, Director of the RCA Patent Department, already

PUBLICATIONS OF THE RCA REVIEW DEPARTMENT SINCE ITS FORMATION IN 1946.

has demonstrated its value to technical and legal authorities, not only in radio and electronics but in other technical fields. It has been purchased in substantial quantities by colleges and schools. Several titles are now under consideration as additional volumes in this Series.

An important service provided by the RCA Review Department is the preparation of Indexes to its RCA Technical Papers. These booklets list substantially all technical papers written by RCA personnel since 1919. Volume I (1919-1945) and Volume II-a (1946) appeared early in 1947. Since that date over 22,000 copies have been distributed. Similar distribution for Volume II-b (1947) is underway. The Indexes list the papers chronologically, alphabetically by author, and include a subject classification section to provide maximum usefulness. Yearly Indexes are planned for 1948 and 1949; in 1950 the sub-volumes are scheduled to be consolidated into RCA Technical Papers-Index, Volume II (1946-1950).

Extra Service to Subscribers

From time to time, *RCA Review* publishes or distributes various technical pamphlets, bibliographies, reprints, charts and miscellaneous material for scientists and engineers. Generally these items are gratis and are provided solely as an additional service to subscribers and others who request them.

Another function of the RCA Review Department which deserves mention is the editorial and publication assistance available to RCA authors. Under this arrangement, an author may obtain aid in the preparation of his paper, regardless of the medium for which it is intended. This service relieves authors of many details and has been greatly appreciated.

All material published by the RCA Review Department is carefully selected by a Board of Editors composed of recognized authorities in their fields. Particular attention is paid to the appropriateness, significance and timeliness of the texts. As a consequence, *RCA Review*, the various books and other material are considered authoritative sources of new and advanced information and provide important reference works of the greatest value.

WALTER A. BUCK

Admiral Buck Elected President Of Radiomarine

Rear Admiral Walter Albert Buck, U. S. Navy (Ret.), former Paymaster General and Chief of the Bureau of Supplies and Accounts in the Department of the Navy, has been elected President of Radiomarine Corporation of America. David Sarnoff, President and Chairman of the Board of Radio Corporation of America, made the announcement on March 15.

Voluntarily retiring on March 1, Admiral Buck ended a distinguished career of thirty years in the Navy. He had served as Paymaster General and Chief of the Bureau of Supplies and Accounts from October 1, 1946, to his retirement. For his wartime services, he was awarded the Legion of Merit and other honors.

Admiral Buck is a native of Oskaloosa, Kansas. He was graduated by Kansas State College of Agriculture and Applied Science with a Bachelor of Science degree in Electrical Engineering in 1913 and received a Master of Science degree from the same college in 1916.

Commissioned an Ensign in the United States Navy on July 30, 1917, Admiral Buck served in World War I as supply officer on the *USS Canandaigua*. Following the war, he received a variety of assignments, including four years in the Planning Division of the Bureau of Supplies and Accounts.

At the outbreak of World War II, Admiral Buck was a Commander, serving as force supply officer on the staff of Vice Admiral Arthur L. Bristol, USN, Commander, Support Force, Atlantic Fleet. For his war services on this assignment, he was awarded the Legion of Merit.

In February, 1942, Admiral Buck was attached to the Office of Procurement and Material, Navy Department, Washington, D. C., and in January, 1943, he was assigned for duty as supply officer of the Navy Yard in Philadelphia.

In 1945, Admiral Buck was Director of the Navy Materiel Redistribution and Disposal Administration and then Chief of the Property Disposition Branch, Materiel Division. Prior to his promotion as Paymaster General and Chief of the Bureau of Supplies and Accounts, he served seven months as Assistant Chief of that Bureau.

HAVANA OPENS ITS $3,000,000 "RADIO CITY"

Opening of Cuba's $3,000,000 "Radio City" in Havana will have a salutary effect on broadcasting throughout the Caribbean and Latin America, Meade Brunet, Vice President of the Radio Corporation of America and Managing Director of the RCA International Division, declared after returning to New York from a field trip on which he observed business conditions at first hand in Mexico and Cuba.

"Business in Cuba is excellent," he said. "A progressive spirit prevails. I was particularly impressed with the new RCA-equipped radio and entertainment center built by Goar Mestre. It drew high praise from a group of Latin-American broadcasters who attended the opening. I believe it will have a healthy effect on broadcasting in that area, as well as in other Central and South American republics."

Mr. Brunet said that Mexico recently had passed through a period of business adjustment in which some phases of commerce suffered. But, in his opinion, all current signs point to an improvement.

Modernized Communications Calls for Trained Personnel

Supervisors, Operators and Office Staff Are Included in Courses of Instruction at RCA Communications

by Earl Zack
Training Manager
RCA Communications, Inc.

TO MEET demands created by the increased tempo of international business, news and political affairs, the world-wide radio communications services of RCA Communications, Inc., are operating today at new heights of speed and efficiency. How this modernization has been brought about by the adoption of new operating techniques and methods already has been revealed. But little yet has been told of the extensive plans for training and orienting the personnel who, despite modernization, are essential to a greater degree than ever for the accurate processing of the messages that move over radio channels between New York and more than 60 centers of the world.

Curriculum Limited at Start

From its small beginning in 1946, when the curriculum was limited to instruction in teletype and radio operating, the Training Division of the Personnel Department of RCA Communications, Inc., has been greatly expanded. At present, employees attend classes in supervision, mechanics, preparation for obtaining Federal operators' licenses, stenography and foreign languages. In addition, the Division conducts aptitude and intelligence tests and evaluates operational skills. More recently, courtesy courses have been established for machine operators employed by customers, thus acquainting this important segment of RCA contracts with the most modern equipment and methods.

Need for Greater Skill

As traffic volume increases, the need for greater skill in the handling of radio and teletype equipment increases in proportion. For this reason, possibly the most important of the several existing courses emphasizes these subjects. Each student attends classes on his own time for a minimum of two hours a day. Close to perfect attendance is demanded. If he starts with a minimum of skill, the average student becomes proficient in three to five months.

Upon entrance to the school, the student is thoroughly oriented in the place the Operator occupies in the over-all communications system. He is given extensive briefing in such elements as message form and the parts and meaning of various types of traffic.

The student continues practice on the teletype or Page Printer until he attains a speed of 40 words a minute, free of errors. Requirements call for an ultimate speed of 50 w.p.m. and an accuracy of 99.9%. Either special material prepared by the instructors or live traffic is used in this portion of the training. Once the first stage of proficiency has been reached, the student is moved in succession to the Typing Reperforator, the Package set, which is a compact transmitting and sending unit, and finally to the automatic equipment.

A case history is maintained on each student. In this record are noted his reactions to criticism, the ease with which he learns, his cooperation and adaptability. This information plays an important role when the personnel department considers promotions to advanced positions in the company. Upon graduation, a merit rating form is made out and sent with the student's records to the Placement Division for use when referring him to the New York Superintendent for assignment.

Since the Division started using them the value of these records as an aid in placement has become increasingly obvious to the Company and to the Union.

Another important facet of Training Division activities is the induction of new employees. The desirability of acquainting newcomers to the staff with the organization of RCA Communications, Inc.—what it is, what it does and its place in the RCA family—is obvious. But

CONFERENCE OF SUPERVISORS IN SESSION AT RCA COMMUNICATIONS the lecture course was extended to include older employees when Personnel Coordinators reported that many long-time members of the staff had indicated their desire to be included. Two days is the normal time for this course.

The Training Program does not place all of its emphasis on the lower echelons of employees. This month RCA Communications inaugurated a series of conferences for Supervisors. The subjects for discussion include the place of the supervisor in the company, labor relations, essentials of leadership, indoctrination of new workers, maintenance of discipline, delegating responsibility and building morale. The use of carefully chosen visual aids and training films is an integral part of the program. It is hoped that this conference series will be supplemented later by another on "Modern Organization and Management."

As the company extends its communications circuits in coming years a knowledge of the most commonly used languages and of the customs of other peoples can be of substantial aid in gaining cooperation and the friendship of foreign contacts. To meet this need the Training Division, as an experiment, last year formulated courses in French and Spanish, first for executives and technicians and later for company employees in all categories. Fifty-four students registered in the first classes but many others were excluded because of the limited time at the disposal of the instructors.

Extra-curricular Activities

Any outline of the company's activities in the training of personnel would be incomplete without mention of some of its extra-curricular activities. It trains representatives of foreign governments in some aspects of personnel procedure. It guides and counsels employees, particularly in relation to personal problems requiring psychological analysis. When requested, the Division accepts machine operators of customers for special training. Experience in this category has convinced the company that the higher efficiency of the RCA-trained customers' men reduces message congestion on the tie-lines connecting the customer offices with Communications headquarters at 66 Broad Street.

The foregoing training phases represent only the beginning. More programs and activities are in prospect, and when they materialize, the training program at the end of this year should be as complete and productive as any in industry.

Training for training's sake is, of course, unjustified. The project must pay dividends or it should not be continued. The Personnel Department of RCA Communications is convinced that its plans will pay dividends that will show up as increased prestige in foreign markets, in better morale and employee efficiency and, most important of all, in greater revenue to the company.

Liquid Lens Enlarges Television Images

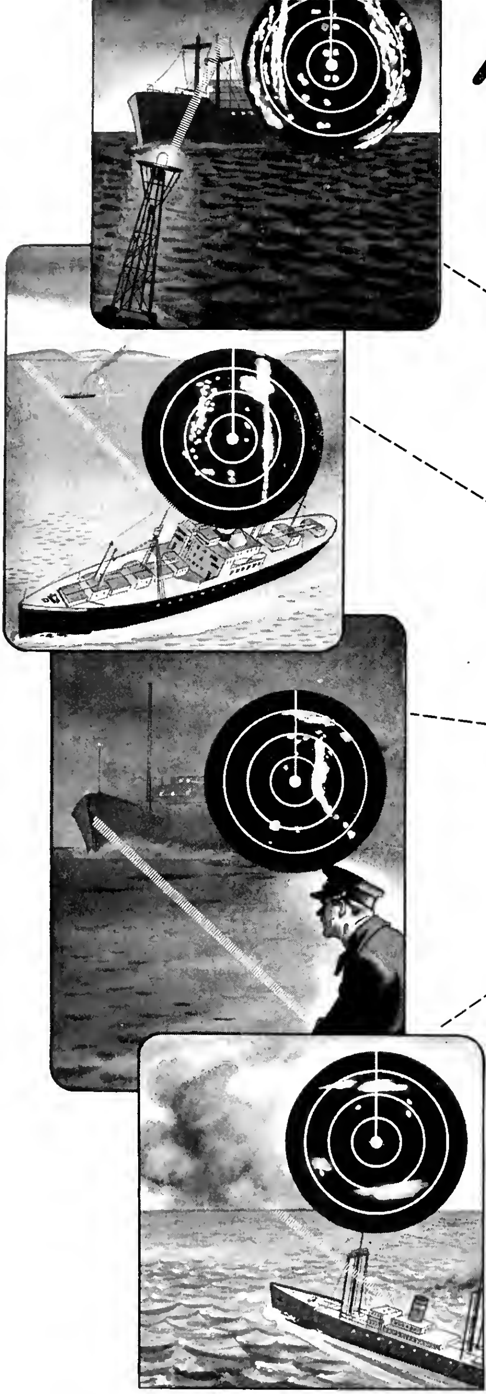
Television pictures received on seven- or ten-inch television picture tubes can be enlarged to the approximate size of those produced on a 15-inch picture tube, through the use of a magnifier developed by the Tube Department of the Radio Corporation of America.

When in use, the magnifier is set up about seven inches in front of the television picture screen, using two metal supports supplied with it. When made necessary by an elevated position of the television receiver, the lens may be suspended from the ceiling and securely anchored in place by tie-wires.

One of the newest applications of plastics in the optical field, the picture magnifier is a transparent Plexiglas lens filled with a clear oil having the same optical properties as the plastic material, a combination that produces a true optical lens.

Designed for use with all makes of direct-view home television receivers, the new lens also has proved its effectiveness in taverns, clubs, and other locations where larger television pictures are desired.

TELEVISION IMAGE MAGNIFIER IN PLACE IN FRONT OF THE SCREEN OF AN RCA VICTOR MODEL 8TS30.



MORE for your money—

with Radiomarine's 3.2cm *All-Purpose* RADAR

1. PILOTAGE

In harbor entrances, on rivers or in restricted channels, the navigator sees on the radar scope the exact location of other ships, buoys, beacons and prominent land projections of the area.

Radiomarine 3.2cm Radar reveals low-lying buoys and channel markers as close as 80 yards from the vessel, under conditions of poor visibility.

2. POSITION FINDING

Lightships or other known objects whose position is shown on navigation charts can be used as targets to obtain a fix and determine the ship's position. The range and bearing may be taken directly from the radar scope.

The 1.8 degree horizontal beam and 0.25 microsecond pulse of Radiomarine 3.2cm Radar locates them with sharper definition and greater accuracy.

3. ANTI-COLLISION

In fog, darkness or storm, radar enables vessels to proceed on schedule and steer a safe course. The navigator watches on the radar scope the bearing, distance, and speed of approaching ships, the exact location of near-by hazards.

Radiomarine's 12 inch viewing scope shows 86 square inches of picture area. Pictures are clearer, larger and steadier.

4. STORM DETECTION

Many navigators use Radiomarine Radar to detect and plot the movement of storms, rain squalls and heavy cloud formations. This information gives the captain early warning to prepare for bad weather and, where possible, to avoid it.

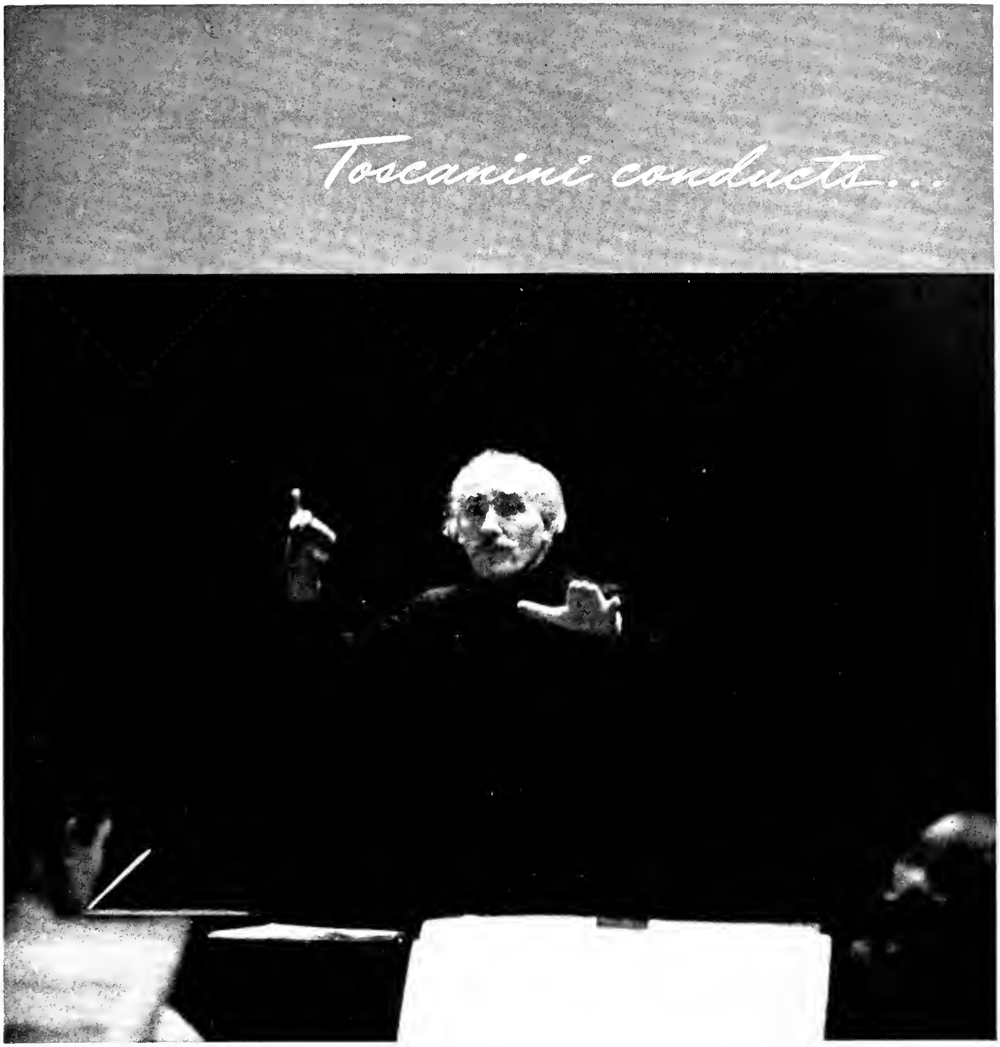
In rain, Radiomarine's fast time constant switch gives the navigator vision through and within the storm area.

