

# RADIO PROGRESS

*What about Television?*

# IN RADIO IT'S RCA ALL THE WAY!



In every RCA Victor Radio, NBC broadcasting skill and RCA engineering combine to give you the magic of radio that's RCA All the Way.

RCA develops and manufactures a great variety of special apparatus of vital necessity in the particular field for which it is developed.

## In Broadcasting

In World-wide Communications

In Sound Motion Pictures

In Aviation Radio

In Police Radio

In Test Instruments

In Marine Radio

## RCA LEADS THE WAY!



Radio Headquarters, the great RCA manufacturing plant at Camden, New Jersey, houses the greatest research and development laboratories in the science of sound transmission and reception.

RCA builds and equips broadcast stations. Through NBC, it organizes radio networks, creates programs and puts them on the air. Equally skilled in the technique of broadcasting and reception RCA builds receiving sets, matched to modern broadcasting. RCA is the only company that makes and does everything in radio.

Only with an RCA Victor can you get the benefit of this unequalled experience—radio that is RCA ALL THE WAY.



# FOREWORD

by DAVID SARNOFF, President,

Radio Corporation of America

In his struggle for new information, man has always reached farther into the mysteries that were beyond his accustomed sphere; farther with the runner through the forest . . . farther with camel caravans across trackless plains . . . farther with caravels into uncharted oceans . . . seeking speed, and relishing the novelty, and the advantages, of new contacts. Almost from the start, mankind has struggled for better communication.

Communication has been civilization's pace-setter. The creeping progress of the past had its being in the muddy trails, the bridgeless rivers and the captured messenger whose tidings never came.

Civilization has lagged when communication has faltered. Surprising new arts were developed, employed and eventually lost in the slumber of the ages. Those that endured won their way about the earth slowly. Nations adhered to old ways not so much because they liked to labor in the ancient, clumsy manner, but because improvement remained isolated, undetected, unheralded over long periods to people of other sections.

Civilization has progressed as communication has gone forward. Rome built highways, and maintained an empire. Vessels of the Middle Ages brought to Europe the prized offerings of the Orient, and something of Eastern scientific progress. The mariner's compass guided navigation. Printing was introduced. Carriage wheels rumbled over more numerous roadways. Cultural advantages were interchanged. Postal services were established. The world advanced, for communication was a more ready servant.

Progress has gained tremendous impetus as communication has been speeded. Our modern age is tuned to the electrical signal. If we should seek the identifying characteristic of modern civilization, we would find it in the rapidity with which society transacts its affairs and moves on to new achievements. Our philosophies are no more profound than those of the ancients, our discoveries no more startling, our inventions no more significant to customs and habits. But we have compressed time. We have crowded into months what once would have been accounted the normal progress of centuries.

The telegraph and telephone gave modern industry its great onrush. Radio has augmented those services amazingly, not only by providing an unprecedented method of reaching great masses of people instantly and simultaneously, but also by giving the world swifter, surer, more direct contacts.

Radio has swept aside many of the limitations that were inherent in earth-bound communication. It has continually unfolded new methods. Its research laboratories look upward and outward. None can forecast the future of communication so long as the ether wave may yet be harnessed to new tasks. Man is still reaching into mysteries beyond his accustomed sphere, laboring on a much broader foundation, seeking to push on the sequence of invention, certain that no hope of making communication a faster pace-setter will be overlooked.



## What about Television?

The eye, RCA's Iconoscope, looking very much like a glass bubble with a sheet of metal for a heart, is the tube which transforms what it sees into electric impulses. That is where television begins. The ear, NBC's faithful and familiar microphone, picks up the accompanying sound and gives voice to the images in a television receiver.

A recent issue of the "Radio and Electrical Appliance Journal" carried the following news item—"British Broadcasting Company eliminates Baird system and concentrates on Marconi-Emi system. Comparison of both systems by government Television advisory committee results in Television of the Electrical and Musical Industries—Marconi-Emi which is the same as the RCA Television in the United States. Briefly, it means that the RCA Television is 'the best on earth' as the British had a wide choice of television systems."

Let us pause for a moment, sift a few facts and see for ourselves how good is the "best" and just how far this marvelous phenomena of "sight broadcasting" has progressed. Just how soon may we expect to sit in our easy chair at home and witness a scene in action many miles away?

Investigation first brings us face to face with the fact that television bears no relation to the present system of sound broadcasting, which provides a continuous

source of audible entertainment to the home. While television promises to supplement the present service of broadcasting by adding sight to sound, it will not supplant nor diminish the importance and usefulness of broadcasting by sound. Television will not obsolete the broadcast receiver being manufactured today because it must use a very narrow high frequency band, far removed in the sound wave spectrum from the portion employed by commercial broadcasting.

In the sense that the laboratory has supplied us with the basic means of lifting the curtain of space from scenes and activities at a distance, it may be said that television is here. But as a system of sight transmission and reception comparable in coverage and service to the present nation-wide system of sound broadcasting, television is not here, nor around the corner. The all important step that is now being taken is to bring the research results of the scientists and engineers out of the laboratory and into the field. RCA is at this very moment

(Continued page 5)

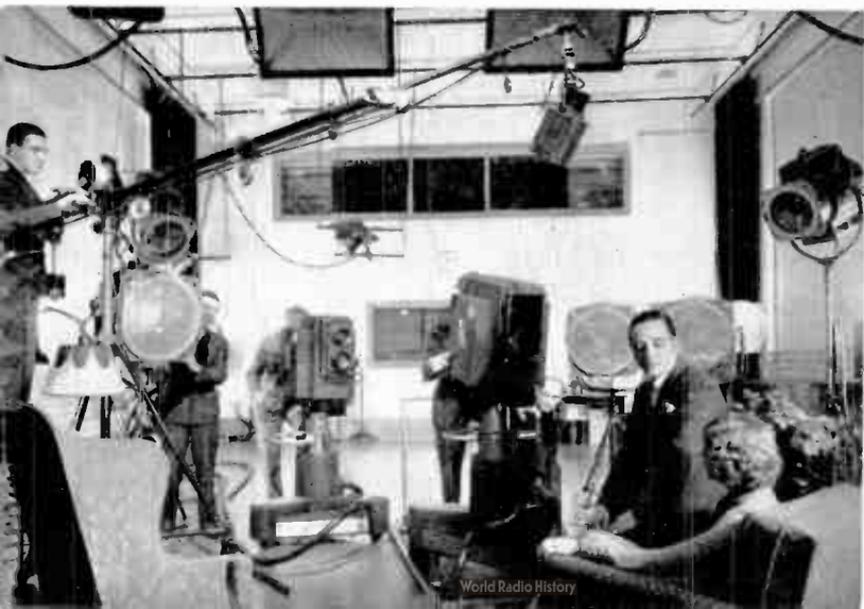


▲ Here you see Felix when transmitted with the early 60 line definition which has now been abandoned for the improved 441 line.



### ALL SET TO SHOOT

▲ The scene has been set, the battery of lights focused on the actors, and the director alert behind the shaded glass panel of the control room. The "lot" is the NBC experimental television studio in the RCA Building, New York, where a general view shows "cameramen" focusing Iconoscopes, and the "sound man" controlling a microphone which, placed at the end of a swinging arm, can pick up sound without coming into the range of vision.



### CAT INTO GUINEA PIG

▲ Felix the Cat has been turned into a grinning guinea pig as the subject used most often in the NBC experimental television studio, RCA Building, New York.

engaged in this phase of the work as indicated by the accompanying photographs.

