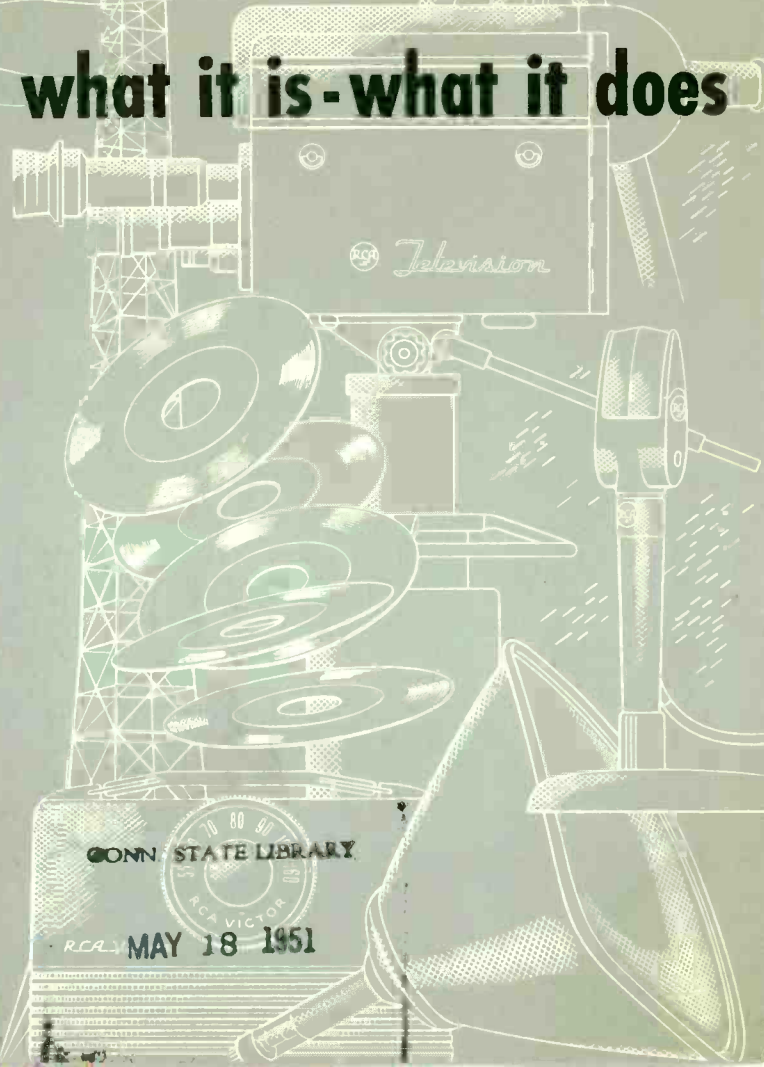


384.1
R118rca
1951

RCA



what it is - what it does



CONN STATE LIBRARY

RCA MAY 18 1951



what it is - what it does

answers to questions often asked

C O N T E N T S

| | Page |
|--|------|
| Foreword | 3 |
| Board of Directors | 4 |
| Radio Corporation of America | 5 |
| Research | 11 |
| Television | 17 |
| Radio | 21 |
| Manufacturing | 27 |
| Communications | 35 |
| Marine Radio | 39 |
| Technical Training | 42 |
| Foreign Trade | 43 |
| Pioneering in Radio | 46 |
| "Firsts" in Television | 50 |

Published by the Department of Information

RADIO CORPORATION OF AMERICA

RCA BUILDING, 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Copyright 1951, Radio Corporation of America

Television is bringing new pleasures in entertainment, education and information to an audience of ever-increasing millions.



Foreword

IN 1950, the Radio Corporation of America had its biggest business year. Gross income reached a new high of \$586,393,000. Employment also set a new record of 54,000. When the Corporation was formed on December 1, 1919, employees totalled 457. This growth is the result of the sound basic concepts of the Corporation, as set forth by its founders and developed and expanded through the skill and loyalty of employees and management, alike. Today, through their combined efforts, RCA is recognized the world over as a symbol of radio pioneering and progress.

Prior to World War I, the United States had been largely dependent upon foreign-owned companies for its international communications facilities. But the rising importance of wireless during the conflict focused the attention of the world on American advances in the communications field. Thus came the opportunity for this country to establish itself as the leader in worldwide wireless. At the suggestion of farseeing officers of the U. S. Navy, the Radio Corporation of America came into being.

Although RCA, at the time of its formation, was concerned primarily with the operation of transocean wireless circuits, actually its charter was much broader in scope. Not only was the Corporation dedicated to the development of electronic communications, but it was permitted to manufacture and sell goods and merchandise and to hold and own patents and copyrights. Faced with this opportunity, the Corporation gradually expanded its activities into related fields, including research, manufacturing, sales and services. Radiotelegraph circuits, carrying messages to 65 foreign centers, and manufacturing plants, operating in nearly a score of American cities, now attest to the service of RCA in global affairs and its contributions to the Nation and its people.