YOU GET ALL 4 NAVIGATIONAL AIDS WITH RADIOMARINE 3.2cm RADAR

Only with 3.2cm radar do you get all four of the aids to navigation described. Ship owners and operators prefer Radiomarine 3.2cm Radar. Its *all-purpose* application is the answer to faster, safer, more dependable navigation at sea, in harbor or inland waters. For complete information write: Radiomarine Corporation of America, Dept. RA-4, 75 Varick Street, New York 13, N.Y.

RADIOMARINE CORPORATION of AMERICA

A SERVICE OF RADIO CORPORATION OF AMERICA



You ARE INVITED to hear the NBC Symphony Orchestra each Saturday evening at 6:30, broadcast over WNBC. Until Maestro Toscanini's opening concert of the Winter season on October 23, his orchestra will be led by a number of distinguished guest conductors.

AMERICA'S NO. 1 NETWORK ... *the National Broadcasting Company*

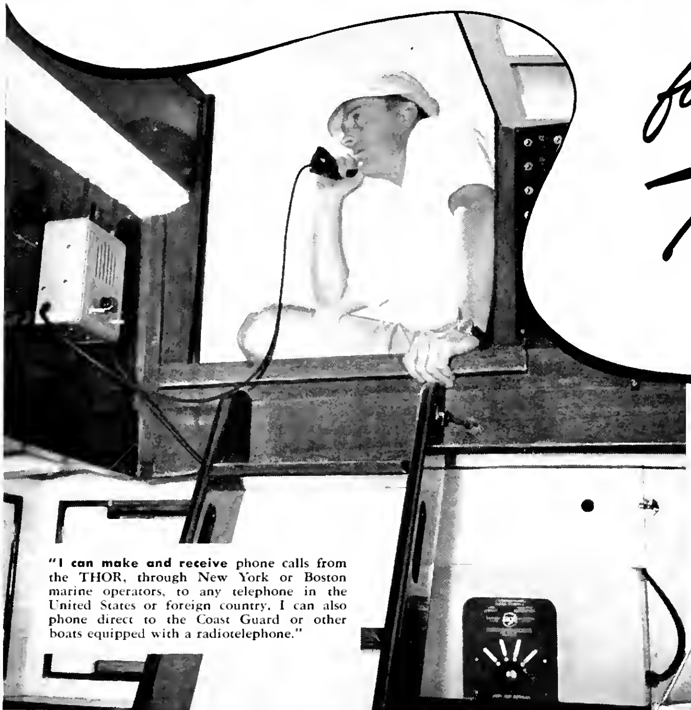
A service of Radio Corporation of America

Printed in U.S.A.

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

JULY

"Why I bought a
RADIOMARINE RADIOTELEPHONE
for the Thor"



"I can make and receive phone calls from the THOR, through New York or Boston marine operators, to any telephone in the United States or foreign country. I can also phone direct to the Coast Guard or other boats equipped with a radiotelephone."

The THOR, an outstanding 39-foot auxiliary sloop of the New Week-Ender Class. Owned by A. EDWARD THURBER, JR. of the Indian Harbor Yacht Club, Greenwich, Conn. Built by Palmer Scott and Co. Produced by Donald B. Abbott. Designed by Philip L. Rhodes.

"Every available cubic inch of space on the THOR is utilized," says Skipper A. Edward Thurber, Jr. "So, any new gear I buy must be a space saver. I found that Radiomarine's Model ET-8028-A 2-way radiotelephone is small and compact without sacrificing performance. The transmitter-receiver unit was easily mounted athwartship, under the bridge deck. It weighs only 42 pounds and occupies a space of 1.15 cubic feet.

"The small Remote Control Unit, complete with handset and loudspeaker, installed at the companionway is handy and convenient to use whether I am on deck or in the cabin. During a season of use, I found this 10-watt, 4-channel 2-way radiotelephone, powered by a 12-volt battery, gave excellent results."

There's a Radiomarine Model for Every Type of Craft

No matter what class or size boat you own . . . you'll find a Radiomarine Radiotelephone that is just right for your boat . . . with nation-wide Radiomarine Service wherever you go. Radiomarine offers a complete line of radiotelephones for dependable 2-way communication . . . radio direction finders for taking bearings regardless of weather conditions . . . for vessels of all types, from giant passenger liners to small pleasure craft.

We will be glad to send you illustrated literature. Address: *Radiomarine Corporation of America, Dept. 1-D, 75 Varick Street, New York 13, N. Y.*

RCA

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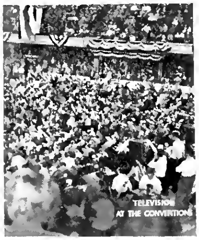
RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



COVER

Five television cameras installed at vantage points in Convention Hall, Philadelphia, made it possible for millions of viewers along the Atlantic seaboard to see directly the G.O.P. conclave in June. The Democratic Convention also will be telecast beginning July 12.

Services of RCA are:

RCA Laboratories Division

•

RCA Victor Division

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RCA Communications, Inc.

•

adiomarine Corporation of America

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lational Broadcasting Company, Inc.

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RCA Institutes, Inc.

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RCA Service Company, Inc.

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RCA International Division

VOLUME 7 NUMBER 4 JULY 1948

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RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.
DAVID SARNOFF, *President and Chairman of the Board*
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.

THE HIGH TOWER AND LOW MASTS AT THE U. S. COAST GUARD STATION ON FIRE ISLAND, N. Y., WILL BE USED IN CONJUNCTION WITH AN RCA HIGH-POWERED TRANSMITTER RECENTLY INSTALLED IN THE BUILDING AT THE LEFT.

Two-Way Television

Speakers and Performers Separated by an Ocean Will Be United on Viewing Screens of the Future.

By David Sarnoff

President and Chairman of the Board, Radio Corporation of America

TELEVISION, which is daily establishing new records in programming, has yet to reveal fully its great potentialities for the spectacular. Science, which has made it potentially the greatest entertainment and educational force the world has ever known, will continually add to the medium's capabilities. People everywhere will be astounded by its speed and versatility in scanning events far beyond the horizon. Many novel techniques have been developed, but they are of minor consequence compared to those that lie ahead.

DAVID SARNOFF

People sitting in their own homes may expect to see a newspaperman in New York interviewing a person in London, Bombay or Rio de Janeiro. On the television screen, in every home from coast to coast, the participants in these transoceanic interviews will appear on the screen as if talking face-to-face in the same room, although in reality they will be separated by thousands of miles.

That will be the magic of two-way television; that will be the miracle that will enable a star of the Metropolitan Opera in New York to sing a duet with a star of the San Francisco Company, both appearing side-by-side on the television screen in every home, though the Great Plains and the Rockies actually separate them. Leaders of nations may be brought face to face on television screens although they are on opposite sides of the earth. The possibilities of this technique in television are unlimited and stimulate the imagination in the cultivation of novel telecasts.

Indeed, thanks to television, people all around the world may expect to see distant events and places as clearly as if in their own backyard. The pyramids of Egypt, along with Niagara, the Grand Canyon, the Golden Gate, and the many wonders of the modern world will come into view. All such scenes appearing in the school room and home will give a new dimension to geography.

Television Cameras in Planes

Already, as a result of wartime developments, airborne television is a reality. As cameras scan the countryside, observers watching television screens many miles away see the birdseye view as the pilot sees it, for the television camera is in the nose of the plane. No doubt the main television centers of the future will have camera-equipped

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"AS A RESULT OF WARTIME DEVELOPMENTS, AIRBORNE TELEVISION IS A REALITY."

"AS TELEVISION GROWS ON AN INTERNATIONAL SCALE, IT WILL ROVE THE GLOBE FOR PROGRAMS AND LITERALLY MAKE ALL THE WORLD A STAGE."

planes in readiness to take off from various points in the country to fly to the most remote areas where such news events as shipwrecks, floods, forest fires, battles and eclipses may be observed at first hand.

Transmitters in these planes will relay scenes to homes and theatres. And with planes so equipped, we may envisage robot rockets carrying a compact television transmitter and camera which can be projected to a specific place under radio control to pick up a scene and relay it for telecasting from stations throughout the world.

Push-Button Polls

Further, experiments indicate that through the magic of radio and electronics, the popularity of a television program or of a political candidate may be polled on a national scale. Tests now under way reveal the possibility that television receiving sets in the future may be equipped with push-buttons, which will enable each observer to express his opinion, "yes" or "no," in answer to a question broadcast from a television station.

Ultimately, it may be possible, during an election campaign, to ask a coast-to-coast audience of many millions of people, while they view a Presidential candidate, whether they plan to vote for or against him. That will be a quick and secret poll, for electronic computers, which can count into the millions and even into billions in the twinkling of an eye, will tabulate the votes.

Entertainment and education work together in many ways. Travel is educational, and so is sighteeing by radio. Television will aid the teacher and supplement the text book, blackboard, phonograph and films. People learn more from sight than from sound; vision etches a more vivid and lasting impression. Television widens the student's range of learning and makes education more interesting, more timely and dramatic. Through television, a great new lecture hall is being erected in which lessons can be illustrated by natural scenes and by actual demonstrations as noted teachers reach not only schools and colleges but millions of people at home who are eager to learn. In short, television as a teacher, and as a messenger carrying information, will spread into many fields. As time goes on and new inventions are made, the services of video will greatly multiply, and it may not be just a fanciful dream that television will alter the habits of the nation as much as did Ford's Model T.

As television grows on an international scale, it will rove the globe for programs and literally make all the world a stage, as Shakespeare envisaged it.

Wide Range of Subjects

Music, drama and fashions, along with sports and education, will be within visual reach of the family circle, even as radio now brings them to the ears of the mind. Impresarios, program planners and creative artists—all will contribute new ideas and talents in the creation of a new art form. And at the same time their efforts will be aided by new radio-electronic devices which will enable television to develop far afield from Broadway and Hollywood.

Today, the world is the eye-witness of the dawn of television. Tomorrow, as new techniques develop, the full brightness of its promise will shine across the hemispheres to bring new pleasures to people everywhere.

"MUSIC WILL BE WITHIN VISUAL RANGE OF THE FAMILY CIRCLE, EVEN AS RADIO NOW BRINGS IT TO THE EARS OF THE MIND."

"TELEVISION WILL AID THE TEACHER AND SUPPLEMENT THE TEXTBOOK AND BLACKBOARD."

Television at the Conventions

Political Conclaves at Philadelphia Telecast Over Eighteen Stations and Viewed by Audience Estimated at More than Ten Million—Television Film Recordings Supplied to Nine Stations Outside the Present Network Area

BEFORE the 1948 Republican National Convention drew to a close in Philadelphia, television had gone a long way toward convincing the electorate and candidates alike of its greatness as a new and vital force in the life of the Nation. From the first rap of the gavel until the emotion-packed climax, when delegates selected Gov. Thomas E. Dewey as the 1948 G.O.P. standard bearer, and Gov. Earl Warren as vice presidential nominee, it was television's biggest show.

Estimates of the viewing audience ran as high as 10,000,000 persons—more than the total attendance at all previous political conventions since the founding of the Republic. No other conclave of the major parties had attracted such a demand on the part of the public to see as well as hear democracy in action; television provided the opportunity. Radio broadcasting, which since 1924, had given Americans this quadrennial lesson in civics, now taught with greater effectiveness through sight added to sound.

Installation of the National Broadcasting Company's radio and television facilities—the most elaborate ever set up for a single event—was completed two days before the Republican delegates convened in the historic Convention Hall. It signalled the start of video pickups that, long before the balloting, had won hearty applause from viewers and had caused delegates and candidates to head the oft-repeated admonition of colleagues to "look your best, for the eyes of the country are upon you." One candidate admitted to reporters that he had consulted a make-up artist to be sure of his appearance.

Between convention sessions mobile cameras scurried around the political-minded city for views of the activities, interviews with visiting luminaries, and special broadcast programs. NBC maintained eight mobile video cameras, five temporary studios and one mobile television unit, together with some fifteen tons of engineering equipment.

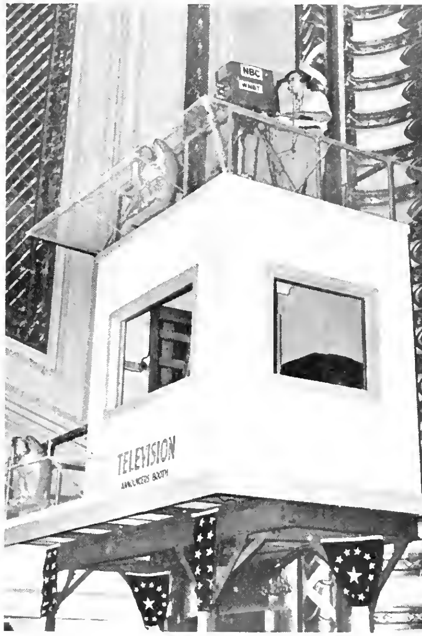
Eighteen television stations in nine Eastern cities pooled their facilities to provide viewers with the political drama. Seven Eastern seaboard stations, members of the NBC television network, broadcast scenes directly from the convention city; nine other NBC affiliates in the Middle West and South West from Buffalo to Fort Worth, which were not interconnected by coaxial cables or radio relays, received by air express film recordings of important events taken from the face of a special kinescope tube. This system known as television recording, was perfected by NBC in cooperation with the Eastman Kodak Company.

Seven Stations in NBC Network

Television stations linked with WNBT, New York, in the NBC network, were: WPTZ, Philadelphia; WTVR, Richmond; WNBW, Washington; WRGB, Schenectady; WBAL, Baltimore; and WBZ, Boston. Reels of television recordings, or film resumes of the highlights, were sent by plane to NBC affiliates: KSD, St. Louis; WBEN, Buffalo; WWJ, Detroit; WLWT, Cincinnati; WTMJ, Milwaukee; KSTP, St. Paul; W6XAO, Los Angeles; WEWS, Cleveland; and KDYL, Salt Lake City.

In the metropolitan area, in addition to the service provided by NBC station WNBT, the convention cameras were linked with stations WPIX, WCBS, WABD in New York, and WATV, Newark.

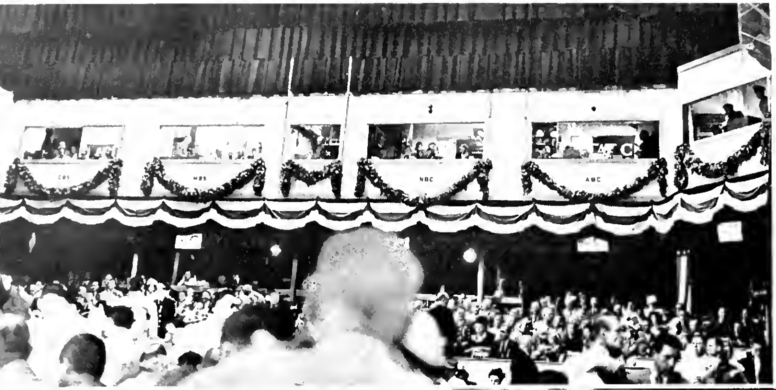
Two hundred NBC engineers, newsmen and executives, worked in high gear to provide complete radio and television coverage of the Republican gathering. They were assisted by a group of political experts, reporters and photographers from *Life* Magazine. At the conclusion of the Republican conclave they turned their attention to plans for televising the Democratic National Convention opening in Philadelphia on July 12.



AN NBC TELEVISION CAMERAMAN HAS AN UNOBSTRUCTED VIEW OF THE CONVENTION FROM HIS LOFTY POSITION NEAR ONE END OF THE AUDITORIUM.

Plans for both conventions, developed over a period of six months, were drawn on the basis of the NBC network's quarter of a century of experience in covering nominating conventions on radio, and on its televising in 1940 of the GOP gathering in Philadelphia. At the latter event, NBC became the first and only telecaster to cover such an event prior to 1948.

Many specialists — from wire



LEFT: FROM THESE BOOTHS OF THE MAJOR NETWORKS, NEWS DIRECTORS WATCHED PROCEEDINGS AND ASSIGNED THEIR STAFFS OF ANNOUNCERS, COMMENTATORS AND ROVING INTERVIEWERS AS THE ACTION SHIFTED FROM ONE PART OF CONVENTION HALL TO ANOTHER.

BELOW: VIEW OF THE CONVENTION HALL AS SEEN BY THE NEWS DIRECTOR FROM INSIDE THE NBC BOOTH.

splicers to political prognosticators and fashion experts — were necessary to provide comprehensive coverage of the 1948 gatherings. In all, NBC sent to Philadelphia 40 commentators, reporters and news editors; close to 50 engineers; half a dozen video directors; a 14-man newsreel crew; telephone switchboard operators; secretaries; stenotypists and the many executives necessary for the coordination of such a complex operation.