In June, 1936 Television Developments were demonstrated for the press by NBC and RCA. A forty-minute program consisting of "live" talent and motion pictures was broadcast from the RCA Television Transmitter on the top of the Empire State Building and received on the 62nd floor of the RCA Building using the new RCA 12-inch receiving tube producing a picture 7 1/2 by 10 inches. This is the largest screen yet employed capable of commercial adaptation.

At the close of this demonstration, Mr. David Sarnoff, president of the Radio Corporation of America, made the following statement which sums up the matter and brings us pretty well up to date on the subject.

"In view of the public interest in the promise of sight as well as of sound through the air we have invited you here today to witness an experimental television test so that the progress in this new and promising art may be reflected to the public factually rather than through the haze of conjecture or speculation.

"You will recall that our field tests in television began only on June 29 of this year. That date marked the beginning in this country of organized television experiments between a regular transmitting station and a number of homes. Since then we have advanced and are continuing to advance simultaneously along the three broad fronts of television development—research which must point the road to effective transmission and reception; technical progress which must translate into practical sets for the home the achievements of our laboratories; and field tests to determine the needs and possibilities of a public service that will ultimately enable us to see as well as to hear programs through the air. On all these fronts our work has made definite progress and has brought us nearer the desired goal.

"First and as of immediate interest, let me tell you the progress of our field tests. As you know, we have been transmitting from our television station on top of the Empire State Building in New York City which is controlled from the NBC television studios in the RCA Building. We have observed and measured these transmis-

sions through a number of experimental receivers located in the metropolitan area and adjacent suburbs. The results thus far have been encouraging, and instructive. As we anticipated, many needs that must be met by a commercial service have been made clear by these tests.

"We have successfully transmitted through the air, motion pictures as well as talent before the televisor. The distance over which these television programs have been received has exceeded our immediate expectations. In one favorable location due to the extreme height of our transmitter, we have consistently received transmissions as far as 45 miles from the Empire State Building.

"The tests have been very instructive in that we have learned a great deal more about the behavior of ultra short waves and how to handle them. We know more about interferences, most of which are man made and susceptible of elimination. We have surmounted the difficulties of making apparatus function outside of the laboratory. We have confirmed the soundness of the technical fundamentals of our system, and the experience gained through these tests enables us to chart the needs of a practical television service.

"We shall now proceed to expand our field test in a number of ways. First we shall increase the number of observation points in the service area. Next we will raise the standards of transmission.

"In our present field tests we are using 343 line definition. Radio Corporation of America and the radio industry have, through the Radio Manufacturers Association recommended to the Federal Communications Commission the adoption of 441 line definition as a standard for commercial operation. Our New York transmitter will be rearranged to conform to the recommended standards. That also means building synchronized receivers to conform to the new standards of the transmitter. Synchronization of transmitting and receiving equipment is a requirement of television that imposes responsibilities upon those who would furnish a satisfactory product and render a useful service to the public. On the one hand, standards cannot be frozen prematurely or progress would be prevented, while on the other hand, frequently changing standards means rapid obsolescence of television equipment.

## TELEVISION ANNOUNCER

Betty Goodwin, NBC's first regular television announcer as she is pictured by the Iconoscope in 441 line transmission. Miss Goodwin posed for the Iconoscope in the NBC television studio, RCA Building, New York, her image was photographed as it came through the air and reproduced on the screen of RCA television receiver.



## TELEVISION'S CONTROL ROOM



"Basic research is a continuing process in our laboratories not only that the problems of television may be solved but also to develop other uses of the ultra short and micro waves which possess such vast potentialities in this new domain of the ether.

"While we have thus proceeded on the technical front of television, the construction and operation of television studios have enabled us to coordinate our technical advance with the program technique that a service to the home will ultimately require. RCA's broadcasting unit—the National Broadcasting Company, under the direction of its president, Mr. Lenox Lohr, has instituted a series of television program tests in which we have sought to ascertain initial requirements.

"Ten years ago the National Broadcasting Company began a national service of sound broadcasting. Now it enters upon its second decade of service by contributing its facilities and experience to the new art of television.

"One of the major problems in television is that of network syndication. Our present facilities for distribution of sound broadcasting cover the vast area of the United States and serve its 128,000,000. Similar coverage for television programs, in the present state of the television art, would require a multiplicity of transmitters and network interconnection by wire or radio facilities still to be developed.

"Our program is threefold; first we must develop suitable commercial equipment for television and reception; second, we must develop a program service suitable for network syndication; third, we must also develop a sound economic base to support a television service.

"From the standpoint of research, laboratory development, and technical demonstration, television progress in the United States continues to give us an unquestioned position of leadership in the development of the art. In whatever form such progress may be evident in other countries, we lead in the research which is daily extending the radio horizon, and in technical developments that have made possible a transmitting and receiving system that meets the highest standards thus far obtainable in field demonstration.

"We are now engaged in the development of studio and program techniques that will touch upon every possibility within the growing progress of the art. The distinction between television in this country and abroad is the distinction between experimental public services undertaken under government subsidy in countries of vastly smaller extent, and the progressive stages of commercial development undertaken by the free initiative, enterprise and capital of those who have pioneered the art in the United States.

"While the problems of television are formidable, I firmly believe they will be solved. With the establishment of a television service to the public which will supplement and not supplant the present service of broadcasting, a new industry and new opportunities will have been created."

New York papers recently carried the following—"The first tests of high definition television using the new standards which have been recommended by the radio industry to the Federal Communications Commission are now being conducted by engineers of the Radio Corporation of America and the National Broadcasting Company, it was announced by Lenox R. Lohr, president of NBC."

Images scanned by the RCA iconoscope, the pickup tube, at the rate of 441 lines per frame have been transmitted from the NBC experimental station in the Empire State Tower and successfully received by a selected number of experimental television receivers in the homes of RCA-NBC engineers and technicians.

"Pictures of 441 line definition are much clearer than those of 343 lines, the definition employed in previous tests from the Empire State," said Mr. Lohr, "another significant advance has been made in our work of television development. As we proceed in this fascinating adventure of bringing radio sight to distant eyes, it is encouraging to be able to report this substantial progress."

"The development of television service," said Mr. Lohr, "promises to be orderly and evolutionary in character and is a tribute to the radio industry which has enjoyed public favor on a scale that is most encour-

aging to its future. The public may purchase present day radio receiving sets with confidence as to their continuing serviceability. Television receiving sets cannot precede a television program service of satisfactory quality, which will be available at the beginning only in sharply restricted metropolitan areas following the eventual solution of technical, economic and program problems."

We can truthfully make the statement that Television is now in the earphone stage of radio. As a commercial operation, television has not yet arrived. It is not around the corner nor even around the block. But we have advanced sufficiently far to say that the technical obstacles are not insuperable. The Radio Corporation of America has invested millions of dollars and an incalculable sum of scientific genius in bringing television to the point where it can be moved from the seclusion of the laboratory to the freedom of experimental service in the field.

### JOAN WINTERS

Popular NBC and stage star, as you will see her in Television.