Through radio broadcasting and television, RCA provides facilities and services that entertain and inform many millions of people in every walk of life. Through years of pioneering in television research, engineering and planning, RCA has contributed

greatly to the growth of this new art, in black-and-white and in color. America is fortunate in having a visual medium of broadcasting to supplement the vast coverage of radio in a time of national emergency.

The RCA monogram has become an international symbol of quality and superior craftsmanship. Its acceptance in industry has been advanced by experience gained in more than three decades of scientific research and engineering in electronics. RCA scientists created Ultrafax, shoran and teloran. They contributed importantly to the development of radar, loran, radio-relay systems, FM (frequency modulation), radio heating and the electron microscope.

But the effect of RCA on the Nation's economy extends beyond the limits of its plants and laboratories. More than 4,500 active suppliers in 42 states are drawn upon to provide raw materials, components and supplies. The continuous flow of goods from these vendors is essential in meeting the Corporation's increased production requirements.

World tensions and the vital importance of having the United States strongly prepared to meet emergencies place new demands on industry, especially electronics and communications which are essential in war as well as in peace. RCA's communications facilities, productive plants, scientific skill, and manpower are geared to the increased defense effort of this Nation to help perpetuate "the miracle of American production." Our resources are primed for united action to resist aggression, to help strengthen the unity of free nations, and to provide our Armed Forces with the most effective electronic weapons for the protection of our freedom and way of life, and the preservation of world peace.



President

RADIO CORPORATION OF AMERICA



DAVID SARNOFF
Chairman of the Board



FRANK M. FOLSOM
President



ARTHUR E. BRAUN



GANO DJINN

RCA
Board of Directors



WALTER A. BUCK



EDWARD F. McGRADY



NILES TRAMMELL



JOHN T. CAHILL



JOHN HAYS HAMMOND, JR.



GEORGE L. HARRISON



CHARLES B. JOLLIFFE



HAREY C. INELES



what it is - what it does

What is "RCA"?

The letters "RCA" are the initials of Radio Corporation of America, the parent of: RCA Victor Division, National Broadcasting Company, Inc., RCA Laboratories Division, RCA Communications, Inc., Radiomarine Corporation of America, RCA International Division, RCA Institutes, Inc., RCA Service Company, Inc., and RCA Victor Distributing Corp.

What led to the formation of RCA?

Prior to and during the first World War, the United States depended largely upon foreign-owned cables and wireless stations for communication with many important parts of the globe. Great Britain was the communications center of the world. The war revealed to Americans that radio offered a new and competitive system; an opportunity to win pre-eminence for the United States in radio communication.

Subsequently, RCA was formed as a result of suggestions by officers of the United States Navy. Arrangements were made to acquire the assets of the Marconi Wireless Telegraph Company of America. A charter was granted RCA under the corporation laws of the State of Delaware on October 17, 1919. The business and property of the American Marconi Company were acquired by RCA on November 20, 1919. On December 1, 1919, RCA began business as an All-American organization. Its charter provides that no person shall be eligible for election as a Director or officer of

the Corporation who is not at the time of such election a citizen of the United States. The charter also specifies that the Corporation may, by contract or otherwise, permit such participation in the administration of its affairs by the Government of the United States as the Board of Directors deems advisable. A clause in the charter provides that at least 80% of the RCA stock outstanding shall be held by citizens of the United States.

The first Chairman of the Board of RCA was Owen D. Young; the first President, Edward J. Nally; David Sarnoff was Commercial Manager.

Where are the RCA executive offices?

Headquarters of Radio Corporation of America are in the RCA Building, 30 Rockefeller Plaza, New York City. This building is the tallest in Rockefeller Center, popularly known as "Radio City".

What is the nature of RCA's business, as outlined in its original charter?