Cooperating with NBC for video coverage of all off-the-floor events at Philadelphia, *Life* contributed materially to the network's presentation of the news as it happened. *Life* men gathered news, conducted on-the-air interviews and provided commentary on feature programs, while the March of Time film unit produced a series of documentaries on the convention and its principal figures which provided viewers with a comprehensive background picture. This included color material, human interest stories and explanations of the political positions represented by the various figures and factions.

Five television cameras were in action at all times during pooled television telecasts, manned in rotation by a crew from each of the four video networks. One camera was fixed atop the television booth at the left of the rostrum. Three were located at the two sides and rear of the hall, and the fifth was focused on the main entrance to catch delegates and notables as they entered and left the auditorium. In the production booth, therefore, a supervisor had five screens to watch, each one representing the scene from one of the cameras. It was up to him to choose the view to be transmitted.

News Desk Techniques Used

One of the highlights of NBC's television and radio reporting was the employment for the first time at such an event of a system of pooled information among the network's editorial staff. Instead of assigning each reporter and commentator to gather news for his own individual radio or television program, the system employed a "news desk" technique, whereby all NBC newsmen at the convention received definite assignments and all contributed the product of their reporting to a central pool of information.

Thus, NBC's overall coverage stemmed from a continuous flow of information in and out of the central pool, rather than an uncoordinated series of reports and news items. This system also made possible a more effective integration of radio and television coverage, since television drew many of its reporters and commentators from radio and leaned heavily on the news furnished by the central pool.

For the first time since political conventions have been held, the disappointed ticket seeker was not ignored. For the convenience of thousands of visitors who were unable to gain admittance to the actual proceedings, RCA and five other manufacturers of television receivers installed a spacious viewing room in the Commercial Museum, adjoining Convention Hall. There 150 receivers of all types were arranged to permit audiences sometimes reaching 6,000 to enjoy the same convention coverage available to television set owners.

In radio, the pooled facilities—installed, as at past conventions, by NBC's Engineering Department—comprised the 52 mikes on the floor (one in front of each delegation) and those in front of the speaker's position on the rostrum. In television, all programming from the floor of the hall was done on a pooled basis, with each network contributing an equal number of cameras and each providing supervision of the coverage for one day on a rotating basis.

Supplementing this pooled equipment, NBC had available in Philadelphia, for its own exclusive use, more studios and equipment than the average-sized radio station possesses as its permanent establishment. In Convention Hall, one flight above the stage, were a fully equipped radio newsroom (complete with wire-service teletypes, broadcast studio and space for writers and editors), a television studio, another radio studio for the use of NBC affiliates and a studio for the rapid processing of the indispensable tape recordings that formed so important a part of the network's continuing coverage.

Control Features Duplicated

This layout, with the exception of the tape recording room, was duplicated at the network's headquarters in the Bellevue-Stratford Hotel, GOP convention headquarters. In addition, studio space was available for both radio and television in the buildings of KYW and WPTZ, NBC's affiliates in radio and television, respectively. It was at KYW that NBC established its master control board through which were funneled all programs originating in the convention city.

In addition to these studio facilities, temporary and permanent, mobile radio and video crews were constantly available for assignment to practically any point of importance in the city. Pack transmitters, with a range of a dozen miles, were used for remote pickup interviews and descriptions on radio, and for similar shows on video NBC had access to a WPTZ mobile truck, borrowed for the duration of the meetings. On the floor of the hall, roaming up and down the aisles for interviews, were two newsmen equipped with shortwave radio microphones, miniature transmitters which beamed their signals to the NBC control booth.

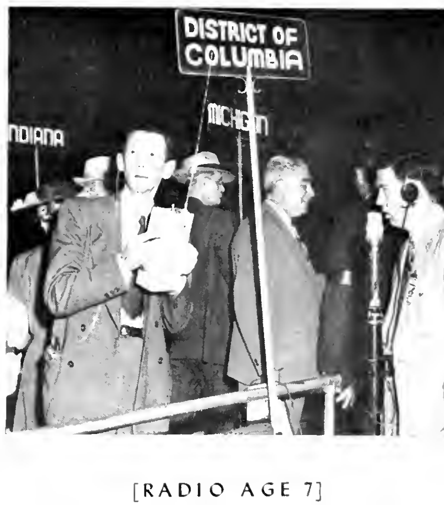
This entire system was connected by a vast maze of interlocking teletype and talk circuits, so that at an instant's notice communication could be obtained between any two points in Philadelphia—all of which in turn were tied in with control points at the network's headquarters in New York.

All studios used in Philadelphia, with the exception of those in KYW and WPTZ, were arranged to permit the immediate repeat of any important interview or news bulletin on television as soon as it had been carried on radio. Also, in many cases cameras were moved in to the broadcast boths so that programs could be televised and broadcast simultaneously.

When the Republican Convention concluded, the radio and television engineers left their equipment intact so that it would be ready to provide similar coverage for the Democratic National Convention opening on July 12.

TELEVISION, NEWSREEL AND STILL CAMERAS CROWD THE BALCONY PLATFORM ASSIGNED TO THE PICTORIAL SERVICES.

NBC COMMENTATOR W. W. CHAPLIN INTERVIEWS DELEGATES WITH THE AID OF THE NEW "RADIO MIKE".



Solar Storms Forecast

Study of Sunspot Activities Reveals Facts That Aid Communications Engineers in Handling Radiotelegraph Traffic During Magnetic Disturbances.

MAGNETIC storms originating from sunspots now can be forecast over short periods dependably to within fifteen minutes of the start of their destructive effects on world-wide radio communications, research engineers of the Radio Corporation of America have discovered.

Forecasting with such accuracy becomes possible because of a better understanding of solar disturbances, the RCA engineers told an international gathering of scientists recently in Washington. They disclosed the results of observations and studies which may shake many time-worn concepts.

Their investigations proved that the size of sunspots is "a meaningless criterion" in predicting havoc that may be caused to radio circuits. Composition of the spots, their polarity and their position on the face of the sun were declared to be the determining factors of lethal bombardment.

Moreover, the RCA investigations established the existence of a "critical zone" on the face of the sun—an area about 26° in radius from the optical center of the sun, on its eastern herisphere. It was discovered that the position of sunspots in relation to this critical zone was of utmost importance. Damaging effects on world radio communications occur when they are within this zone.

Sun May Have Ionosphere

"The existence of a critical zone on the sun," the RCA engineers said, "poses an interesting speculation with regard to the existence of a solar ionosphere, or the equivalent thereof, corresponding to the layer of ionized gas surrounding the earth. This might be the corona or the prominences overlying sunspots. If the 26° semi-circle delineates a region from which radiations affecting the earth's ionosphere are confined, these radiations penetrate the solar ionosphere, only when about seven minutes of arc of the line connecting the sun and the earth. Sunspot radiations of lower angle do not reach the earth, or are returned to the sun."

These new facts on solar disturbances—which cause worldwide radio communications and broadcasting companies considerable concern—were presented by H. E. Hallborg and Miss Audrey Arzinger, of RCA Laboratories, Princeton, N. J., and J. H. Nelson, of RCA Communications, Inc., before a joint session of the Institute of Radio Engineers and the International Scientific Radio Union in Washington on May 3.

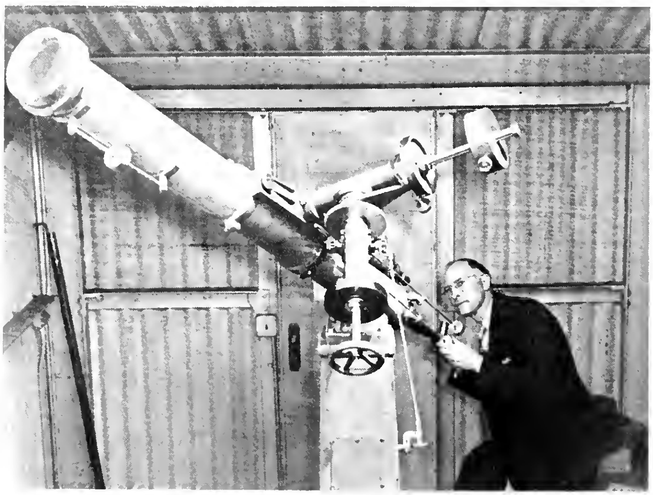
Taking account of the fact that sunspots have been observed for more than 150 years, and that volumes have been written about them, the RCA engineers stated that their investigations represented no invasion into the field of the astronomer, but rather an effort to cooperate with him in the application of solar knowledge.

"We have established that mere size of a sunspot is a meaningless criterion in assessing its possible damage to communications," the report stated. "A huge spot, consisting mostly of penumbra, or dark fringe, may be a complete dud in its effect upon radio circuits. A small spot mostly umbra, or inner darkness, may be quite deadly. Rapidly changing spots, indicative of activity, are the most lethal in their effects upon radio circuits."

Observatory Supplied Reports

The RCA scientists accredited the Mount Wilson Observatory with providing regular reports on the polarity of the umbras as red (positive) and violet (negative), together with relative intensities of the red and violet. It was found that the reds have a preponderant effect in the northern hemisphere of the world, violet in the southern hemisphere. Reds were said to depress frequencies in the northern hemisphere and raise them in the southern. The action of the violet was discovered to be vice-versa.

"This phenomenon," the RCA engineers said, "may be due to the earth's polar attraction for solar radiations of opposite polarity,



J. H. NELSON SWINGS AN 8-FOOT TELESCOPE TOWARD THE SUN FOR A STUDY OF THE EVER-CHANGING SOLAR SPOTS.

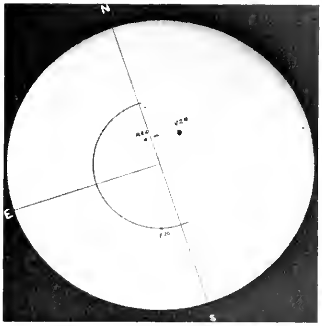
causing a lowering of ionization near the poles for one polarity, and intensification of ionization for the other."

The determination of the critical zone on the sun was reported to be an outgrowth of observation started several years ago by Mr. Nelson, using a six-inch reflecting telescope constructed by himself. He was later joined by Mr. Hallberg and Miss Arzinger in a research program which includes the preparation of daily maps and the issuance of daily radio weather forecasts.

Better Predictions Possible

The further localization and confirmation of the critical zone, and the confinement of sunspot counts to those in this zone, will not only increase the day-to-day correlations of ionosphere and circuit performance, but will provide a more realistic basis for frequency predictions over the sunspot cycle, the RCA engineers reported, adding:

"Practical application of the critical zone, as here indicated, has produced a dependable forecasting service with many hits registered within fifteen minutes. Its use is now an accepted RCA Communications, routine service, and an unquestionable aid to traffic handling. The forecasts are distributed daily throughout the RCA system.



THE SEMI-CIRCLE ON THE LEFT OF THE UPWARD LINE INDICATES THE "CRITICAL ZONE" OF THE SUN WHERE THE PRESENCE OF SUN-SPOTS MOST SERIOUSLY AFFECTS RADIO COMMUNICATIONS.

Gratitude for assistance in the RCA project was expressed to meteorologists of the Harvard Astronomical Observatory, Climax, Colorado; the Mount Wilson Observatory, Pasadena, California; the McMath-Hulbert Observatory, Pontiac, Michigan; the U. S. Naval Observatory, Washington, D. C.; and the Central Radio Propagation Laboratory of the Bureau of Standards.

APPROVE TAPE RELAY SYSTEM

Leading Nations Express Interest in Proposed Plan to Use Latest Communications Method

NEARLY all leading countries of the world are participating or have agreed to participate in the extension of a system of international radio communications employing modern printing tape relay methods. Sidney Sparks, Vice President in Charge of Commercial Activities of RCA Communications, Inc., reported on June 23, in Mexico City, at the summer general meeting of the American Institute of Electrical Engineers.

Tape relay operation, highly developed during and since World War II, permits messages to be transmitted from the network of one nation over one or more radio links and into the national network of another country without customary manual reprocessing at intermediate points, Mr. Sparks explained.

"The efficiency with which traffic can be relayed by the new methods," he said, "minimizes incentives to maintain direct circuits, and a logical trend in the international network will be toward fewer circuits carrying heavier traffic loads at lower unit cost. Tape relay traffic routes will be available at lower cost and will be used increasingly to avoid delays due to interruption or congestion of direct circuits."

Mr. Sparks said that growth since the war of the international printing tape relay network, in the face of difficulties, is a "clear indication that the international radiotelegraph industry is conscious of its responsibilities and opportunities."

As a pioneer in the modernization of radio's international facilities, RCA renders assistance to communication ministries all over the world, providing them with concrete engineering proposals and plans to improve and extend radiotelegraph services.

"If the printing tape relay concept ultimately prevails," Mr. Sparks said, "then some future international radiotelegraph conference may attack the frequency problem on a more fundamental basis than has heretofore been contemplated."

Instead of attempting to parcel out frequencies to each country sufficient to meet the requirements of its many direct circuits, the conference may undertake to establish the pattern for an international tape relay network such as to insure high grade service for each country, with adequate safeguards for economic, political and military interests.

SIDNEY SPARKS (RIGHT), VICE PRESIDENT OF RCA COMMUNICATIONS, AND A GROUP OF U.N. OFFICIALS, WATCH THE TAPE RELAY TRANSMISSION OF RADIOTELEGRAPH MESSAGES FROM LAKE SUCCESS, N. Y., DIRECT TO GENEVA, SWITZERLAND.

TELEVISION RECORDING

New Development Permits Filming of Video Programs From Screen of Kinescope Picture Tube, Together with Sound, for Distribution to Non-Network Stations.

By Robert M. Fraser
Engineering Development Group, National Broadcasting Company

THROUGH the use of a new NBC development called the Television Recorder, television programs including picture and sound can now be recorded on film direct from the screen of a television receiver for distribution to stations not yet interconnected by coaxial cables and radio relays. As the quality of the basic television image improves, the quality of recordings in kinescope photography will be enhanced to a degree where the average viewer will be unable to tell if the program he is seeing is "live" or "canned." The kinescope recorder method will permit not only the establishment of a coast-to-coast video network before cables or relays are installed but will allow retention of television programs for documentary, historical, legal or critical purposes in a manner similar to recordings of radio programs.

The development of this recording system was started in 1938 with experimental cameras operating at 8, 15, and 16 frames per second. They were followed by a prototype camera operating at 24 frames per second. This model was the forerunner of the $10,000 recorder cameras in use today.

In the earliest experiments, a decade ago, it was found that the amount of light obtainable from available kinescopes was not enough to produce a full exposure on the fastest films obtainable at a 1/30th second exposure in a 16-frame-per-second camera.

The cameras used in the early efforts were spring-motor driven and the shutter rate was not synchronous with the frame rate of the television system. This caused a flaw in the pictures called "shutter bar" or "banding" in which a black-and-white bar moved across the film image when projected.

Much research work in finding an accurate method of operating the motor-driven shutter in conjunction with the sequence of television images finally led to an acceptable mechanism free from banding effects.

Commercial Camera Designed

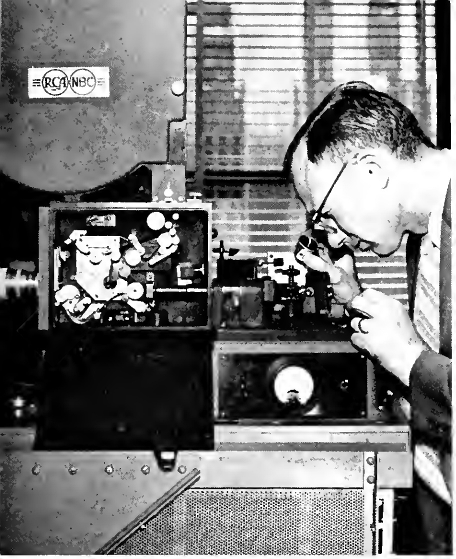
Engineers of the Eastman Kodak Company and National Broadcasting Company working together designed a commercial camera along the lines of the original model. However, the design of the new camera was complicated by many factors. First the commercial version had to be able to record a half-hour show with a 1,200-foot load of 16mm film instead of the 200-foot roll used in the first model and in regular Cine Specials. The shutter had to rotate with a minimum of flutter since even a slight change in angular speed resulted in banding of the film image. Success eventually came through the use of a synchronous motor to drive the shutter at the necessary speed through a set of precision gears. Another synchronous motor of larger capacity drives the film transport mechanism and the Geneva intermittent which is the device that pulls down the film strip from one frame to the next. The two motors are kept in step during the starting and stopping periods by an ingenious coupling which allows the stronger of the two motors to assist the weaker until both reach proper speed. The coupling then floats so that there is no physical connection between the motors.