## LIFE AT SEA SAFEGUARDED BY NEW RCA EQUIPMENT

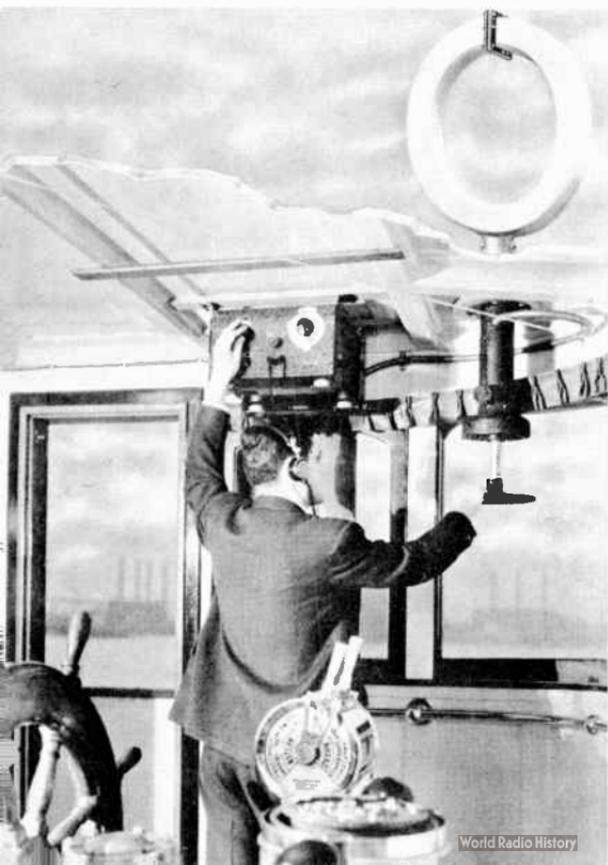
Radio science has just made available to American ship owners a new radio device for the protection of life at sea that listens, thinks and acts without human attendance. The device is known as an automatic radio alarm, and is intended for shipboard service in "standing watch" for emergency calls from other vessels at all times when the radio operator may be off duty.

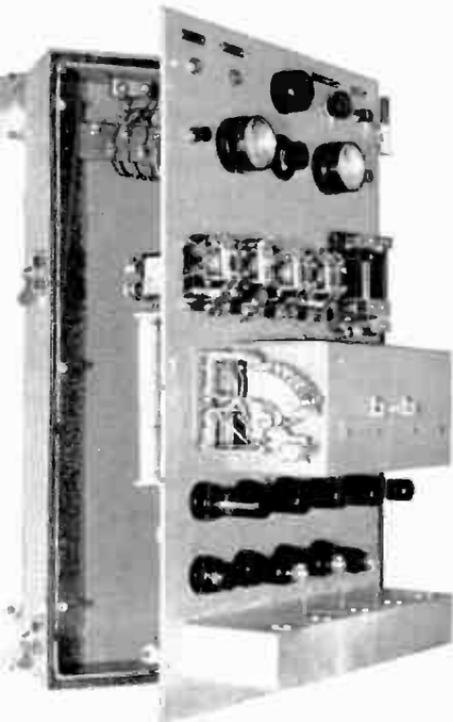
"We call it an automatic radio alarm," said Mr. Pannill, president of RCA's Radio Marine Corporation of America, "but a device which listens, thinks and acts almost deserves a name like Christopher Columbus. Consider some of the specifications for its performance.

"Upon completion of his watch at the radio, the operator turns on the automatic alarm and leaves the cabin. Thereupon the alarm begins its work of listening for the telegraphic characters of the international SOS from other vessels. It is set to 'recognize' a series of dashes, each of four seconds duration, separated by an interval of one second. It is also endowed with the discretion of recognizing a dash which may be a trifle less or a trifle more than four seconds in length. It has an electrical memory that will retain four such dashes in sequence, after which it will ring bells and turn on warning lights in the radio operator's sleeping quarters and on the bridge.

"But this is not all that is required of the new device. It must let the deck officer on watch and radio operator know immediately if it should become incapacitated for assigned duties while on watch. Accordingly, if a battery fails, or a tube burns out, or if it develops other 'pains in its sawdust' it will operate the same alarm, bringing human intelligence on the run to its assistance."

Had radio knowledge progressed to this degree back in the days of the ill-fated Titanic, hundreds might have





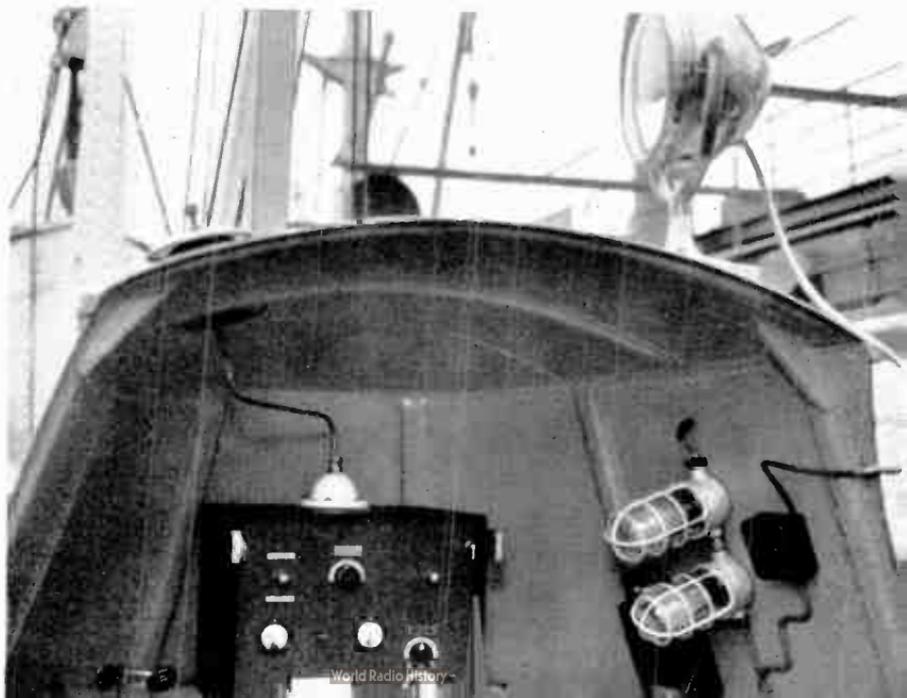
## NEW RCA AUTOMATIC ALARM FOR SHIPS

been saved who perished due to the fact that the only wireless operator aboard a ship much closer than the Carpathia was asleep. Had this ship been informed of the disaster in time it could have arrived on the scene hours before the Carpathia.

The RCA Radio Direction Finder is another device that has provided a new safety, to navigators, furnishing reliable data as to exact location, impossible to secure by any other means. Present day navigation has been made much more secure by the scientific research of the RCA laboratories.

Of vital interest in view of the Department of Commerce regulation with regard to safety on the high seas, is RCA's Lifeboat Radio apparatus making two-way communication possible over distances up to 150 miles.

NEW RCA LIFEBOAT RADIO





# RCA The PIONEER

Not all pioneering is done in Covered Wagons on the Overland Trail toward the land of the setting sun. Not all pioneers are necessarily disciples of Daniel Boone and Davy Crockett. Many unsung heroes have displayed an almost equal courage in the laboratories of science and invention developing the many marvelous achievements which we have today accepted as commonplace.

Under the banner of RCA many phases of the art we know as Radio have been worked out by the patience and perseverance of eager groups of men who have explored that vast and invisible empire of Radio-active waves, harnessing and guiding their energy, converting them into obedient servants of man. In the form of Radio Broadcasting, they have contributed greatly to the culture, education and entertainment of the entire world.

The Radio Corporation of America is the world's largest radio organization and the only one that builds everything from the microphone in the studio to the complete radio receiver. Consequently, it is only logical that RCA should build the best radio instrument for the home—RCA Victor!

Rising seventy stories above Radio City, in New York, the RCA Building is a fitting symbol of RCA's achievements—achievements which date from the beginning of broadcasting and stamp RCA as the Pioneer of Radio.

## MARINE RADIO

RCA pioneered the change from spark transmitting apparatus on board ships to the more efficient vacuum-tube equipment.

RCA pioneered the contacting of ships around the world and the transmission of weather maps, news, etc., to ships at sea, by radio.