Nylon Solves Emulsion Problem

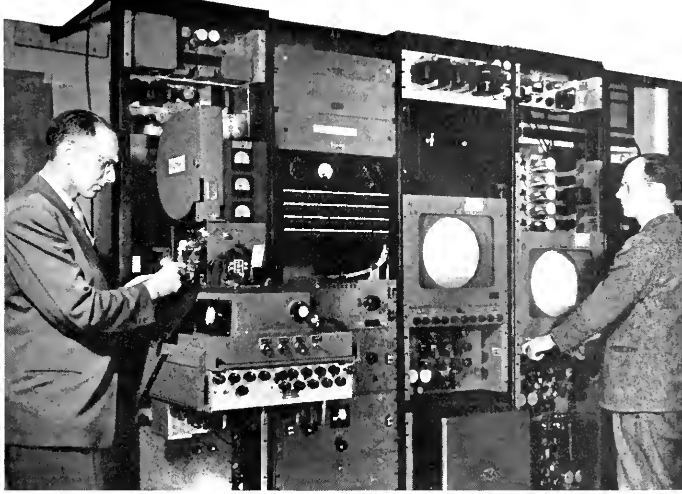
Nylon which has a low coefficient of friction is used in the film gate and pressure plate to minimize the accumulation of emulsion from the film, always a source of trouble in motion picture cameras. All friction points in the takeup side of the 1,200-foot magazine are equipped with ball bearings so that takeup of film progresses smoothly from the two-inch core diameter of the empty reel to the 10-inch diameter of the full 1,200-foot roll.

Focussing and framing of the picture are carried out by means of a right-angle view finder equipped with a magnifying lens. Visual focussing is done by means of this

DUDLEY GOODALE, PIERRE BOUCHERON, JR., AND GEORGE M. NIXON OF THE NBC ENGINEERING DEVELOPMENT GROUP EXAMINE LATEST MODEL OF A TELEVISION RECORDER WHICH RECORDS BOTH PICTURE AND SOUND ON THE FILM STRIP.



RALPH LOVELL EXAMINES THE MECHANISM WHICH APPLIES THE SOUND RECORDING TO THE EDGE OF THE FILM CONTAINING THE TELEVISION RECORDING.



COMPLETE TELEVISION RECORDING EQUIPMENT INCLUDING CAMERA AT EXTREME LEFT WITH SOUND RECORDING AND MONITORING PANELS.

finder and checked by exposing film at several different settings. Before each program is recorded, processed film is examined under a microscope to determine the best actual focus.

The camera lens is a two-inch Eastman Anastigmat F1.6. Normally, apertures of f2.0 to f2.8 are used.

For several reasons, 16mm film rather than 35mm film was selected for kinescope recordings. One of the main reasons was that the cost of 35mm film is somewhat more than three times the cost of 16mm for the same period of recording. The current quality of television images, which will undoubtedly undergo gradual refinement, is considered to be roughly equivalent to 16mm home movies, although actually somewhat better with reference to contrast and detail. However, recording on 35mm rather than 16mm film results in no marked improvement at the present time. Fire regulations covering the use of the wider film are rigorous regardless of whether the film is acetate safety base or the combustible nitrate base, whereas the narrower films, available only in acetate safety base, are not restricted by such regulations.

In producing television recordings in the NBC studios, Radio City, New York, programs are piped by direct line to the kinescope tube. For programs originating outside the studio the program is taken from the coaxial cable before the signals reach the Empire State transmitting station.

Printing of the film is done according to standard motion picture laboratory practice. Step printing in which stock and negative are exposed to the printing light, a frame at a time, is preferred over continuous printing, where the negative and print stock run past an illuminated slit at a continuous speed.

Recording of the sound portion of a television program is accomplished with standard 16mm sound-on-film recording equipment at the rate of 24 frames per second.

ENGSTROM HEADS RESEARCH INSTITUTE

E. W. Engstrom, Vice President in Charge of Research, RCA Laboratories Division, has been elected President of the Industrial Research Institute, Inc., for 1948-1949.

The Institute, of which Radio Corporation of America is a member, was organized in 1938 under the auspices of the National Research Council. In the past ten years, the organization has grown from the original nucleus of fourteen member companies to more than a hundred. These concerns employ research staffs numbering more than twenty thousand people.

Purposes of the Institute are to promote through its members more economical and effective techniques of organization, administration and operation of industrial research, and to distribute information on these subjects; to stimulate an understanding of research as a force in the economic, industrial and social activity of the nation, and in general to promote high standards in the field of industrial research.

Prior to his election as President, Mr. Engstrom had served in 1946-1947 as a member of the Institute Board of Directors and Chairman of its Finance Committee, and in the following year as a Board Member, Vice President and Chairman of the Program Committee. As President, he will continue a member of the Board.

TELEVISION MILESTONES

Preeminence of the United States in Television is Largely Due to RCA Accomplishments in Science that Led to the Development of a New Industry, a New Service to the Public, and a New Bulwark of National Security.

I believe that television, which is the technical name for seeing instead of hearing by radio, will come to pass in due course . . . the transmission and reception of motion pictures by radio will be worked out within the next decade —David Sarnoff, April 5, 1923.

THE cornerstones of modern television were designed and put into place by the scientists and engineers of the Radio Corporation of America who dedicated them to the advance of communications and to the establishment of a new medium of entertainment and information.

On the firm foundation of pioneering and research at RCA Laboratories, television has developed as a new industry, as a new service to the public, and as an important element in military, naval and aviation operations that bulwark the national security.

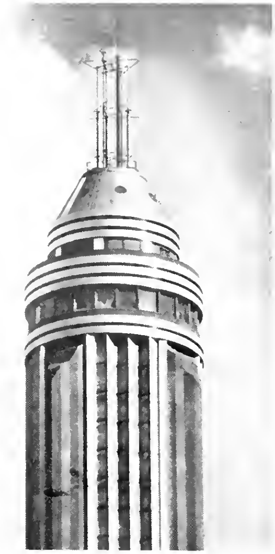
The outstanding achievements of RCA in the development of television overspread all phases of radio, electronics and optics, from microwaves and electron tubes to electronic cameras and video receivers.

Historic television advances achieved by RCA scientists and engineers have made the United States preeminent in television and have provided American homes with the finest television instruments in the world; NBC, through broadcast engineering and programming, has made outstanding contributions to the progress of television as a new art form—a medium of entertainment, news and education.

The chronology of television is marked by RCA-NBC *firsts* which reveal the historic steps in the development of a new science, a new art and a new industry:

1923—Dr. V. K. Zworykin, now Vice President and Technical Consultant of RCA Laboratories, applied for patent on the iconoscope, television's electronic "eye," or camera tube. *(December 29.)*

DR. V. K. ZWORYKIN HOLDS THE ICONOSCOPE CAMERA TUBE INVENTED BY HIM IN 1923.



EARLIEST TYPE OF TELEVISION ANTENNA ERECTED ON THE EMPIRE STATE TOWER, BY RCA-NBC IN 1931.

1929—Dr. V. K. Zworykin demonstrated an all-electronic television receiver using the kinescope, or picture tube, which he developed. *(November 18.)*

1930—Television on 6 x 8-foot screen was shown by RCA at RKO-Proctor's 58th Street Theater, New York. *(January 16.)*

NBC began operating W2XBS, pioneer experimental television station in New York. *(July 30.)*

1931—Empire State Building, world's loftiest skyscraper, was selected as site for RCA-NBC television transmitter. *(June)*

1932—RCA initiated field tests with 120-line, all-electronic television. *(May 25.)*

1936—Television outdoor pickups demonstrated by RCA at Camden, N. J., on 6-meter wave across distance of a mile. *(April 24.)*

1937—RCA announced development of electron projection "gun" making possible television pictures on 8 x 10-foot screen. *(May 12.)*

Mobile television vans operated by RCA-NBC appeared on New York streets for first time. *(December 12.)*

1938—Scenes from Broadway play, "Susan and God," starring Gertrude Lawrence, telecast from NBC studios in Radio City. *(June 7.)*

1939—RCA and NBC introduced television as a service to the public at opening ceremonies of New York World's Fair, featuring President Franklin D. Roosevelt as first Chief Executive to be seen by television. *(April 30.)*

Improved television "eye," the "Orthicon" first introduced by RCA. *(June 7.)*

Major league baseball was telecast for the first time by NBC, covering a game between the Brooklyn Dodgers and Cincinnati Reds at Ebbets Field. *(August 26.)*

First college football game — Fordham vs. Waynesburg — televised by NBC in New York. *(September 30.)*

RCA receiver in plane over Washington picked up telecast from NBC station in New York, 200 miles away. *(October 17.)*

Portable television equipment, to supplement motor truck mobile stations, demonstrated to FCC by RCA. *(December 1.)*

1940—RCA demonstrated to the FCC, at Camden, N. J., a television receiver producing images in color by electronic and optical means employing no moving mechanism. *(February 6.)*

New York televised from the air for the first time by a plane equipped with RCA portable television transmitter. *(March 6.)*

Television pictures on $4\frac{1}{2}$ x 6-foot screen demonstrated by RCA at annual stockholders meeting in Radio City. *(May 7.)*

Television program broadcast from NBC station, New York, received on *USS President Roosevelt* while 250 miles at sea enroute from Bermuda. *(May 14.)*

Coaxial cable used for first time in television program service by NBC in televising Republican National Convention at Philadelphia and transmitting scenes over New York station. *(June 24.)*

Election returns, telecast for the first time as RCA-NBC showed teletypes of press associations reporting the news, as well as commentators at the microphone. *(November 5.)*

1941—Demonstrating television progress to the FCC, RCA exhibited the projection-type home television receiver featuring a screen $13\frac{1}{2}$ x 18 inches. . . . Television pictures including a prize fight from Madison Square Garden and a baseball game at Ebbets Field, Brooklyn, were projected on a 15 x 20-foot screen in the New Yorker Theatre. . . . Scenes at Camp Upton, Long Island, were automatically relayed by radio to New York establishing a record as the first remote pick-ups handled by radio relay stations. *(January 24.)*

.IN-SOOSE BOXING BOUT AT MADISON SQUARE :N WAS PROJECTED ON LARGE SCREEN AT NEW YORKER THEATRE, IN 1941.

Color television pictures in motion were put on the air by NBC in the first telecast in color by mechanical means from a television studio. *(February 20.)*

RCA-NBC made successful tests with first projection-type color television receiver using mechanical methods. *(May 1.)*

NBC's television station WNBT became the first commercially licensed transmitter to go on the air. *(July 1.)*

1942—First mass education by television was initiated by RCA-NBC in training thousands of air-raid wardens in New York. *(January 23.)*

1943—NBC televised major sports and other events at Madison Square Garden for wounded servicemen in television-equipped hospitals in the New York area. *(October 25.)*

1944—NBC announced plans for nation-wide television network to be completed possibly by 1950. *(March 1.)*

1945—RCA demonstrated projection-type television home receiver featuring screen approximately 18 x 24 inches. *(March 15.)*

RCA Image Orthicon tube of supersensitivity was introduced as solution to major problems in illumination of studio television programs and outdoor pickups. *(October 25.)*

Greatly improved black-and-white television pictures and color television in three dimensions featuring live talent were demonstrated by RCA at Princeton, N. J. The color system was mechanical; the black-and-white all-electronic. *(December 13.)*

GERTRUDE LAWRENCE IN A SCENE FROM "SUSAN AND GOD," FIRST BROADWAY PLAY TO BE TELEVISED.

1946—Airborne television as developed during the war by RCA and NBC in cooperation with U. S. Navy, U. S. Army Air Forces and the National Defense Research Council was demonstrated at Anacostia Navy Air Station. *(March 21.)*

First world's heavyweight championship fight to be seen on television featured Louis-Conn at Yankee Stadium, New York, televised by NBC and transmitted to Washington, D. C., via coaxial cable. *(June 19.)*

Post-war television receivers introduced by RCA Victor Division. *(September 17.)*

Color television pictures on 15 x 20-inch screen produced by all-electronic means were demonstrated publicly for the first time by Radio Corporation of America at RCA Laboratories, Princeton, N. J. A simple radio frequency converter was announced that enables black-and-white receivers to reproduce in monochrome the programs of color television stations operating on high frequencies. The converter also enables all-electronic color receivers to receive the programs of low or high frequency black-and-white transmitters. *(October 30.)*

1947 — RCA demonstrated simultaneous electronic color television system at FCC Hearing held at Princeton, N. J. Film and live

Continued on Page 32

NEW TELEVISION STUDIO

Latest Addition to NBC Facilities Provides Space for Staging Four Video Productions at a Time

POSSIBLY not the largest television studio in the world, but certainly the most modern and best equipped, NBC's "8G" in Radio City became a working part of the network's expanding television service on April 22. The new studio increases by three to four times the studio production capacity of NBC's television department and in its appointments represents the cumulative result of two years of planning by engineers and program personnel.

Studio 8G, on the eighth floor of NBC's headquarters in the RCA Building here, is equipped with radically new audio and video controls, television studio cameras and lighting. It has provisions for six of the newly-designed NBC television cameras which make use of the sensitive RCA Image Orthicon tube. The studio lighting eliminates four-fifths of the heat generated by lights formerly used in television studio operations.

In preparing Studio 8G for operation, workmen installed 500 miles of wire, over two miles of coaxial cable, 52 tons of refrigeration, and enough light, heat, power and air-conditioning to supply a village of 100 average-size homes.

As many as four separate programs may be presented consecutively from the studio. Added scenery effects—including falsified perspectives for background scenery, use of photo-enlargement drops, and use of the floor as part of the scenery—will be possible because of the increased size and scope of Studio 8G. In addition, rigging for the scenery will be four times as heavy as that used in NBC Television's present studio 3H, permitting more massive, more realistic sets.

Control Room Has Plastic Windows

The most revolutionary feature of the studio is the control room, designed by NBC engineers. Located one floor above the studio itself, it is separated from the studio by a partition of light-attenuating plastic, which eliminates excessive light from the studio which would interfere with the operation of the monitors. At the same time it permits the operators to see into the studio. Of trapezoidal shape, the control room is so located as to give engineers and program directors a clear view of the entire studio.

Studio 8G, a converted radio studio, measures 48 feet by 87 feet. It is approximately three times as large as 3H, the studio out of which NBC Television has been operating since 1935.

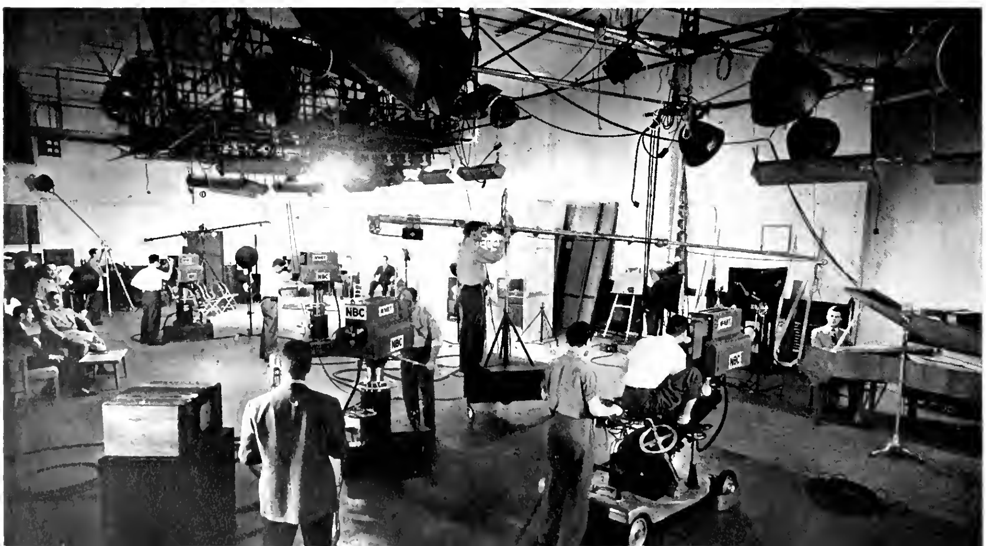
Overhead, and covering one half of the studio, is a permanently fixed steel catwalk which will be used as a lighting bridge. In addition, there are demountable lighting towers which can be used anywhere in the studio—a flexible system devised by NBC engineers to hang lights on short order.

The lighting will consist of a combination of fluorescent units, large incandescent lamps and banks of photo-floods with internal silver reflectors which can be used in any combination required.

A low level of heat will be emitted by these lights because of the small amount of illumination required by NBC cameras. These require a maximum intensity of from 200 to 250-foot candles, reducing to one-fifth the heat and light formerly needed in television studio productions.

The new NBC cameras—of which four will be used at the beginning of the studio's operations but will later be increased to six—use the sensitive RCA image orthicon tube. The cameras were designed by the network's engineers and are of special construction to accommodate the requirements of the new studio.

NBC'S NEW STUDIO 8G IN RADIO CITY PROVIDES SPACE FOR THE PRODUCTION OF FOUR PROGRAMS SIMULTANEOUSLY, AND HAS FACILITIES FOR SIX IMAGE ORTHICON CAMERAS.



STAFF MEMBERS OF THE MUSEUM OF NATURAL SCIENCES IN BUENOS AIRES EXAMINE A CONSOLE MODEL OF THE RCA ELECTRON MICROSCOPE.

Electron Microscopes Abroad

Scientists in Many Foreign Countries Are Using Instruments For Closer Studies of Natural Resources.

NATURAL resources of many countries, in addition to the United States, are being submitted to closer study than ever before by means of electron microscopes. In a statement disclosing this fact, Meade Brunet, a Vice President of Radio Corporation of America and Managing Director of RCA International Division, said that eighty-five of the instruments produced by RCA now are used by research scientists and technicians outside of this country.

"This activity emphasizes the increasing attention which some parts of the world are placing on the fuller development of natural resources, and shows a desire to increase benefits to the public through more exhaustive research," Mr. Brunet declared.

"Many countries are examining their natural resources under these electronic 'super-eyes' to support broad national programs. Foreign scientists are stepping up their study of such vital resources as cotton, wood, coal, oil, rubber and silica, to mention a few raw materials so necessary to employment and security."

With a magnification of more than 100,000 diameters, the RCA electron microscope has become one of the most effective scientific research tools, Mr. Brunet said. Its resolving power is from fifty to 100 times that of ordinary laboratory microscopes, making possible the opening of vast new areas for investigation. Approximately 200 are employed by American medical research laboratories, colleges and industrial organizations.

"The electronic search carries over into manufacturing and finished goods, as well as into the many fields of public health," said Mr. Brunet. "Orders from numerous agencies within a single country indicate the variety of uses which foreign laboratories are finding for the RCA electron microscope. French industry, for example, is employing it for research in rubber, glass and silicas. A recent order brought to eight the number of RCA electron microscopes being used in France.

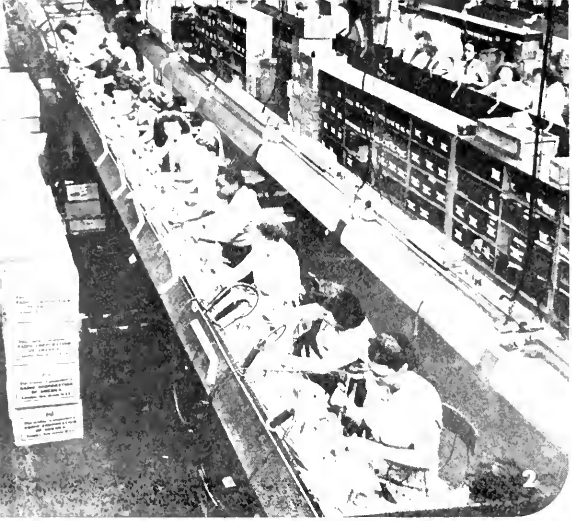
"In Canada, where the electron microscope has been found of particular value in forestry research, there are four of these instruments in operation. Argentina has four, and Brazil, seven, including one employed by the police in criminal investigation.

"The British Medical and Agricultural Research Institutes, as well as the Cotton Research Bureau, are among the twelve purchasers of the RCA electron microscope in England.

"Mexico's most recent purchase of an electron microscope is a specially converted instrument for use in high altitudes. It has been ordered by the Ministry of Agriculture at the Agricultural College of Chapingo. Others are being used in Mexico City by the Health Department, by the Agriculture Ministry, and by the Escuela Nacional de Ciencias Biologicas for research in physical chemistry."

Mr. Brunet mentioned a number of organizations as the first in their respective countries to install an RCA electron microscope: Administracion Nacional de Combustibles Alcohol y Portland, in Montevideo, Uruguay; Instituto Nacional de Higiene, in Havana, Cuba; the University of Guayaquil, Ecuador; and Fouad University, in Cairo, Egypt.

MEMBERS OF THE MEDICAL CORPS AT THE UNIVERSITY OF BRAZIL WATCH DR. ORLANDO BAIOCCHI AS HE OPERATES AN RCA ELECTRON MICROSCOPE RECENTLY INSTALLED AT THE UNIVERSITY.



Television Receivers in P

These scenes show steps in assembling television receivers in the RCA Victor plant, Camden, N. J.

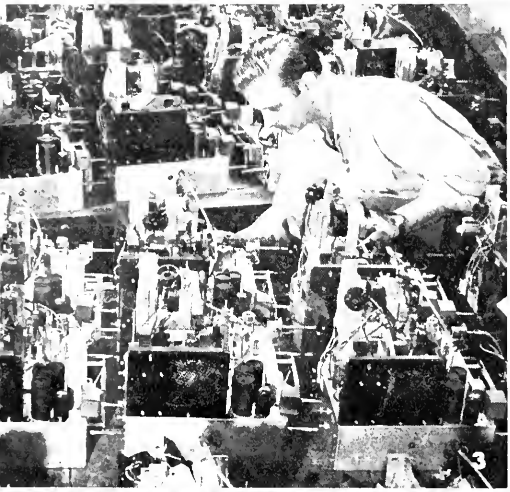
1. Riveting sockets and small parts to chassis is the first step in making television receivers.

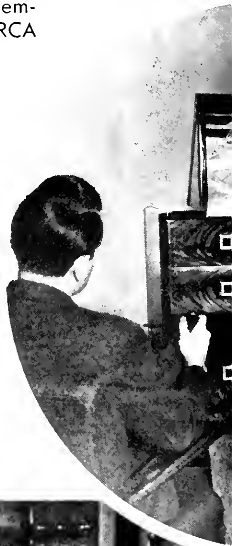
2. Skilled women workers begin the complicated job of soldering wires connecting components.

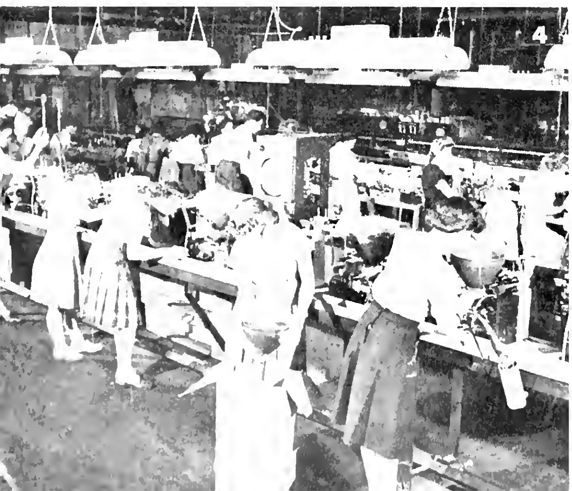
3. An inspector checks the completed chassis before passing them on to cabinet assemblers.

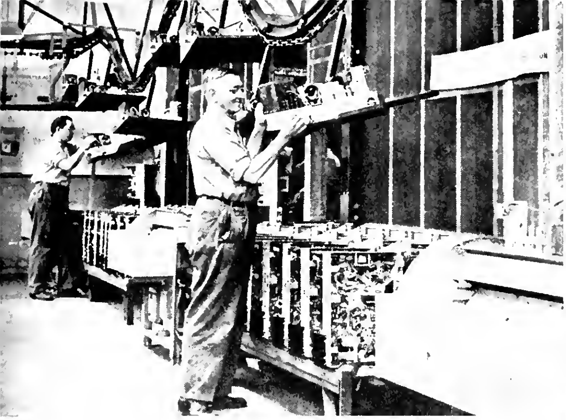
4. Each receiver is carefully checked with its kinescope picture tube in place.

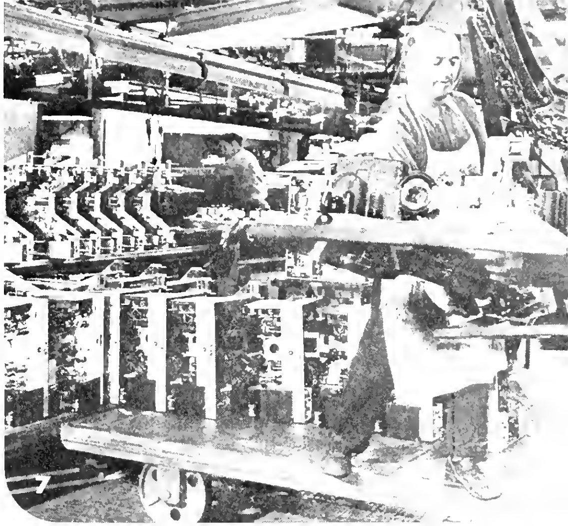
5. Preparing assembled receiver for testing and alignment of its component parts.





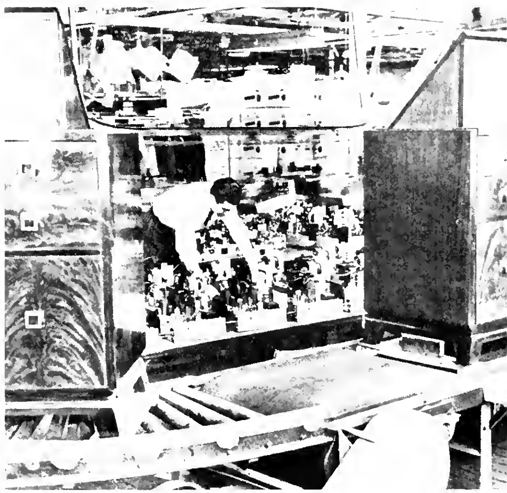






ction at RCA Victor Plant

Left: RCA Victor projection television receiver with retractable 15 x 20-inch screen.



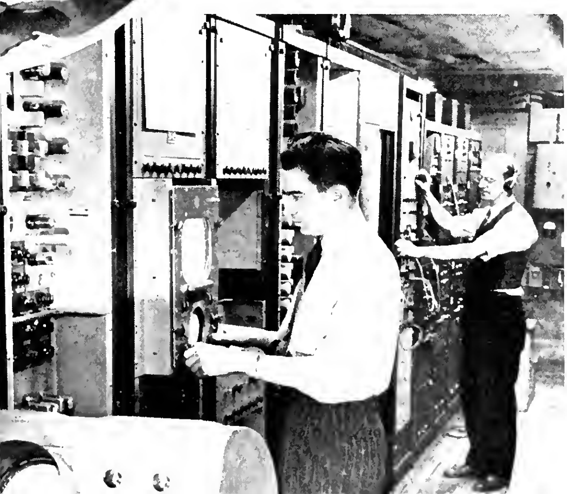
6. Chassis are loaded on conveyor lines which take them to the final cabinet assembly room.

7. At the end of conveyor lines, receivers are removed for insertion into their cabinets.

8. Projection type receiver consoles halt here to receive the chassis shown in the rear.

9. Test patterns are generated at these panels for use in adjusting tuning controls.

10. Workmen make final adjustments on projection receivers before crating them for shipment.



DEMONSTRATION OF LARGE SCREEN TELEVISION PROJECTION, PROVIDING A SCREEN PICTURE 6 BY 8 FEET.

TELEVISION AND THE THEATRE

Large Screen Developments Are Likely to Create Major Changes in Theatre Programming and in the Production of Film Features, Watts Says

By W. W. Watts

Vice President in charge of Engineering Products Dept., RCA Victor Division

IT is usual, in a discussion of television, to trace its growth beginning with the first whirling-disc scanners of 1885. Actually, these chronological facts are of little consequence compared to an appreciation of television as it exists today—an "infant" industry growing into maturity—and an understanding of where it may go tomorrow.

Recently, the Radio Corporation of America published an advertisement announcing that television is now "Forty Million Big," a reference not to 40 million viewers, or anything like that number, but to the fact that television program service now covers an area populated by 40 million people.

For many years every broadcast of the NBC Symphony under Toscanini had been viewed by capacity crowds in one of the world's largest studios. Yet, on the night when this program was first televised, it was seen and heard by more people than comprised the total of all previous studio audiences. To recognize the import of this, let us take a brief glance at some current and future statistics.

There are now in operation 28 television broadcast stations. The Federal Communications Commission has granted 83 Construction Permits and applications for 281 additional stations have been filed with the FCC.

If the currently proposed FCC revision of television channel allocations is enacted, then, ultimately, there will be channel space for 953 stations in 456 cities—with an audience that could grow to equal that of the estimated 66 million radio sets now in 37 million homes.

There are, of course, other forms of television than the home type. One is Large-Screen Television, a nomenclature applied to television pictures varying from 6 by 8 feet to 15 by 20 feet.

Although usage has invariably linked these projection systems to the "theatre", it is my belief that theatre television is but one of many applications for large-screen television equipment. As one example, it is conceivable that such equipment will be used for audiences at television studios since the presence of large numbers of visitors to studio sets when in use is fully as impractical in television as in motion picture studios.

Promotional use of large screen television in connection with sports and news events also will be made and may, in some cases, displace the "moving light" bulletin boards now widely used by newspapers. Overflow auditoriums, department stores, hospitals, hotels, cocktail lounges, and night clubs provide additional fields of usage.

Applications Seem Endless

In fact, the possible applications of television seem endless. For instance, television cameras on the front of guided missiles provide a picture by radio to permit guiding the missile to its target; underwater television has obvious uses for examining locations now beyond man's reach. In hospitals, famed surgeons have shown that they can demonstrate their technique by television to audiences far in excess of the capacity of normal surgical amphitheatres. In motion picture studios, directors can view tomorrow's "rushes" on two-dimensional television screens while the scene is being shot. From their easy-chairs on the studio floor, directors can view what is being filmed by the motion picture camera as it gyrates above some huge set on the end of a camera crane.

With possibilities such as these, several motion picture companies already have begun their participation in television. Paramount, through television station operation and demonstrations of its film storage system at the New York Paramount Theatre, has shown an active interest in the medium. Warner

Bros. and Twentieth Century-Fox have filed applications for television stations in several cities.

Film Companies Show Interest

More than a year ago, development work at RCA indicated the attainment of large-screen television pictures of a quality much superior to pre-war performances. Some of the motion picture companies were interested. Inquiries came from national and local theatre circuits, and independent theatres. However until programming possibilities had been explored and customer "know-how" developed, we were not too sure what type of equipment ultimately would best suit customer needs. We could easily have been led into "building a boat that couldn't be moved up the cellar stairs". Accordingly, several motion picture companies were offered what have since been called "joint development contracts" under which we agreed to furnish technical information and "know-how", engineering assistance, a large-screen projector capable of producing 6- by 8-foot projected pictures, a large-screen projector capable of throwing a 15- by 20-foot picture and, ultimately, an 18- by 24-foot picture, a kinescope photography system which, when coupled to a high-speed developer, is capable of feeding film to a standard theatre projector in a short time-cycle—less than 1 minute—and the services of trained theatre service engineers.

Warner Bros. and Twentieth Century-Fox joined us in this undertaking and have some of the equipment in operation. The remainder is scheduled for early delivery.

All of these systems are constructed as professional equipment without regard to physical dimensions or installation requirements. Indeed, the larger projection unit, employing a 42-inch reflector, contains the largest Schmidt-type projection system in use.

Everyone knows that television broadcast stations use and require vast amounts of film fare for programming. They are obtaining some of it from a supply "made in Hollywood." Of its quality, all one can say is that it is the best Hollywood made in those years. Why, one might ask, does the public accept the current film fare? The answer is simple: novelty and lack of competition. As viewers and sponsors increase, they will demand and get better film programming. Furthermore, it is our opinion that advertisers will finance much of this film programming, because we are convinced that the American pattern of free television, like free radio, already has been established and will continue.

Telecaster is a Film Producer

The term "film storage and kinescope photography systems" refers to the business of filming the picture from a special high-intensity television monitor. Adoption of this method makes the television broadcaster a producer of pictures—perhaps chiefly for syndicate or transcription purposes, but nevertheless a producer of pictures.

Thus far, relatively little has been said about the precise nature of programming, much about equipment. Essentially, that is the position of RCA. When we manufacture and sell theatre film projectors and sound equipment, we do not tell the exhibitor what films to run. That is his business and one in which he is skilled.

And speaking of things to come, there is an additional RCA television item which is due on the market shortly in limited quantities. This is a large-screen, nominally priced television projector capable of a 7- by 9-foot picture, suitable for theatre lobbies and lounges.

THE AUTHOR AND BARTON KREUZER, MANAGER OF RCA THEATRE AND RECORDING EQUIPMENT, EXAMINE A TELEVISION PROJECTOR GIVING A 15 BY 20-FOOT SCREEN IMAGE.

Much of the equipment which has been mentioned here utilizes motion pictures. It has been estimated that television stations of this country ultimately will require many more feet of film than Hollywood now produces, a condition aided and abetted by the fact that there are few chances of "extended runs" on television.