RCA perfected the Direction Finder or Radio Compass, which guides ships safely into port. With the same dependability that characterizes this great invention—one of the many marine radio devices built by RCA—RCA Victor radios guide listeners to greater radio pleasure.

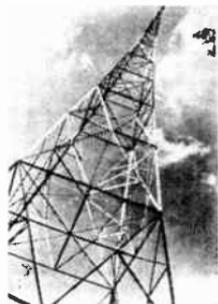
## COMMUNICATION

Commercial long-distance short-wave radio communication between the United States and foreign countries was pioneered by RCA.

RCA solved the problems of continuous all-weather reception for RCA Communications, Inc., which branch of the RCA activities links the U. S. and its insular territories with 45 foreign countries with continuous service via 57 Radio circuits.

Since RCA made short-wave reception commercially reliable, it is only natural that RCA should know how to build superior short-wave receiving equipment for home use.

## RCA PIONEERED THE NETWORKS



Through the National Broadcasting Company, RCA pioneered network broadcasting, now familiar to all. It is a far cry from the first transmitters with their limited and uncertain operation to the vast and dependable systems of today.

Over 50 per cent of the total broadcasting power in the United States has been supplied through RCA.

It is due in large measure to this experience in building broadcasting equipment that RCA is better fitted to build a finer radio receiver than anyone in the industry.

## RCA PIONEERED HOME RECEIVERS

The past guarantees that today's RCA Victor instruments incorporate the most recent radio design and mechanical improvements, because the most outstanding advancements in home receivers have been made and offered first to the public by RCA! RCA leads—others follow.

RCA pioneered the first practical superheterodyne receiver for home use. Today, 90 per cent of the world's receivers use this circuit.

RCA pioneered the first power-operated dynamic-type loudspeaker for the home.

RCA pioneered the first tubes and radio operated by current from the light socket.

## RCA Victor Radios Reflect the Diversified Experience of RCA

The diversified experience of RCA is reflected in the marvelous performance of RCA Victor instruments. In addition

to the purely radio achievements already described, RCA has been outstanding in associated industries. For instance:

RCA perfected the now universally used sound-on-film method for synchronized talking motion pictures.

Fifty-two per cent of all moving picture theaters in Manhattan are RCA equipped with 43 houses on Broadway alone. In the United States close to 4500 theaters use RCA equipment.

RCA pioneered transmission of photographs by radio across the Atlantic Ocean.

RCA pioneered home sound picture apparatus using 16-millimeter standard amateur film.

RCA pioneered the recording and reproducing of phonograph records electrically.

RCA pioneered two-way telephone conversations between ships at sea and homes or offices.

RCA pioneered the ribbon type velocity microphone, improving the quality of broadcast programs, sound motion pictures and phonograph records.

The same engineering laboratories that designed the extraordinary equipment responsible for the reliable commercial performance of these Radio Corporation of America organizations are behind the superiority of RCA Victor instruments, incorporating all the important new developments, such as Magic Brain, Magic Eye, the new Metal Tubes, that marvel of acoustics, the Magic Voice, and sensational ELECTRIC TUNING, with push button control.



# LET'S LOOK AT THE RECORD

It is rather difficult to believe that in one small corner of your home you may place the sum total of the greatest efforts of all the greatest musicians the world has known from the dawn of history to the present day. Yet, between the covers of the albums of Recorded Music you will find measured in musical achievement the essence of a thousand lives and a thousand lifetimes. All that is greatest in music, from its very beginning up to and including the advance guard of tomorrow, is here made permanent, made musically satisfying, made priceless by the miracle of modern electrical recording.

The art of the phonograph has progressed steadily for more than thirty years. The discontent of the scientist and the musician has persisted until this moment, and human experience to the contrary notwithstanding, it would seem that the phonograph and recorded music in their final form have arrived.

The present day record, while unchanged in physical appearance, is a far better product than it was a decade or two ago. The research of the Radio laboratory is in a great measure responsible for the improvement in this field as in many other arts and industries.

By way of illustration, the telephone has been materially aided by Radio developments. As a result of "booster circuits," or radio-type audio amplifiers, placed in the lines, conversations over unlimited distances are heard clearly with normal volume and natural tone.

Radio has proved the benefactor of the Phonograph Record in more than one respect. The electrical recording through radio microphones and radio type audio amplifiers instead of the old mechanical and megaphone principles has resulted in a High Fidelity product infinitely superior to the old acoustical record.

Under the old system the range and number of instruments used was extremely limited. Overtones were lost entirely. Today no symphony orchestra or operatic chorus is too large for the scope of the radio microphone. Room presence reproduction instead of the old horn type sound is the result.



Popularity of symphonic recordings is bringing fresh laurels to Leopold Stokowski.



people have come to want the great symphonies in recorded form to play when, and as often as they desire. Played on the modern radio-phonograph, these masterpieces are brought to life with perfect fidelity.

Radio is the greatest single factor in the sale of more than 100,000,000 records in the last four years. In 1936 music lovers purchased close to 30,000,000 phonograph records. Despite the present day vogue for "swing" which naturally contributed some to this total, the bulk of these recordings were the works of Beethoven, of Brahms, of Wagner, etc., placed upon the shelves of newly formed record libraries. Side by side with Shakespeare and Dickens on the book-shelves of the American home, these albums of recorded music, the language that knows no boundaries, is today contributing to the development of a more cultural America. No finer media is available for those who take their music seriously than the wealth of recordings made by RCA Victor of the greatest music in the world as interpreted by the world's greatest artists.

Maestro Toscanini's agreement to return to the United States for a series of broadcasts over NBC caused excited buzzing throughout the music world.

And here is a paradox. The great orchestras conducted by such masters as Toscanini and Stokowski, whose art can now be recorded with utmost fidelity, have by their radio broadcasting of fine music over the coast to coast networks, created an entirely new mass group of enthusiasts appreciating the better things in music. These are the record buyers of today. Thousands of



# RADIO MARCHES ON

The names of Maxwell and Hertz appear on the early pages of Radio history, but it remained for Marconi to actually make a dream come true—the transmission of a telegraphic message without wires.

Long range radiotelegraph communication between the nations of the world as well as ships at sea has been overshadowed by the rapid rise of the commercially sponsored radio broadcast with its wealth of entertainment and education available to all who will take the time to listen. However without the experimental work of the early "brass pounders" of "wireless" we would have no radio broadcasting today. No music, no comedy, no drama, no news coming out of the ether into our homes. Radio today has come to be such a vital factor in our every day lives that we seldom even think back a few years to the time when it was only the hobby of a few "hams."

In its infancy radio struggled with very long waves up to 25,000 meters in an effort to establish satisfactory service with the use of so called long wave alternators. The vacuum tube at this period had not been perfected to the degree that it could be used for continuous service in high power transmission. While the alternators gave very satisfactory service during the colder months of the year, old man static hampered them considerably in warm weather.

Realizing that any public service must go on despite adverse conditions regardless of their nature, RCA engineers labored ceaselessly to improve transmission. The year 1924 saw in operation RCA's first commercial short wave transmitter tuned to 103 meters. Its tremendous success opened a new era of communication because of the possibility of focusing the energy of the transmitter upon a given point of reception coupled with the greater number of short waves available.

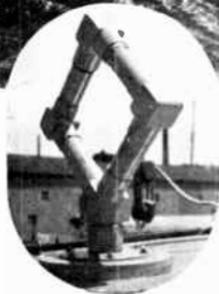
After considerable research RCA developed high powered vacuum tubes which when used on wave lengths as low as 15 meters made possible excellent daytime communication, far better than results on the very long waves formerly employed.

Having conquered the bands between 15 and 60 meters, RCA turned its attention to even shorter waves, known as ultra short waves between 3 and 8 meters. Static and fading, the enemies of higher wave lengths are practically missing from this band, but the range is limited unless broadcasting is done from high elevations. Utilizing this knowledge RCA engineers have installed a complete public phone system linking the many islands in the Hawaiian group, the sending stations being located for the most part on mountain tops.

RCA engineers have recently created the so-called "acorn" tubes only 5/8 of an inch in diameter, for use on ultra short wave work as low as a half meter. What new vistas of usefulness of radio waves will be opened up by these tubes is for the moment a matter of speculation. Each new application leads the way for innumerable others.

Facsimile transmission, messages in the handwriting of the sender, pictures, etc., sent "via RCA" will some day possibly completely supersede the dot and dash telegraphy. Television, the projection of light images will strike down the last barrier of distance and make communication of widely separated persons completely effective.

The future is rich with promises—the mystery of the unknown in Radio greatly exceeds the known—waiting for the hand and brain of man to harness this greatest force of nature. RCA is dedicated to the exploration of the great uncharted bands of the radio-active waves constantly extending its program of scientific development into every field that gives promise of public service and benefit to mankind.



To most of us, saving lives at sea, calls to mind a sinking ship. But there is another application and a big one for the term "Saving Lives at Sea." For years RCA has maintained a free Medical Service in cooperation with the Seaman's Church Institute and the U. S. Public Health Service for vessels having no physician aboard. To freight steamships plowing their way across the world, radio has flashed medical advice dealing with nearly all the ills to which the flesh is heir, as well as emergency advice in the treatment of accident cases.

A physician in New York City called by officials of RCA successfully directs by radio a difficult childbirth case on a steamer far at sea. A stoker is overcome with cramps from drinking too much ice water. "Ginger in hot whiskey" comes the answer, "keep patient warm but not too hot." Jaundice, epileptic fits, heart attacks, pleurisy and many other ailments have been diagnosed and prescribed for by radio, even to the details of diet.

An engineer is stricken with paralysis on a steamer off the Florida Coast. The

operator calls the RCA station at New York, the proper treatment is advised but it is also imperative that the patient be placed in a hospital as soon as possible. In another day the case becomes more urgent. The RCA station at Palm Beach handles messages of arrangement between the Coast Guard and the ship. Through the night they flash back and forth and in the morning a seaplane finds the steamer—a mere dot on the sea. The Coast Guard aviator swoops down alongside and the stricken man is whisked off to a Miami hospital.

An accident occurs on a freighter nosing her way across the Pacific. Hot oil under high pressure sears a man's hand. Quickly the hand swells to twice its normal size and the unfortunate man writhes in pain. Cristobal is a week's sail away, but complete instructions for treatment and alleviation of physical distress arrive promptly by radio from the RCA Station at San Francisco.

Again a seaman gets a sliver of cast iron in an eye and is nearly mad with the torture, but radio quickly brings instructions for easing the pain until the eye may have the delicate touch of a surgeon. Whether an oiler slips and injures his spine or a sailor develops an infection from the bite of a pet monkey, competent medical advice is promptly forthcoming by radio through the marine facilities of RCA, standing by to lend a hand.



## LUCY MONROE

Lovely young American Soprano, heard over NBC networks. This versatile songstress appears on a wide variety of programs.

## ◀ DON AMECHE

Handsome young radio star who first gained national recognition in the First Nighter weekly broadcasts over the coast-to-coast NBC-Red Network is now fast rising to similar prominence in the movie world.



JACK BENNY with the able assistance of BEN BERNIE seems to be taking up violin playing in a big way.



## Giant 12 Ton, 200 mile per hour Flagship of the AMERICAN AIRLINES INC.

For the airplane in flight, as for the liner on the high seas, radio is the only practical means of communication. Equipment for airplanes and airport stations constitutes still another part of RCA's developmental and service work in the communication field. Combination radiotelephone and telegraph transmitters have been developed for use in airplanes, and other specialized equipment has been made available for airports.

The RCA Radiocompass performs the essential operations of successful air navigation by permitting the pilot to fly a course toward the selected radio station. By merely following the movements of a visual indicator, he flies directly to the point selected. Flights

may be completed over territory or water where the standard radio aids to aerial navigation are non-existent or under conditions whereby the use of conventional navigation would render the flight extremely hazardous. A more accurate course may be flown, through the use of the RCA Radiocompass, with a reduction in travel time and operation expense resulting. Thus, the use of this instrument results in more efficient airplane operation in good as well as bad weather by allowing the pilot to devote his entire time and attention to flying the airplane, thanks to the virtual elimination of the ever-present orientation problem.

Certainly no two developments have done more to remove the barriers of time and distance, than the science of Aviation and Radio.



These little maids of the Far-East welcome the development of western civilization. The great plane in the background has brought them a new RCA Victor all-wave Radio.

# RADIO IN NATIONAL DEFENSE

During all the years of its existence, RCA's executives and technicians have maintained close contact with the Army and the Navy, with a view to making RCA communication systems efficient and helpful to the United States should a national emergency ever unfortunately require that those systems be taken over by the Government for its service during such an emergency.

Many executives and technicians connected with RCA's international or marine system are reserve officers of the United States Army or Navy. The charter of the Radio Corporation of America requires that its directors and officers shall be American citizens. It requires that at least 80 per cent of its outstanding stock, entitled to vote, shall at all times be in the hands of loyal citizens of the United States. The company is free from foreign influence, control or domination.

The Radio Corporation of America is a business organization essentially representative of the American public. It has approximately 250,000 shareholders, among whom are residents of each State and Territory of the United States.

The experience of the World War demonstrated—as in the complete severance of all the German cables and half the cables of the Allies—the vulnerability of a system of international communications which depended upon connecting wires. Military authorities were impressed, on the other hand, with the importance and flexibility of the new method of communication by radio.

With the technical advances made since the war, radio has come to be an exceedingly important consideration in the national defense. It is the only means of long range communication between moving objects, such as airplanes, submarines and battleships. It supplies the only practical means of communication between elements which cannot be linked by wires or runners, such as between different front-line fighting units. The speed and directness of its contact between nations are vital emergency, as well as peace time factors. In a national emergency, radio broadcasting may have an essential use for public information and the preservation of public morale.



By DAVID SARNOFF

**N**O subject more properly commands the attention of thoughtful men and women, of fathers and mothers everywhere, than the problem of "Youth and Crime Today."

It is tragic enough to think that some boys and girls of today will be criminals tomorrow. But it is appalling to be told, as we have been, that the youth of today is furnishing so large a share of our criminals. The material loss resulting from this juvenile delinquency is bad enough, but its social and spiritual loss is the most tragic indictment of our civilization.

Others more informed than I am on this subject have discussed these questions from the standpoint of their actual experience and expert knowledge. I have been asked to discuss here the part which radio plays in this great problem.

What is the relationship of radio to crime? Radio is the greatest means of

mass communication at our command. It is a distributor of knowledge, of culture and of entertainment. Radio, therefore, can contribute the moral and mental enlightenment which should be the most effective deterrent of crime.

But once the crime has been committed, radio takes its place as the longest arm of the police department, the speediest method of capturing the fleeing criminal.

In the struggle between law breakers and law enforcers, the contest between escape and capture has always been one of speed. In the past, a start of a few minutes gave the fugitive a decisive advantage. If his horse ran faster than that of his pursuers, he escaped. If it did not, he was caught. When science replaced the horse with the railroad, the few minutes which elapsed before an alarm could be sounded were often irretrievable.

Then came the telegraph. No matter how fast horse or train could give him speed, the criminal might find the police waiting for him at his destination. If he crossed the seas, the cable would prove his Nemesis. Later came the telephone, to give new and decisive advantages to the Law in its contest with Crime.