If you could build a theatre large enough to accommodate at one time all of the patrons who attend a three-week run, you would show your film only once. That, in effect, corresponds to television.

A little forecasting based on current AM-FM broadcast practice provides some idea of what the potential film usage of television might become. Today there are about 2,500 AM-FM stations on the air. Nearly half of these are affiliates of the four major chains. They operate about 18 hours per day. Conservatively, they use five hours of chain-originated material daily. That adds up to 4 chains times 5 hours (20 hours daily), times 365 days, or 7,300 hours of network-originated material per year.

Now let us see how those figures might apply to television. It has already been pointed out that the FCC has prepared nearly 1,000 channel allocations in 456 cities. Let us assume that when these 1,000 stations are on the air, they follow the current broadcast pattern, carrying chain material for the same 5 hours, with 2½ hours programmed from film. Four networks times 2½ hours (10 hours per day) times 365 days means 3,650 hours of film annually.

That is the equivalent of 1,825 two-hour features or 14,600 15-minute shorts—plus all the additional film material the 500 remaining independents will use, which is not network originated.

It will require far more film, more technicians, more talent, and more equipment than exists today. It presents an opportunity to which both the motion picture industry and the television industry can anticipate with high enthusiasm.

New Explorations To Open Way For Television Expansion

RCA's Experimental TV-Station in Washington to Conduct Tests in 500 Megacycle Region — Jolliffe Says if Experiments Reveal Expansion of Television Into Ultra-high Frequencies is Practicable, a Simple, Inexpensive Adapter Can Be Provided for Present TV-Receivers.

A NEW exploration by engineers of the Radio Corporation of America of radio frequencies above 500 megacycles, as a medium for expansion of television broadcasting, will begin about September 1, in Washington, D. C., Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories, has announced. An application for the installation of an ultra-high-frequency television station in the nation's capital was filed by RCA with the Federal Communications Commission on May 27, and the necessary license to proceed with the new experiments was granted on June 24.

"Results of the tests," Dr. Jolliffe said, "should provide further information on the problems involved in the development of television on frequencies above 500 megacycles, and if successful will be a major contribution to the expansion of this service to the public."

The new experimental station will be installed at the Wardman Park Hotel in Washington, location of the National Boardcasting Company's commercial television station, WNBW. The simultaneous operation of these two stations on 67 megacycles and 510 megacycles, Dr. Jolliffe pointed out, will give engineers an opportunity for the first time to compare the service possibilities of ultra-high frequencies with those of the present lower-band commercial frequencies.

Should these new experiments reveal that expansion of television into the ultra-high frequencies is practicable, a simple and inexpensive adapter can be provided for present television sets. Such a device will enable these sets to receive programs broadcast on the higher frequencies, as well as on the present television wave-band.

Transmitting equipment for the tests has been completed, Dr. Jolliffe said, and installation will begin as soon as the FCC authorizes construction. It is expected that tests will commence about September 1, 1948.

Part of Long-Range Program

The Washington experiment is a continuation of a long-range research program of RCA Laboratories to determine the usefulness of ultra-high radio frequencies for television, Dr. Jolliffe said. In the past, he continued, RCA has carried out tests on 288 megacycles, 500 megacycles, and 910 megacycles, but the Washington project will be the first to be conducted with television programs produced by an existing commercial station.

With numerous other services seeking additional frequencies, Dr. Jolliffe said, the only part of the spectrum in which additional channels for television can be found is between 475 and 890 megacycles which already has been set aside by the Commission for future development of television. Little is known of the characteristics of these frequencies as a medium for television signals, hence it is necessary to carry out comprehensive tests such as those now planned by RCA and NBC to determine how the frequencies can best be utilized for maximum service to the public.

Converters to Be Provided

In order to conduct complete field-test comparisons with the low-band (67 mc) transmissions of WNBW, RCA Laboratories will design simple converters for the use of engineers and other observers. These devices, when attached to standard television receivers, will make it possible to compare the reception of programs as they are transmitted simultaneously on both low-and-high-band channels, thus affording a constant check on the transmission characteristics of the two bands.

The transmitter will produce an effective radiated power up to 25 kilowatts. With this power, engineers can make field strength surveys of a 500-megacycle broadcast service under all conditions of urban, suburban and rural areas, and over all kinds of terrain, an accomplishment heretofore not possible.

Jolliffe Testifies Relative To Television and FM

If all television, which gives promise of being a billion-dollar business this year, were required to move at this time to higher radio frequencies, "it would mean no television at all," Dr. Jolliffe testified at a hearing of the Senate Interstate and Foreign Commerce Committee.

"RCA is interested in the fullest development of all radio services," Dr. Jolliffe said. "It was a pioneer in FM, and it was a pioneer in television. We do not take a stand in favor of one of these services as against the other. We believe in both and we are convinced that the needs of both can be advanced without a feud between the two.

"In our opinion, the way to promote FM is to promote FM and not fight television."

Dr. Jolliffe said that RCA believes this view is shared by most persons in the industry. "But there appear to be some," he continued, "who would block the progress of television with charges which misrepresent the purpose and leadership of RCA and NBC in bringing television to the American people. One of these misrepresentations is the assertion that all television should be moved into the higher frequencies. Let us make no mistake about this. If such a move were made at this time, it would not mean more television. It would mean no television at all."

Television Can Expand Into H.F.

Television can *expand* into the higher frequencies without disrupting its service to the public, Dr. Jolliffe said. It is one of "the brightest promises of America's industrial progress," he asserted. "If permitted to develop, television will provide thousands of new jobs."

Dr. Jolliffe pointed out that the upsurge in television business has been the occasion for a number of special editions in newspapers recently. He presented copies of these special editions, and asked that they be made a part of the hearing record "because they demonstrate in a very understandable way the extent to which television is being translated into a new business and more jobs."

"The rush to television is an indication of the immense public interest in this new service to the home," he continued. "RCA and NBC are only two of the companies in the forefront of the development of television. Actually more than 45 companies now manufacture television sets. Many of these set manufacturers are small companies whose only business is television. In addition to RCA, still other companies in the television industry are making transmitters, studio equipment, tubes and other component parts for use in television apparatus.

"In addition, as of May 1 of this year, 97 television stations are on the air or have been granted permits to go on the air for commercial television broadcasting, and 223 applications for construction permits for new stations are pending. Of the 97 stations referred to, NBC has two stations on the air and three under construction. Many others are owned by newspapers, other broadcasters, motion picture producers, manufacturers, and other companies and individuals."

The question has been asked, Dr. Jolliffe said, whether present television sets would become obsolete if the Federal Communications Commission opens up a band of frequencies around 500 megacycles to supplement the present channel assignments to television. "The answer is," Dr. Jolliffe said, "that they would not become obsolete."

"Obsolescence of television receivers," he continued, "can be avoided by the addition of a simple converter which was developed by RCA about two years ago to illustrate the principle in connection with color television. It works equally well for black-and-white television. By the use of this converter, present sets designed for the channels currently in use can receive television on the high band also.

"We estimate the manufacturing cost of a converter like this to be about $10. It can be easily manufactured by anyone. As television expands into the higher frequencies, this converter or a circuit which performs the same function can be built into new television receivers, with the result that those receivers will contain more than one band, just as do the present multiband sets for sound broadcasting.

Only One Large Band Available

"The frequency space from 475 to 890 mc is the only large band of frequencies now available into which commercial television can expand. The use of this band for television presents many engineering problems. Most of these problems have not been solved. That is why I said at the beginning of my statement that if all television were required to move to these higher frequencies it would *not* mean more television. *It would mean no television at all.* New vacuum tubes capable of generating high power at these frequencies must be developed and manufactured. Much needs to be learned about the facts regarding wave propagation at these frequencies. In short, we need to learn how to use these frequencies to render a reliable television broadcast service to the public.

"A substantial amount of propagation data on high power transmissions at 500 to 900 mc has been obtained, and a technical paper on this subject has been prepared for publication in the June issue of the *RCA Review.* On April 12, we made available to members of the FCC and its staff, at RCA Laboratories in Princeton, our latest findings and technical data on the problems to which I have referred.

"We have been working diligently to solve these problems and much progress has been made. We are continuing this work. We want to make it very clear, however, that there need be no halt in the progress of television, nor any obsolescence of present receivers."

FM Has 80 Channels

Dr. Jolliffe said that there had been no discrimination in the allocation of frequencies against FM and in favor of television. "The contrary is the fact," he testified. "In 1936, 12 channels were made available by the FCC to FM and 8 to television, both for experimental service. In 1939, FM was increased to 14 channels and television to 20.

"As a result of the FCC hearings of 1940, television was required to vacate its channel #1 in favor of FM. Because of this, television was reduced to 19 channels and FM increased to 35. FM was authorized to proceed as a commercial service in May 1940 and television was made commercial in July 1941.

"Following the FCC hearings of 1944 and 1945, television was required to vacate still more channels in favor of FM and other services. The result this time in terms of channels for commercial service was: television, 13 channels; FM, 80 channels. Only last week television lost still another channel.

"The score today, on commercial channels, is: television, 12; FM, 80."

Dr. Jolliffe continued:

"The irresponsible charge that anyone is trying to hold back or block FM has been recklessly hurled before this Committee and elsewhere. The record of research, development, production and broad-

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TUBE PLANT ENLARGED

Million Dollar Extension to Lancaster Factory Will Provide an Additional Acre of Space for the Manufacture of Television Picture Tubes

WHEN engineering and production staffs of the RCA tube plant at Lancaster, Pa., succeeded late last year in tuning up their ingenious machines to turn out television kinescope tubes at the then unheard of rate of one-a-minute, they discovered that the results of their efforts, admirable as they were, were still much below the fast-growing demands of the television industry. For almost overnight, television had caught the fancy of America. Each set that was sold, sold others. Everyone, it seemed, wanted a television receiver. And as set production increased, the demand for kinescopes kept pace. RCA recognized the situation and moved rapidly to meet it. Early this year, a million dollars were set aside for the construction of a wing to the Lancaster plant, which would make available nearly an acre of additional space for more automatic machines and proportionately more tubes.

Before the new building is completed sometime this summer, workmen will have begun the installation of the machines that, by the end of the year, should begin to contribute their appreciable output to the present supply.

Built in 1942 and operated throughout the war by RCA for the Navy Department as the largest single supplier of cathode-ray and power tubes for critical war equipment, the Lancaster plant was purchased by RCA from the Navy in April, 1946. The most modern electron and televsion tube factory in the world, the plant at war's end comprised 394,450 square feet of efficient manufacturing and engineering space and presented a supreme opportunity to bring to immediate fulfillment one of the rosy promises of the postwar "dream world."

Plans Revealed to Industry

The first move was to expand and convert the plant's existing equipment, and design and install additional high-speed production machinery. At the same time, RCA's plans were made known to the electronics industry at large with a view to stimulating wide-scale interest and some measure of standardization of tube sizes on the part of manufacturers and designers so that the new-born television industry could move forward on a broad front.

Today, 1800 highly-skilled workers are employed at the plant and television tube production is running on a two and three shift basis for most operations. Newer and even more efficient methods and machinery continue to be installed. Luminescent materials for the glowing picture face of the picture tube, once produced by the cupful in laboratories, are now manufactured at the rate of almost a ton a month at Lancaster. As an indication of the remarkable efficiency necessary in this operation, impurities must be held to less than one in 30 million to prevent impairment of the luminescent face of the television tube.

The installation of the first of three giant "settling machines" which made the critical process of applying the luminescent screen to the face of the tube almost totally automatic, has recently been completed at Lancaster. The endless belt machines automatically and precisely feed the luminescent solution into the glass bulbs, transport them across the machine while the television screen forms, pour off the excess fluid, wash the bulbs first in an acid then in a water bath, and finally blow them dry. In this critical operation, any vibration which might disturb the even settling of the luminescent particles to the face of the tube must be eliminated. The giant three-ton settling machine is so finely balanced that it is powered by a single quarter-horsepower electric motor—no larger than the motor in a vacuum cleaner. Mounted on precision ball bearings, the machine stands on a vibration-deadening cork "island" isolated from the rest of the plant by thick sandwiches of concrete and cork.

Electronization, expected to be the next great revolution in America's industrial plant, is already

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RCA TUBE PLANT AT LANCASTER, PA, NOW BEING ENLARGED WITH A MILLION DOLLAR EXTENSION WHICH WILL SUBSTANTIALLY INCREASE THE FACTORY'S 1949 OUTPUT OF KINESCOPE TUBES FOR TELEVISION.

DAVID SARNOFF, PRESIDENT AND CHAIRMAN OF THE BOARD, ADDRESSING THE 29TH ANNUAL MEETING OF RCA STOCKHOLDERS IN RADIO CITY, MAY 4, 1948.

RCA Stockholders Meeting

Net Profit After Taxes of Radio Corporation of America for First Quarter of 1948 Amounted to $5,764,498—Earnings Per Common Share for Same Period Equal to 36 Cents, Compared with 28 Cents for First Quarter of 1947.

NET profit, after taxes, of the Radio Corporation of America for the first quarter of 1948 was $5,764,498, representing an increase of $1,084,433, or 23 per cent, over the same period in 1947, Brigadier General David Sarnoff, President and Chairman of the Board of RCA, announced at the 29th Annual Meeting of stockholders held on May 4, in a studio of the National Broadcasting Company at Radio City. Profit for the first quarter of 1948 — before Federal Income Taxes—amounted to $9,631,498.

Earnings per common share for the first quarter of this year amounted to 36 cents, as compared with 28 cents per common share for the first quarter in 1947.

Consolidated gross income of RCA during the first quarter of 1948 amounted to $88,053,297, compared with $76,560,096 for the same period last year. This represents an increase of $11,493,201, or 15 per cent over the 1947 figure.

During the past ten years, RCA has paid nearly $61,000,000, or 58 per cent of net profits, in dividends to its stockholders, General Sarnoff reported. Of this amount, $32,000,000 was paid to holders of preferred stock and $29,000,000 was paid on the common stock. He said that during the same ten-year period the net worth of the Corporation was increased by $48,000,000, and is now in excess of $113,000,000.

40,000 Employees on May 1

On May 1 of this year, RCA personnel numbered nearly 40,000, he said, praising the loyalty and spirit of cooperation given to the Corporation by employees.

"It is especially gratifying to report that there were no strikes in RCA during the past year," he declared. "The labor problems that arose from time to time were solved through genuine collective bargaining with the forty-one unions representing our workers. Wage rates throughout industry in general are at the highest level in history. Wages and salaries paid to RCA employees in 1947 totalled nearly $108,000,000, or more than 34% of our gross income.

"To meet increased living costs, the Radio Corporation of America has from time to time granted wage increases to its employees. The average weekly take-home pay for hourly paid employees in our manufacturing division was $48.96 in January, 1948, an increase of 93% over January, 1941."

General Sarnoff's report covered all phases of RCA activities in radio—research, engineering, manufacturing, broadcasting and world-wide communications.

"At the end of 1947, RCA had a backlog of unfilled orders amounting to approximately $100,000,000," he announced. "At that time, consolidated inventories totalled $61,500,000 of which $16,400,000 represented raw materials, $18,400,000 consisted of work in process, and $26,700,000 represented finished goods."

Despite expanded manufacturing facilities of the RCA Victor Division, orders for home instruments still exceed production, he said, declaring that the major increase had been in the sale of television sets which, in turn, increased demands for electron tubes, prompting expansion of the RCA Tube Plant in Lancaster, Pa.

Radio Industry Highly Competitive

The radio industry, in all its phases, is one of the most highly competitive businesses in the United States, he pointed out, recalling that newspapers, magazines, and broadcasting stations throughout the land carry the advertisements of the competing radio products and services. These, he declared, provide abundant proof of the keen competition which exists in this industry.

"Outstanding advances in television have amply justified the optimism expressed at our meeting last year and on other occasions," asserted General Sarnoff. "Television began in 1947 to fulfill its promise of becoming a new and dynamic postwar industry. It is gaining impetus daily. The Federal Communications Commission has authorized 93 television stations. In addition, 226 applications for construction permits are pending before the Commission.

"More than 300,000 television receivers are in use and this number increases daily. By the end of this year, it is estimated that 800,000 television sets will be in the homes of the public. RCA leadership in television, research, engineering, manufacturing and broadcasting has played an important part in bringing this new service into so many American homes.

"Today, there are twenty-five television stations on the air. More than forty stations are under construction and at least half of them are scheduled to be in operation before the end of the year. Television stations now on the air with daily programs reach territory inhabited by 40,000,000 people, and this coverage is expanding rapidly."

Reporting on the activities of the National Broadcasting Company, he said that NBC is a leader in establishing television as a service to the public. In addition to its pioneer station, WNBT, New York, and its second station, WNBW, Washington, NBC has television stations under construction in Cleveland, Chicago and Hollywood. By the end of this year a number of additional NBC network affiliates will have television stations on the air.

NBC marked its twenty-first year in 1947 with the largest volume of business in any year since its formation, the report revealed. Surveys conducted by impartial fact-finding organizations show that its outstanding programs attract more listeners to NBC than to any other network. The network consists of 169 standard broadcasting stations, six of which are owned by the Company.

FM Is Winning Acceptance

General Sarnoff stated that FM broadcasting is winning wider public acceptance, and recalled that RCA has been active in the technical development of FM since 1924. It was pointed out that RCA tube and circuit developments have simplified the technical design of FM transmitters and receivers and have lowered manufacturing costs.

"Today, as FM broadcasting spreads across the country at the rate of approximately 50 new stations a month," said General Sarnoff, "RCA is one of the chief suppliers of equipment. We have delivered 167 FM transmitters, and have orders for 138 more. Ten models of RCA Victor home radio instruments provide FM reception. Each of our television receivers is designed to receive by FM the sound portion of the television program."

PRODUCTION LINES AT THE RCA VICTOR PLANT IN CAMDEN, N. J., DELIVER AN INCREASING NUMBER OF TABLE MODEL TELEVISION RECEIVERS TO MEET THE GROWING DEMANDS OF THE PUBLIC.

With respect to the demand for RCA products in foreign countries, he reported that the distributing organization of the RCA International Division has taken substantial orders for communications equipment in Venezuela, Colombia and Pakistan, and declared that the RCA manufacturing plant in Mexico is being expanded and one under construction in Brazil will be in operation by the end of the year.

Scope of Research Increased

Scientific research and pioneering at RCA Laboratories continue on an ever-increasing scale, he said, adding:

"Our scientists and research men will continue seeking new knowledge, not only in radio and electronics, but in allied fields. We have commenced work in atomic physics because it is related to electronics.

"Nuclear energy, as a source of power, may become an important factor in communications. It is no idle dream to envisage that radio sets of the future may take their power from tiny capsules of atomic energy or even from small particles of such material. Should this miniature power supply become possible, smaller and more compact radio and television sets may be built."

New records of speed and accuracy in the handling of overseas radio messages were achieved during the past year by RCA Communications, Inc., a service of RCA, General Sarnoff reported, noting that new equipment and mechanized operations have greatly advanced the art of world-wide communications.

While mounting costs of operations, lower volume of international traffic and steadily increasing competition from overseas telephony and airmail caused a decline in operating revenues, he said, the new rate schedule authorized by the Federal Communications Commission, effective April 28, is expected to improve the present situation.

His report revealed that radar, as an outstanding developmint in marine communications, has become a primary field of activity for Radiomarine Corporation of America, with its radar installations on American and foreign vessels totalling 200. Radiomarine also was said to be maintaining a substantial volume of sales of radiotelegraph, radiotelephone, and direction finder apparatus, at the same time modernizing and expanding its system of inland waterways and coastal radio stations.

A WORKMAN AT THE RADIOMARINE PLANT ASSEMBLES RADAR ANTENNAS FOR INSTALLATION ON AMERICAN AND FOREIGN VESSELS.

General Sarnoff stated that enrollment of students at RCA Institutes has reached an all-time high of 1,625, seventy-five per cent of whom are war veterans. To provide for this expansion of the student body, RCA Institutes has moved to new quarters at 350 West Fourth Street, New York.

Looking Ahead

"In considering the future," General Sarnoff said, "the Directors and Management of the Radio Corporation of America are mindful that this is a critical period in world history and that business and industry face continuing uncertainties both at home and abroad.

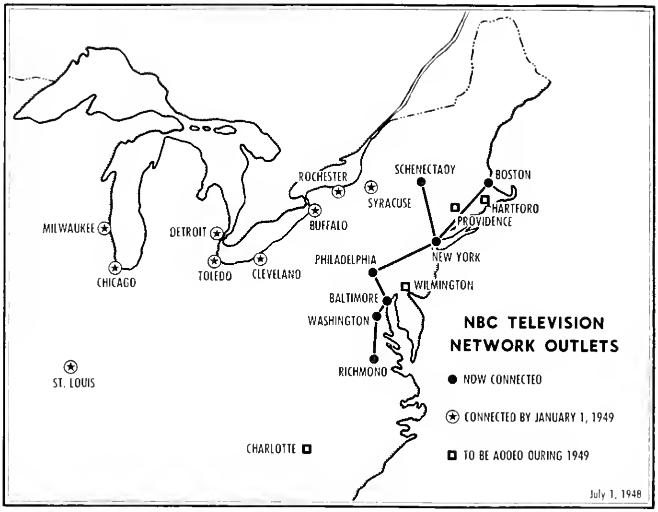
"Moreover, the rapid development of television and FM and their relationship to standard broadcasting have brought many new problems into the radio industry that must be faced with the courage of pioneers and the prudence of experience. With our comprehensive operations in research, manufacturing, broadcasting and world-wide communications, we are well equipped to meet these challenging problems and to solve them.

"The radio industry was born of science and its growth is continually nurtured by research and invention. In wartime we vividly saw how the strength and survival of nations depended upon the skillful application of science, and in no small measure upon the availability and efficiency of communications. Indeed, it was from radio that radar, loran and shoran sprang, as well as airborne television, the proximity fuse and many other electronic devices.

"Unhappily the world is still far from having achieved peace and security. Therefore, we must be alert to the responsibilities we have to our country and to our fellowmen. Radio and aviation have reduced the size of the globe and they must be strong in peace if they are to protect us against war. Our industry is a vital bulwark of national security.

"We, of the RCA Family—stockholders, management and workers alike—have great obligations as a result of our daily alliance with countless millions of people. America's research laboratories, manufacturing plants and communication facilities in wartime, were called 'an arsenal of Democracy'. In peacetime, they must also serve the interests and welfare of the public and thus help to promote the principles of freedom, democracy and opportunity for advancement — principles to which the people of our nation are devoted.

"Since the formation of RCA, twenty-eight years ago," said General Sarnoff in conclusion, "continual pioneering and experience have equipped us for industrial leadership under the American competitive free enterprise system. RCA has played a leading role in building the vast industry of radio, now enlarged by television. During these years it has advanced as one of America's great industrial organizations. Proud of past achievements, aware of present responsibilities, and alert to future opportunities for increasing the scope and value of our service to the public, we shall do our best to foster progress and to maintain RCA leadership in the science, art and industry of radio and television."



MAP OF NORTH EASTERN U. S. SHOWING THE SEVEN NBC TELEVISION NETWORK STATIONS IN OPERATION AND NINE OUTLETS TO BE ADDED SOON.

Tube Plant Enlarged

Continued from Page 22

widely utilized at Lancaster. In one of the first manufacturing operations on the bulbs, r-f heat burns a dime-sized hole in the glass side wall and welds a metal anode-button to the glass at a temperature of 700 degrees centigrade.

The vacuum itself within the tube is created by another "robot" process in the "straight-line exhaust machines." After rigid inspection, including exacting scrutiny of the luminescent screen face, the precisely engineered electron gun which focuses the beam of electrons to "paint" the glowing television picture on the luminescent face of the tube is inserted into the glass neck and the bulb is placed on moving carts which pass through long oven-like machines. Eighty-four of the bulbs are handled at a time in two parallel exhaust machines. The evacuated tubes, each with a vacuum ten times that of an ordinary electron tube, emerge from the far end of the exhaust machine to be automatically "pinched off" and sealed, and placed on the conveyor belt for the trip to the next process, untouched by human hands.

Besides its vital production role, the Lancaster plant is, in effect, a "pilot plant" for the growing television industry. The unique automatic machines, the rich fund of "know-how" have all been made available to the tube-making industry at large.

For this and many other reasons, some future historian may well point to the low-lying brick structure at Lancaster as the open sesame that unlocked the gates to television, another of America's great industries.

New Explorations Open Way

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casting set forth in this statement, and the position taken by the RCA toward opening up the higher frequencies of the radio spectrum, completely disprove this charge.

"The Radio Corporation of America unequivocally and categorically denies the charge."

Dr. Jolliffe pointed out that RCA and NBC have made notable contributions to the development of FM. "RCA has worked on FM since 1924," he continued. "RCA was a leader in the development of the higher frequencies and the new radio services which those frequencies made possible.

"Long before FM broadcasting could commence, these higher radio frequencies had to be pioneered. New vacuum tubes had to be created to work on these frequencies. Transmitters, antennas and receivers had to be developed to meet their hitherto unexplored characteristics. This was the pioneering on which RCA engineers spent years of exploration, research, invention and engineering. Commencing almost with the beginning of the company in 1919, RCA has been in the forefront of the development of this natural resource.

"The significance of this pioneering work can best be understood when it is realized that two of the principal advantages of high frequency or FM broadcasting, viz., high fidelity and freedom from natural static, are derived from the use of these higher radio frequencies, and not from the type of modulation employed."

MICROPHONES - 1920 TO 1948

Recent Introduction of Bantam-Size, High Fidelity Instrument Climaxes Development of These Units Since Earliest Days of Radio Broadcasting.

By T. A. Smith

General Sales Manager
Engineering Products Dept.,
RCA Victor Division.

FEARED by novice performers as a lethal monster ready to pounce upon the timid, and variously caricatured as a "fiend in metal" and a "pie-plate on a stick," the familiar radio microphone, long the symbol of broadcasting, has followed the trend of the times and become a sleek, streamlined object. It is compact, greatly improved in appearance, and capable of a quality of performance once considered almost beyond the reach of engineering design. Compared to the crude carbon button microphone of 1920, the new bantam-sized velocity instrument, introduced recently by RCA Victor, has reached a point of advance comparable to that exhibited by the sleek automobile of 1948 in its relation to the ox-cart of our colonial pioneers.

Although the microphone as a converter of sound into electrical pulses is as old as the telephone, it was the demands of radio broadcasting that gave impetus to its development. As the scope of broadcasting widened from the earliest days of radio, when any sound reaching the loud speaker however faithful to quality was considered a miracle of science, down to the present when strict fidelity of tone is the yardstick, the capabilities of the microphone have never lagged behind the industry's rapid growth.

Broadcasting Provided Impetus

While the models of 1920 gave satisfactory service for the simple studio programs of those years, the demands of broadcasters soon called for a more practical approach to microphone design. Large groups of performers took the place of lone artists, radio moved to the concert hall and the opera, and then, putting on seven league boots, it took jaunts out of the studio and broadcasts from remote points became commonplace. An improved microphone was the only answer.

The first microphone that could be considered a forerunner of the quality instruments of today was the condenser "mike." It came to light in 1928 and though far from perfect, relegated the carbon microphone to the shelves of museums. To some degree, it cut out unwanted background noises, but its output was so low that it required a small built-in amplifier to make it operable. Because of its bulky construction it was not the type of microphone to be carried throughout the broadcast of an 18-hole golf match.

First High Fidelity Microphone

In 1930, RCA developed the velocity ribbon microphone, the first true high-fidelity unit. However, this unit, too, was a bit unwieldy, since it employed electromagnetic field poles requiring direct current which was usually supplied by a heavy storage battery. But, taking advantage of improved materials, RCA engineers substituted permanent magnetic metal for the bat-

JINX FALKENBERG DEMONSTRATES THAT FACES OF PERFORMERS AND SPEAKERS ARE NOT HIDDEN WHEN THE NEW, COMPACT MICROPHONE IS USED.

THE NEW BANTAM-SIZE MICROPHONE (THIRD FROM LEFT) IS COMPARED HERE WITH THREE OTHER TYPES FAMILIAR TO AUDIENCES IN RADIO STUDIOS AND AT PUBLIC EVENTS.

tery-powered field coils and a unique microphone was born—the RCA 44A. It took only a very short time after its introduction for this "mike" to achieve world fame; in the United States it won recognition as the "standard of the broadcasting industry."

Prior to the advent of the RCA-44 series, microphones were essentially non-directional. Because of this, noise and undesired sound were picked up along with desired program sound. The new velocity "mike," however, was truly bi-directional, with pickup confined mostly to the front and back of the instrument.

A smaller version of the "44" series (known as the Junior Velocity Microphone Type 74), was introduced by RCA in 1935 and became popular among broadcasters. Its reduced size permitted a better view of speakers at banquets and conventions, and performers in night clubs.

Yet what the broadcasting industry still lacked was a microphone which was uni-directional, one which would give uniform response over a large angle without distortion, and one which could be so oriented that undesirable noises coming from a particular direction would be eliminated. RCA introduced such an instrument, the uni-directional model, in 1936. It was entirely new and an exclusive RCA development.

Trend Toward Lighter Weight

Continued research resulted in the later light weight types. One of the models contained a switch for selecting the output of either the velocity, the pressure unit, or a combination of the two units, to produce either bi-directional, non-directional, or uni-directional response. As the next step RCA in 1945 introduced the now famous single ribbon microphone. This polydirectional unit can be adjusted by a single switch to give an infinite number of directional pickup response patterns.

MICROPHONES USING THE PERMANENT MAGNET PRINCIPLE OF OPERATION UNDERGO FINAL INSPECTION AT THE RCA PLANT IN CAMDEN.

Taking advantage of the newest, lightweight magnetic alloys to further reduce the size of microphones, RCA engineers then started work on a bantam-size unit which would embody the output and high fidelity of the larger types with a fraction of their weight. The result was RCA's newest miniature velocity microphones, an instrument of broadcast quality, but smaller than a pack of cigarettes. The new diminutive unit is a low-cost instrument for use in radio studios, at remote broadcasts, in night clubs and conventions. It is so small that it will not conceal the faces of singers and speakers, and it fits comfortably in the palm of the hand. It weighs only 12 ounces, making it ideal as a portable unit.

Reduction in the size and weight of this microphone, known as the KB-2C, was brought about by the ingenious idea of designing the magnetic structure as part of the case. New, highly efficient magnetic materials have also contributed to the reduction in size, while retaining an output level comparable to that of larger, conventional types of microphones.

French Firm to Make Tubes Under RCA Contract

American type radio tubes, particularly the "miniatures" now widely used in this country, will be manufactured in volume in France under an agreement concluded between the Societe des Lamps Fotos, one of the leading tube producers in France, and the Radio Corporation of America, it was announced on May 6 jointly by Francois Grammont, managing director of the Societe, and Meade Brunet, vice president and managing director of RCA International Division.

The agreement, which covers licenses on certain RCA tube patents and the supplying of technical and manufacturing information, Mr. Grammont said, exemplifies the principles embraced in the European Recovery Plan. The Fotos Company, he added, plans to offer French producers of radio equipment the advantages enjoyed by the industry in the United States.

PRAISE FOR RADAR

Skippers and Navigators Reveal How Radar Serves Them in Many Different Ways in Storms, Fog and Darkness

EYE-WITNESS accounts extolling the value of RCA shipboard radar installations have been received by the Radiomarine Corporation of America in recent weeks from a large number of users. More than 200 vessels now employ this modern navigation and safety aid in darkness, storms and thick weather. The reports tell of its use up and down the Atlantic and Pacific Seaboards, in the Gulf area and on the Great Lakes, the Mississippi River and its tributaries, as well as by foreign-flag vessels on the high seas and in port entrances.

These on-the-spot accounts, volunteered by captains and mates, demonstrate the benefits and savings in time and money which RCA radar has made possible. They reveal dramatically for the first time the wide variety of operating conditions under which the commercial 3.2-centimeter units provide "eyes" to shipping. Excerpts from a representative group of the reports follow:

. . . "Picked up ships in snow squalls. Operated with good results during heavy snow storm in Baltic Sea and off Cape Race."

. . . "The Captain told the Second Mate one time during a squall that he would rather sail for $100 less pay than to sail without radar. Just before sailing time it started to haze. The Mate said he did not care how thick it got; with the radar they would go out in any kind of fog or weather."

. . . "Along the coast of Florida, the RCA radar was used on the 15 and 20-mile scales and aided in picking up navigational markers and also ships at a range of about 25 miles. We continued on up from Florida to Cape May using these longer ranges merely as an anti-collision measure."

. . . "The ship sailed the afternoon of January 15th. While going down the canal (from Port Arthur) the pilot mentioned to the Captain and the other bridge personnel that the RCA radar picture was the finest he had ever seen, and it was the first one, in his mind, that would have enabled him to take the ship out of there in a fog."

. . . "On arrival off Galveston, the vessel encountered fog. The entrance was made by radar. The Captain uses the radar exclusively when taking bearings on other vessels or harbor entrances, as the radar bearing is much more accurate than a Pelorous bearing."

. . . "Made landfalls by radar in the Baltic Sea and from port to port in Finland when not visible to the naked eye."

. . . "Performance excellent. Used constantly in smoky weather in Florida Straits and in sleet storm coming up Delaware River."

. . . "Going through English Channel — low visibility — radar used to large extent to pick up buoys and lights that were not visible more than one mile at the most."