But the victory was brief. Progress, in presenting a new boon to mankind, unfortunately gave back to the law-breaker his most effective weapon—speed. The automobile, followed quickly by the airplane, once more gave to the criminal a swift means of escape. It increased the area of search and diminished the chance of detection.

Presently the same scientific progress created another force in crime control, although at first neither the criminal nor the police were fully aware of its potentialities. That force was radio. Men could talk from point to point without having to depend upon connecting wires. Not only could they talk from point to point without these wires, but a man could talk from one point to thousands of unconnected and different locations simultaneously.

For the first time communication became mobile as well as rapid. Radio flashed the alarm of crime instantaneously over a wide area. It cut off escape by sea as well as by land. It cut off that escape in all directions at once. It turned the criminal's newest helpmate, the automobile, against him. It enabled men to hunt him down with airplanes

and speed boats. It flashed his picture and his fingerprints to the police of every city. It raised a barrier against him on every side and as he sought escape, the very air through which his car was speeding was charged with alarms to the nearest law enforcement officers.

So it was the scientist who became the apprehender of the criminal. Through radiobroadcasting and through facsimile reproduction, the radio engineer made the criminal's lot more hazardous. No speed which the law-breaker can command can outdistance radio, which travels with the speed of light.



The part which radio plays in the detection and apprehension of the criminal is of recent date, but despite its youth, radio equipped police cars now patrol the principal cities of forty-three states. These cities have an area of 61,000 square miles, and more than 40,000,000 inhabitants. Such police cars are as closely in touch with headquarters as if a wire connected each one of them with their central police station. In New York City alone, 480 cars patrol 83 precincts, some of them scores of miles away from headquarters.

To indicate the speed with which this new force can operate, I am told that in a recent demonstration, which was in no way pre-arranged, three cars patrolling the Rockaway section, far out on Long Island, were ordered by radio to report to the central office. The first telephone response from one of these cars was made in less than one minute after the radio order had been flashed.

This was no unusual circumstance, as the record of the New York Police Department will show. One instance which they describe with pride at Centre Street is the case of a holdup on the twenty-first floor of a Fifth Avenue office building. One of the bandits accidentally discharged his revolver. Frightened by their own alarm, the robbers fled at once. They ran down three flights of stairs and then stepped into an elevator. But when they got to the ground floor, three minutes after the shot had been fired, they found every exit closed by policemen who had raced to the building in radio cars. A tenant in a nearby office, who heard the shot, had 'phoned to the police. Radio did the rest.

But even that achievement was slow compared with the speed which trapped the extortioner who recently threatened the wife of a well-known advertising man in New York. The criminal used the telephone to make his demands. On one of his calls, the intended victim kept him talking while detectives traced the call to a pay station. When they located it a radio alarm was sent out from headquarters. A minute later, the lady heard the man at the other end of the wire yell, "Don't shoot! I'll come!"

Last year patrolmen in New York's 480 radio cars made 4,941 arrests, almost all at the scene of the crime. These were obviously, as one police officer put it, better and less expensive arrests, because the criminals were caught red-



handed, important evidence was preserved before it could be destroyed, and the Police Department saved the cost of investigation and search.

Radio has also been used effectively against kidnapping, the most terrible of all crimes. Strangely enough, one of the earliest instances of this use was in the kidnapping of the four-year-old son of Dr. E. F. W. Alexanderson, inventor of the famous Alexanderson alternator, one of the most important developments in the history of radio. When his child was abducted in 1923, Station WGY in Schenectady broadcast a description of the boy for several days and Dr. Alexanderson personally used the microphone and asked the public to help in the search. Four days later, a man who heard the broadcasts in a nearby town was passing what he supposed to be an abandoned shack when he heard a child singing. He investigated and found the Alexanderson boy in the custody of an old woman, who, it was determined later, had no idea that she was taking care of an abducted child.

In the case of the recent kidnapping of the son of a New York broker, a phone call was traced, but this time the criminal managed to escape when he saw the radio car approaching. However, within a few hours the child was released and quickly restored to his parents. Being a smart lad, he was able to give an accurate description of his kidnapers, and this coincided with a description the police had of the extortioner who had telephoned. They tracked him down in a short time, and he then confessed that when he saw the police car he realized that he had no chance to carry out his plans and therefore had set the boy free.



What is believed to be the first use of radio to capture a fugitive from justice took place in a shore-to-ship transmission in 1910. The criminal was the famous Dr. H. H. Crippen of England, who had murdered his wife and was caught on the high seas.

Another instance came two years later when a young man for whom a warrant had been issued at Harrisburg, Pa., was found to have sailed on the S. S. Graf Waldersee from Philadelphia. As the ship was only an hour or so on her way down the Delaware, a tug was chartered and overtook the liner. But when they had caught up with their quarry, the police found that in their haste they had put to sea without the necessary authority to arrest the man. A wireless was sent to Philadelphia and in a few minutes the formal authority was received in reply, and the fugitive was taken off the ship. Today, the use of radio for such arrests is a common occurrence.

Many other radio devices aid the work of the police. By means of facsimile transmission, rogues' gallery pictures and fingerprints can be flashed instantly across the continent or across the sea.

A villain in the famous play, "Within the Law," boasted that he was the first gunman in history to use a Maxim silencer. Similarly, a certain Filipino swindler, arrested in 1929, can boast



that he was the first criminal captured by a radio photograph. After fleeing from New York to Honolulu, the sleepy Filipino was aroused from his berth aboard ship at five o'clock in the morning, and identified by means of a facsimile radio photograph, taken from an original in the files of the New York Police Department and projected by radio 2600 miles across the Pacific Ocean.

Today, if a criminal is known to have escaped by ship, a warning and description can be put into the hands of the master of every ship, whether it is an hour or a week out of port. Recently, the police of Poland flashed by radio, a photograph of a suspected forger. As he walked the gangplank in New York, he was quickly identified and arrested.

Among other radio aids now at the command of the police are such devices as the photoelectric cell, activated by a beam of invisible, or infra-red light, thus forming a surprise "crime alarm" which an intruder on the protected premises cannot circumvent. Then there is the so-called "gun detector," now in use in an increasing number of prisons, to prevent the smuggling of weapons or tools by convicts from work shops to their cells.

No one knows what further protection to life and property the ingenuity of radio engineers will offer society in the future. Perhaps the next step will be to equip each patrolman with a small, short-range radio transmitter by which he can instantly send an alarm or call the nearest station for help. Again it may be the adaptation of one or more of the functions of television to record evidence during the actual commission of a crime. When the time comes that facsimile receivers are in universal use, it will be possible to flash the picture of a fugitive to millions of homes simultaneously and thus put an army of citizens in every part of the country on his trail.

So much for what we might call the scientific achievements of radio in the field of crime. As a father speaking to other fathers—and mothers—I would rather speak of the achievements of radio in the prevention of crime. Who can doubt that the growth of knowledge and appreciation of fine music in the minds of millions of school children each year will result eventually in a higher cultural average and a lower percentage of crime? Who will question the statement that many young people who are being brought up under unfavorable social conditions will be influenced to a healthier attitude toward life by listening to an inspiring sermon or an enlightening discussion of some fundamental problem of life? On the other hand, such outstanding dramas of criminology, as those portrayed for the past five years by Warden Lawes of Sing Sing, to mention only one instance, have brought home to many young people the sordid and unprofitable side of criminal life.

If radio can help to improve the thinking processes of young men and women, and if the efforts of educators and sociologists become increasingly more effective, there will be a definite and constructive change in the attitude of young people toward wrong-doing.