. . . "Captain is still singing high praises of the RCA unit."

. . . "Heavy rain. Spotted targets O. K. Picked up Mantanilla (buoy), distance 10 miles, heavy seas. Used radar approaching Hatteras in dense Gulf Stream vapor. Ships distinctly spotted through this vapor and heavy spray. Picked up Winter Quarters Light vessel at 18 miles. The Captain was entirely satisfied with the operation of the radar."

. . . "RCA is to be congratulated for the fine work done in being able to install the equipment in the face of so many difficulties. The men who were in charge of the installation did a remarkable job."

Time and Oil Saved

. . . "We completed a 2½ month voyage to Rio de Janeiro and then to Baltimore with the radar working perfectly. Along the Brazilian coast the ship keeps about 10 miles off shore and it is always hazy and it is impossible to take visual bearings. But, by using the radar, we were at all times able to pick out identifying land masses. Also, by means of the radar, we kept the ship on a true course, thereby saving time and oil."

. . . "Left Ketchikan for Prince Rupert. Stood by radar almost continuously negotiating some narrow passages and had intermittent snow, rain and hail squalls. 1½ and 5 mile ranges used exclusively and results were excellent."

. . . "Passed Scotch Cap at 2:00 A.M. in heavy snowstorm that obliterated all lights. Operation with radar was excellent."

. . . "The radar operated successfully throughout a recent trip from the West Coast to China, the Philippines and back. On the way to China, the ship ran into some bad weather of near typhoon force and yet we were able to pick up islands and other ships with little difficulty."

. . . "Came into Lynn Canal and Skagway, Alaska, in thick snowstorm. Radar is a blessing in this weather."

Navigated Channel in Fog

. . . "During a voyage on Great Lakes from Chicago to Holland, Michigan, we navigated a tricky channel in a thick morning fog, proceeding on slow engine into a harbor, found the radar of real value."

. . . "Radar equipment permitted the vessel to run seven hours through dense fog at night on the Tennessee River."

. . . "U. S. Army Engineers are using RCA radar for the preparation of radar charts of the Ohio River. This is an example of the advantages of a high resolution radar in picking up narrow channels, bridges, and other targets for inland navigation."

. . . "The Captain is highly pleased with performance of this radar and jokingly remarked that he is ready to throw his searchlights overboard inasmuch as he has no need for them because of the radar."

. . . "We are very well satisfied with the over-all performance of our Radiomarine radar. It is used a great deal for navigation on our trips between Rotterdam and New York."

. . . "I believe that the apparatus will pay for itself within two years, perhaps sooner, by saving ship's time. In addition, ship and crew are, of course, considerably safer against collisions and breakdowns."

. . . "Captain summed up by reporting that the Radiomarine radar performed very well under all conditions and that he was very much satisfied with its performance in clear as well as in tropical squally weather."

CO-SPONSORS OF THE NBC COLLEGE-RADIO PLAN. L. TO R.: DR. JOHN W. TAYLOR, PRESIDENT, UNIVERSITY OF LOUISVILLE; GEORGE W. NORTON, PRESIDENT, STATION WAVE; J. U. MILWARD, DIRECTOR OF UNIVERSITY DEVELOPMENT, AND NATHAN LORD, VICE PRESIDENT AND GENERAL MANAGER OF WAVE.

COLLEGE-RADIO PLAN

Experiment in Home Study Courses for Adults Launched by NBC and University of Louisville as a Preliminary to Nationwide Educational Project.

AN ADULT edcuation project of impressive scope in which institutions of higher learning will join with NBC and its affiliates in a college-by-radio plan to provide home-study courses built around selected network-produced programs, was launched on June 21 at the University of Louisville, in Kentucky. The Louisville experiment is being headed by Mayor Charles P. Farnsley of Louisville, Dr. John W. Taylor, president of the University, and George W. Norton, Jr., president of WAVE, the NBC outlet in the Kentucky city. Sterling W. Fisher, Manager of NBC's Public Affairs and Education Department, is supervising the plan.

In explaining how the experiment will operate, Fisher said that listeners may register at a nominal fee for a course in current events, music, literature or a like field, through a participating university. "The registrant," he said, "will be expected to tune in regularly both to the appropriate net work program and the supplementary guidance broadcasts. He will submit reports on his listening and on assigned reading. At stated intervals and at the end of the course, he will take an examination prepared by the college with which he is registered."

Two kinds of certificates will be awarded for work successfully completed, one for students not interested in or not qualified to seek college degree credits, and the other, involving more concentrated study, for students desiring college credits.

Courses Based on Noted Programs

Home-study courses for the national college-by-radio will embrace many of NBC's outstanding programs in the fields of education and public affairs, such as "World's Great Novels," "University of Chicago Round Table," "Living—1948" documentary series, "Public Affairs," "Pro and Con," "America United," "Doctors Today," the NBC Symphony Orchestra and "Orchestras of the Nation." Other series in science, history, government and home-making may be added later.

The Louisville experiment started with two NBC network programs, "World's Great Novels" and "University of Chicago Round Table." The University of Louisville has invited Dr. Harvey Webster, distinguished professor of English at the University of Chicago, to conduct the college-by-radio literature course, which will have "World's Great Novels" as its core. A member of the social science department of the University of Louisville will be charged with the current events course, which will be built around "University of Chicago Round Table." Classroom discussions will be broadcast from the University campus.

Results of the Louisville case study will be made available in the fall through all NBC affiliated stations to colleges and universities throughout the country.

Will Help Millions of Adults

The project has the endorsement of former U. S. Commissioner of Education John W. Studebaker. "The NBC college-by-radio plan," he said, "will be a great forward step in strengthening and elevating American life. It will enable millions of adults to carry on systematically their education, through home-study courses which join together stimulating and enlightening radio programs produced by skilled radio people, and material for reading and study prepared under the professional supervision of colleges and universities."

Speaking for WAVE, Mr. Norton said: "Education through radio now, for the first time in history, has the opportunity to perform a completely universal service to the community, the nation and the world. We believe this NBC-University of Louisville-WAVE project is a milestone in true education for the people—a significant milestone in AM-FM radio collaboration in practical public service."

President Taylor of the University of Louisville said: "Over a century ago Americans began making a high school education a right rather than a privilege. Now over half of our citizens have been to high school. Our goal for the next generation or two should be to make a college education a right rather than a privilege for our citizens.

Many Can Profit by More Study

"The general intelligence tests given to young men entering the armed forces during the past war have proved beyond doubt that 49 percent of our population can profit by at least two years of college work, and 32 percent have the mental ability to complete an advanced liberal or specialized education. To educate in anything but an unreasonable length of time the vast numbers involved by using present college facilities and methods would be well nigh impossible. The solution to this problem must then lie in making use of modern technological means to take higher education from the university campuses into the homes of those desiring higher education."

PROMOTIONS

Four promotions in the RCA and NBC organizations were announced by Brig. General David Sarnoff, President and Chairman of the Board of RCA, following meetings of the RCA and NBC Boards of Directors on July 2.

Glen McDaniel, Vice President and General Attorney of RCA Communications, Inc., was elected Vice President of the Radio Corporation of America to serve on the President's staff. Associated with the law firm of Sullivan and Cromwell, 48 Wall Street, from 1936 to 1942, Mr. McDaniel handled cases before the Securities Exchange Commission, the Federal Trade Commission and State and Federal courts. In March, 1942, he was named Special Counsel to James V. Forrestal, then Under Secretary of Navy. Later that year he was commissioned a Lieutenant, USNR, in the Office of the General Counsel of the Navy Department. Promoted to Lieutenant Commander in 1944, he figured prominently in the procurement of aircraft for the Bureau of Aeronautics.

Charles R. Denny, Vice President and General Counsel of the National Broadcasting Company was elected Executive Vice President of NBC. Before joining NBC in 1947, Mr. Denny successively was in the legal divisions of the Department of Justice and the Federal Communications Commission. In the latter post, he served as General Counsel before his appointment to membership on the Commission, becoming its Chairman in 1946.

David C. Adams, Assistant General Counsel of the National Broadcasting Company was elected Vice President and General Attorney of RCA Communications, Inc. Prior to joining NBC, Mr. Adams was a member of the legal staff of the Federal Communications Commission and, in addition to his legal duties, a member of the Cable and Radio Committees of the Board of War Communications.

Gustav B. Margraf, in charge of the Washington office of Cahill, Gordon, Zachry and Reindel, and legal representative of NBC in Washington since 1942, was named to succeed Mr. Denny as Vice President and General Attorney of NBC.

Commenting on the promotions, General Sarnoff said they were "in keeping with RCA policy for regular infusion of youth in management." Mr. McDaniel and Mr. Denny are 36 years of age, Mr. Adams is 35 and Mr. Margraf, 33.

"Radio and television, because of their close alliance with science and the arts, are young and rapidly expanding industries," said General Sarnoff. "Youth is essential for industrial growth and progress. The challenges and problems that continually arise call for well-trained young men with energy and initiative, and a record of accomplishment even at an early age."

NBC REPRESENTATIVES IN CHARGE OF THE COLLEGE-RADIO PLAN. L. TO R.: KEN R. DYKE, ADMINISTRATIVE VICE PRESIDENT IN CHARGE OF PROGRAMS AND PUBLIC AFFAIRS; STERLING W. FISHER, MANAGER OF THE PUBLIC AFFAIRS AND EDUCATION DEPARTMENT, AND WADE ARNOLD, ASSISTANT SCRIPT MANAGER.

Twenty Oil Tankers To Carry RCA Radar

Twenty of the most modern Radiomarine radar units utilizing post-war design are to be installed on seagoing tankers of the Standard Oil Company (New Jersey), following tests carried out aboard the "Esso Paterson." Eventually the Company expects to equip the ninety vessels of its American and Panamanian Flag fleets with radar.

Television Milestones

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talent were broadcast over ½ mile on 520 megacycles; power 50 watts, channel width 14.5 megacycles. *(January 29.)*

1947—"Blue baby" operation televised by RCA at Johns Hopkins University was witnessed by several hundred doctors and nurses assembled before ten television receiving sets in hospital auditorium. *(February 27.)*

1947—All-electronic color television on 8 x 10-foot screen as developed at RCA Laboratories demonstrated by Dr. V. K. Zworykin at Franklin Institute, Philadelphia, Pa. *(April 30.)*

1947—First demonstration of American television in Europe conducted at Milan (Italy) Fair on June 9, at the Vatican, where Pope Pius XII was televised for first time. *(July 12.)*

1947—RCA announced development of Ultrafax, or radio-mail system, that has a potential for handling a million words a minute and capable of transmitting 50,000-word novels from New York to San Francisco in 60 seconds by high-speed photographic process. *(June 23.)*

1947—Color pickup camera for three-color electronic color television, using the simultaneous system, was demonstrated to members of FCC and others at RCA Laboratories. Studio and outdoor pickups were shown with a picture brightness of 8 foot-lamberts; pictures were projected on 7½ x 10-foot screen and on a home-receiver screen 11 x 14 inches. *(July 16.)*

1947—Surgical operations at New York Hospital televised and viewed on screens at American College of Surgeons Congress, at Waldorf-Astoria Hotel, New York. *(September 8.)*

1947—NBC announced that in cooperation with Eastman Kodak Company a special camera had been developed to photograph television images directly from the kinescope screen, thus opening the way for kinescope recordings and film syndication of television programs. *(September 13.)*

1947—Theatre Guild presents St. John Ervine's drama "John Ferguson" as first in a series of plays on NBC television. *(November 9.)*

1948—Trinity Church service telecast for the first time; it was the first program of its kind to be televised in New York from interior of a church during a religious service. *(February 22.)*

1948—NBC Symphony Orchestra, Maestro Arturo Toscanini, conducting an all-Wagnerian broadcast concert, also was telecast for the first time. *(March 20.)*

1948—Beethoven's "Ninth Symphony" played by NBC Symphony Orchestra, Maestro Arturo Toscanini conducting, was telecast as well as broadcast; estimated TV audience, 370,000. *(April 3.)*

1948—Telecast of Republican National Convention at Philadelphia enabled more people to eye-witness the event than the sum total of all who ever attended GOP Conventions since the founding of the party in 1854. *(June.)*

> *In speaking of television for the past 25 years or so, we have been accustomed to saying that "television is around the corner." I should like to bury that phrase. Television is no longer around the corner. It is beyond the doorstep; it has pushed its way through the door into the home! — David Sarnoff, September 13, 1947.*

Louis-Walcott Telecast Sets All-Time Record

Approximately seven out of every eight television receivers in the seven cities served by the NBC Television network, were in use on the night of June 25, and 99.7% of the sets were tuned to the Louis-Walcott championship prize fight that evening, a special survey by C. E. Hooper, Inc., revealed. The resulting rating of 86.6—highest in the history of radio and television—was 7.6 points above the broadcast of President Roosevelt's war message on December 9, 1941, the previous record holder.

Further analysis of the survey showed that the total television audience of WNBT, New York, key station of the NBC network, was 3,930,000 with two million additional viewers distributed among the remaining cities carrying the network sports feature. WNBT's average home audience was 12: seven men, four women and one child.

Electron Microscope for Virus Research

Impressed with the fact that the effective treatment of colds is possible only by an understanding of the cold virus of which he was a victim, Earling H. Samuelsen, Norwegian ship owner, has donated an RCA electron microscope to the Institute of Bacteriology of the University of Oslo for use in conducting research in the virus infections common to Norway. The idea of the gift was conceived by the donor while he was being treated with a series of cold injections by Dr. Theodor Thjotta, Director of the Institute and Professor of Bacteriology.

The RCA electron microscope permits the examination of bacteria, viruses and other particles of the submicroscopic world, with magnifications up to 100,000 diameters.

Dividend Declared By RCA

Following the meeting of the Board of Directors of the Radio Corporation of America in New York, on June 4, Brig. General David Sarnoff, President and Chairman of the Board, announced that a dividend of 87½ cents per share had been declared on the outstanding shares of $3.50 Cumulative First Preferred stock, for the period from April 1, 1948 to June 30, 1948. The dividend was payable July 1, 1948, to holders of record at the close of business June 14, 1948.

NBC Television

Vision—1948

NBC Television is Theater

Theater—without aisles, but with all seats on seventh row center

Theater—with the stage's most intimate house: your own

Theater—with the brilliant immediacy of the legitimate stage, and the visual scope of motion pictures

Theater—with stars to play an endless repertory of drama

Theater—with the excitement of premieres and the satisfaction of established favorites.

NBC TELEVISION IS THEATER

to an audience that has ceased to marvel at the promise of television—an audience that knows the dramatic reality of Theater in sight, sound and substance on the air.

What has been said of theater on NBC Television? In context or out, reviews of NBC's dramatic shows read like this:

The Last of My Solid Gold Watches (Tennessee Williams' play, produced by ANTA and NBC on December 14) "challenging video material..." —*Billboard.*

Twelfth Night (NBC production, starring Ann Burr) "chalk up another outstanding television production to NBC's credit."—*Variety.*

The Purple Doorknob (ANTA-NBC production, December 17) "...a harmonious fusion of script, performance and production, the whole constituted a singular triumph." —*N. Y. Times.*

The Late George Apley (NBC-Theater Guild production, December 7) "...a well-produced, acted and directed version."—*Variety.*

Regularly scheduled dramatic programs are but one feature of the balanced television entertainment offered by NBC...America's No. 1 Television. The whole range of sight-and-sound—sports, news, films, special events, children's programs, concerts and variety shows—are beamed to viewers from The National Broadcasting Company, a service of Radio Corporation of America.

WNBT NEW YORK

Printed in U.S.A.

Millions of Americans—with RCA television—will see history as it is made at the two National Political Conventions.

This year, television joins press and radio as a "political reporter," in Philadelphia, at the Republican Convention, June 21, and the Democratic Convention, July 12. As political leaders step up to speak, you're right with them on the convention platform.

The Candidate will be televised as he looks into the camera—talks to the people, face to face. His appearance, smile, gestures, combine with the sound of his voice, and his message, to complete the transmission of his personality. You have a new opportunity to know your man!

Important as any in history, the 1948 conventions will be covered from start to finish by keen-eyed RCA Image Orthicon television cameras. Highlights and sidelights, all will be seen. And what the camera catches will be sharp and clear on the screens of RCA Victor home television receivers . . .

Today, 40,000,000 Americans are within reach of regularly scheduled daily television programs.

Television as an aid to good citizenship, through the formation of an informed public opinion, is one of the ways in which developments from RCA Laboratories serve the nation and its people. Advanced research is part of any instrument bearing the name RCA or RCA Victor.

When in Radio City, New York, be sure to see the radio, television and electronic wonders at RCA Exhibition Hall, 36 West 49th Street. Free admission. Radio Corporation of America, RCA Building, Radio City, N. Y. 20.

RADIO CORPORATION of AMERICA