Radio offers to education an auditorium many times greater than the com-

bined capacity of all schools and colleges in the country. At present, the educational world still faces the task of perfecting a method of popular education which will take full advantage of the possibilities inherent in broadcasting. An even greater opportunity for education by radio will come when television adds sight to sound.

## The GUN DETECTOR "gets its man"



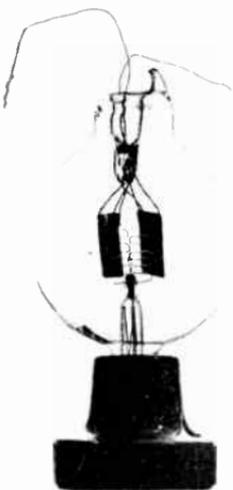
# EVOLUTION OF THE RADIO TUBE

As far back as 1725 DuFay noticed that a conductive path for electricity was formed between a hot sphere and a cold one. Many experimenters worked with this idea and then in 1873, Mr. F. Guthrie found that at red heat an insulated iron ball would retain a charge of negative, but not positive electricity. This discovery brought about the Elster and Geitel experiments with an incandescent lamp having a filament and a plate, in 1880, three or four years before "Edison's Effect," which the latter made no attempt to explain at the time. That Elster and Geitel knew what it was about, is shown by their pointing out the valve effect of this combination in 1889.

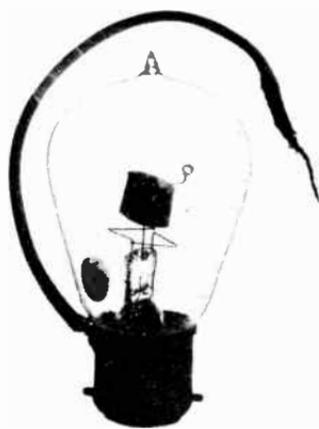
Dr. Fleming, in England, began his experiments in 1883 and not 1896. It was J. J. Thompson's researches on the conductivity of gases, published in 1897, which were responsible for Dr. Fleming's being able to apply what was then common knowledge, to the use of this Elster and Geitel device in radio circuits.

This led finally to the work of Dr. Lee de Forest and his "audion," or three element vacuum tube. This development, incidentally, was the beginning of the present radio industry, which produces millions of radio sets, tens of millions of radio tubes each year, and maintains over six hundred broadcasting stations. It also is the basis of communication stations that link the world, and today electronic tubes are continuing to find hundreds of industrial, musical and entertainment applications. There is no doubt that this once innocent appearing "glass bottle of mystery" is destined to change a lot of the fundamental processes.

The new all-metal tube, sealed in steel, a revolutionary advance in vacuum-tube design, in which the radio tube breaks away from lamp-making tradition and is engineered to meet radio's special requirements more efficiently.



de Forest  
AUDION



FLEMING  
VALVE



FIRST  
AC TUBE



NEW  
Metal Tube



**FRED ALLEN AND  
PORTLAND HOFFA**

The pair that makes  
Wednesday night  
the highspot of the  
week by their broad-  
cast over the NBC  
Network.

# SECRETS OF NBC SOUND EFFECTS

**T**HE radio set is tuned in on a tense moment of drama. The listener "sees" the scene—a cheery living room with a blaze crackling in the fireplace, while the wind moans outside and sleet beats against the panes.

There is a creaking sound as the door opens on its hinges. The wind and sleet howl in through the doorway. There are quick steps across the room, harsh words. Then a pistol is fired. The front door slams shut. Outside, a horse rears, prances for a nervous moment, then thunders away into the night, the sound of the hoof-beats growing fainter in the distance.

## Technique of Sound Effects

Few words have been spoken, yet the listener has been aware of every movement made. This, in brief, is due to the fact that radio sound effects have become a well-defined technique. It was not always thus, and Ray Kelly, head of the National Broadcasting Company Sound Effects Laboratory, is the best person to tell the story.

"When I took over the NBC sound effects laboratory six years ago," says Kelly, "my equipment consisted of a set of dishes, some broken, a knife and fork, a handful of toys, one portable door, and one elementary thunder machine. Even as short a time as six years ago, listeners did not demand the veracity of sound which now must be a feature of every program. Sound effects must now be so accurate that the listener will never pause to question their actuality."

Before telling something of the history of sound effects, let's take one glimpse at the method by which the sounds in the scene, described above, were made. The actors in the drama are all clustered around the microphone. Over to the left, with a microphone of his own, is an NBC sound effects man, one of the men in Ray Kelly's department. On his sound table he has an ordinary blank cartridge pistol, a ball of cellophane, two rubber suction cups, and two big black boxes, mounted on rubber wheels. Also on rubber wheels is an ordinary door, in a frame.



**CABIN DOOR, MARCHING SOLDIERS  
AND THEATRE CURTAIN IN SOUND**

## How It's Done

By crumbling the cellophane before the microphone the realistic sound of the fire is obtained. The two black boxes are a sleet machine and a wind machine, each run by electric motors. The sound effects man opens the door. The electric motors are speeded up, thus increasing the sound of the wind and sleet. After the harsh words, the pistol is fired and the door slammed. Then the sound effects man picks up the rubber suction cups, one in each hand. By beating these cups on a flat board (cocoanut shells are used when the horse is running on a hard road) an accurate imitation of the sound of a running horse is obtained.

As short a time as six years ago, sound effects were a very minor part of broadcasting. Today, as has been indicated, they are an entire department in a vast corporation. When Ray Kelly started he had one assistant, a college boy who worked part time. Today, in the New York office alone, he has fourteen assistants, all highly trained technicians, all working at high speed to provide sound effects for some 160 programs a week.

## Sound Effects Library

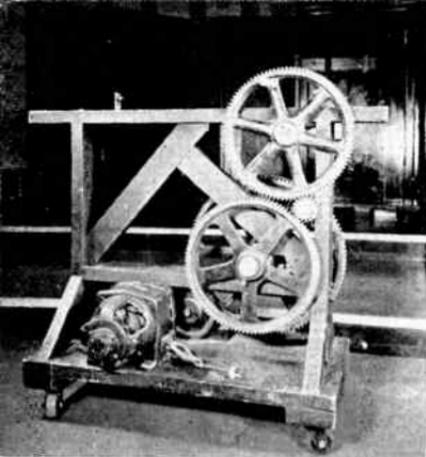
The first problem was a sound effects library. He set to work to collect sounds of almost everything that made sounds—all types of motor noises, animal moos, bleats and neighs; bird calls; the sounds made by falling water; sounds in all their infinite variety. He wanted these sounds on his library shelves, ready for use at a moment's notice, and he began to get them.

RAY KELLY NOT ONLY TALKS ABOUT THE WEATHER BUT REALLY DOES SOMETHING ABOUT IT. HERE HE'S MAKING THUNDER.



In many instances, he found that a recording of the actual sounds was best. In some cases, however, and due to the delicacy of the microphone, he found that it was better to create the sounds synthetically in the studio, as in the case of the cellophane "fire" and the rubber suction cup "horse".

The sounds made by firearms caused him a lot of trouble. After much experimenting, he finally was convinced that a pistol shot sounded more like a pistol shot than any imitation of the sound. It was also noticed that the actors in the studio reacted more realistically when a real pistol was used—and Kelly is an artist in his own right. Machine guns baffled him, though, until one of a thousand-odd experiments developed what he was looking for. Now when a gangster on an NBC radio drama cuts loose with his "tommy gun," one of the sound effects men simply waggles a telegraph



Straight line production by Ray Kelly. A whole factory operates when these gears revolve.

key, set on top of a long amplifying box. When the sound comes out, almost any gangster who wasn't looking would automatically say, "They've got me, boys."

## Special Equipment Required

One big room in the department is filled with weird-looking machines and other contraptions, all evolved after years of trial and error. One side of the room is lined with doors of almost every variety—doors which squeak eerily as they open, doors with knobs which rattle, automobile doors, screen doors, swinging kitchen doors. In the center are the rain, sleet and wind machines. Kelly found, after much experimentation, that rain did not record very well. He made several complicated devices which reproduced the sound—for the microphone—better than the actual sound of the elements. It was much the same with wind and sleet.

On the other side of the room are the water machines. One of these is simply a paddle wheel in a barrel—the sound of a steamboat chugging 'round the

bend. Another is nothing more than an ordinary sink and faucet, through which water is forced by a system of compressed air tanks; Kelly found that only a faucet would make the sound of water dripping from a faucet.

## Thunder Machine

One of the NBC sound effects chief's especial pride is his thunder machine. In the beginning of radio, thunder was produced either by tapping a bass drum or by bending a thin slab of black sheet-iron, suspended on four uprights. To those in the studio the sheet-iron sounded like a June thunderstorm in full swing. But Kelly's acute ear, listening in at the loudspeaker, caught the faint ring of metal. The average listener might not have noticed, but he knew that the radio audience was becoming more critical. He wanted perfection, so he set to work.

## Solution by Accident

The "work" consisted of hundreds of experiments, none of which quite satisfied him. He soon got to the point where he was saying "By thunder!" quite frequently—and he wasn't referring to a machine. Then, at his home one day, Kelly was taking down the summer screens. His screw-driver slipped. To the ordinary ear the sound of the screw-driver sliding across the screen mesh would have been an ordinary ra-a-a-ssp. He listened closer and he heard a low, rumbling undertone. He got busy.

When next a script called for thunder, Kelly trundled his screen into the studio. When the thunder cue came, he rapped on the mounted window screen with a tympani hammer. To

those in the studio, there was no sound. The director looked startled. But the control room men had heard—long, rumbling peals that made them automatically look up for the black clouds in a sky which they could not see.

He explained his thunder machine by pointing out that the lowest sound made by the tympani hammer on the screen was picked up by an electric needle similar to that used on phonographs. The sound was electrically amplified before it went into the microphone. Now he has perfected his "booming screen" so he can use it as the booming of cannon or the rolling of surf. The cannon boom is produced by a sharp tap. The surf is simply some lead shot rolling across the screen.

The chimes of Big Ben in London caused plenty of trouble, too. He had recordings of the actual sound. He used studio chimes with exactly the same pitch as Big Ben's boom. Neither was just right. The sensitive NBC microphones got overtones and echoes. Kelly solved that by using his electrical pick-up once again, and by sounding a chime that was just a trifle off-key. On the loudspeaker, the sound was indistinguishable from the boom of Big Ben itself—and Kelly tried it out on native Londoners.

## Rain That Isn't Wet

As for rain—well, Kelly admits that what you hear over your radio is not rain. To be explicit, what you hear is bird seed. Plain bird seed and Ray Kelly's genius with sound is what makes rain on the radio. The sound itself comes from a machine which looks like something you might see in a Jules Verne laboratory. In a turret at the top is the hopper containing the seed. Kelly turns on the electric current and the seeds begin to pour out in a regulated

stream. First they fall on a turning disk, with a lever which pushes off a regulated quantity, making the difference between a drizzle and cloudburst. The seed first hit a suspended ping-pong ball. Then they fall on a sheet of cellophane, in turn dropping onto a tissue-paper bag, each different object being in its own separate compartment. It may sound odd, but put them all together (and add Ray Kelly) and any radio listener will admit that you've got rainy weather. And when Kelly turns on his variegated wind and thunder machines—well, that means a night outside that isn't fit for man or beast.

Kelly believes now that his sound effects laboratory is the best in the world. He is confident that he can reproduce almost any known sound, and on very short notice. But he and his assistants are not resting on their laurels. They are constantly at work, improving their library. And they are looking ahead: they are working with an eye to the day when television will become a day-by-day reality.

Showers or Deluges are readily supplied with this special mechanism.



# PRINCIPAL PRODUCTS of RCA

(On Exhibit at Chicago Display Room)

**Radio Receivers and Radio-Phonographs:** Over 40 models, for the home (Domestic or Foreign), including 3 automobile models. Also, special receivers for schools, hotels, auditoriums, and for aviation, police and amateur use.

**Component Radio Parts and Radio Accessories:**

**Antennas:** Multiple and other types.  
**Mica Capacitors.**

**Tubes:** Receiving—All-Metal and Glass types.  
Transmitting and Special Purpose Tubes.

**Victor Records and Bluebird Records.**  
Electrical Transcriptions for Broadcasting.

**Broadcast Station Transmitters and Associated Equipment,** such as Velocity and Other Types of Microphones, etc.

**Police Radio Equipment:** Transmitters and Receivers.

**Gun Detector—**for Detecting Weapons on Criminals.

**Aviation Radio Equipment:** For Aircraft and Airports.

**Amateur Radio Apparatus.**

**Sound Reinforcement and Public Address Systems.**

**Electric Chimes—**for Belfry Service.  
**Advertising "Sound Trucks"** and Associated Equipment.

**Photophone:** High Fidelity Sound Motion Picture Recording and Reproducing System.

**Portable Sound Recording Equipment.**  
**Sound Motion Picture Projectors** for Industrial, Commercial and Home Use.  
**RCA Sonotone Theatre Hearing Aids.**  
**Trans-Lux Rear Projection Theatre Equipment.**

**Test Instruments:** Cathode Ray Oscillograph, Frequency Calibrators, Beat Oscillators, Regulated Power Units, Universal AC Bridges, Frequency Modulators, Test Oscillators, etc.

**Watch Analyzer—**for Manufacturers and Jewelers.

**Marine Radio Equipment:** Receivers, Transmitters, Direction Finders and Radio-beacons.

**Transoceanic Radio:** Telephone and Telegraph Equipment.

**Lifeboat Radio Transmitters and Receivers.**

**U. S. Government Radio Equipment:** Receivers, Transmitters, Sound Motion Picture Projectors, Sound Projectors, Sound Powered Telephones, Microphones, etc.

***In Radio it's RCA All the Way***

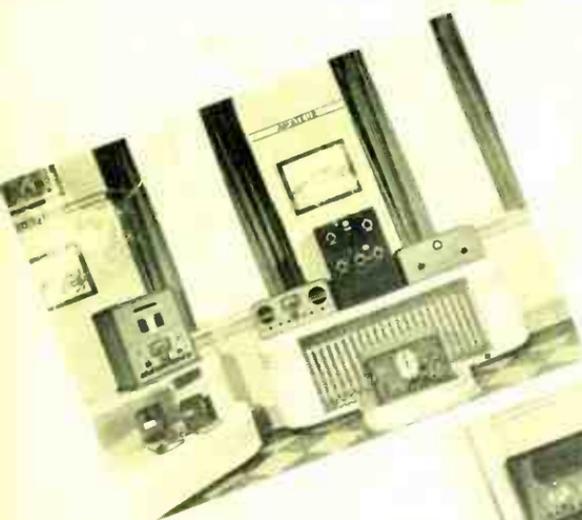


*Views  
of the  
New*

*REAR  
Victor*



*Chicago  
Display  
Room..*



*An Invitation...*  
You are cordially invited  
to visit the RCA Display  
Room, and inspect the  
many diversified products  
listed in this booklet.



# **RCA VICTOR DISTRIBUTING CORP.**

441 N. LAKE SHORE DRIVE  
CHICAGO, ILLINOIS