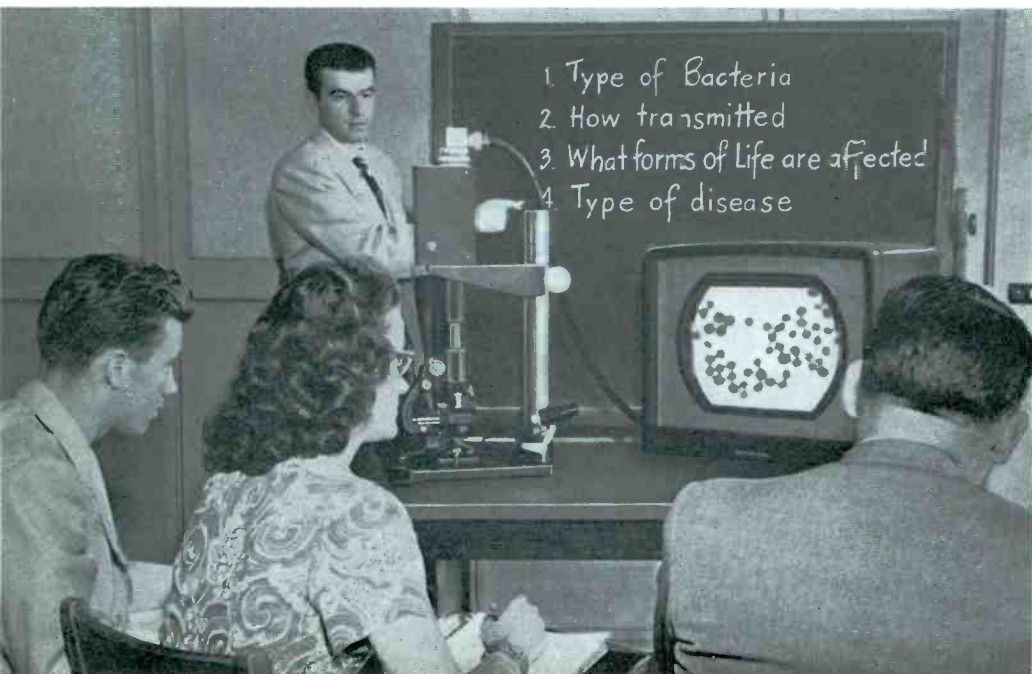
To send and receive signals, messages and communications; to create, install and operate a system of communication which may be international; to improve and prosecute the art and business of electric communication; to radiate, receive and utilize electromagnetic waves; to create, manufacture and sell goods and merchandise, and to hold and own patents, patent rights, copyrights and other real and personal property of every description.



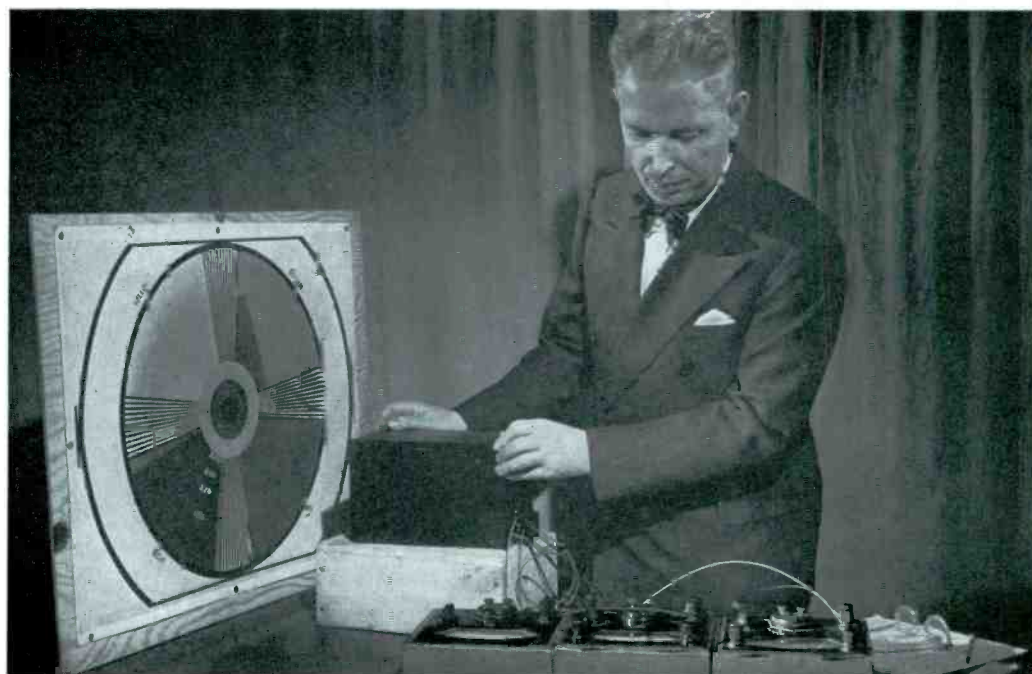
Modern scientific testing instruments are available to expert television technicians at branch offices of RCA Service Co., Inc.



During 1950 the RCA Exhibition Hall in Radio City, New York, attracted 1,250,000 visitors from all over America and foreign lands.



RCA's new industrial television system offers vast potentialities as an aid in classroom instruction.



Physicist at RCA Laboratories demonstrates tristimulus photometer, developed for the accurate determination of colors.

What are the industrial activities of RCA?

Radio Corporation of America is one of the world's foremost radio organizations. Through its various divisions and wholly-owned subsidiaries, it is engaged in numerous phases of radio: research and engineering, design and development, manufacturing, domestic and foreign sales, communications, broadcasting and technical training.

Is RCA engaged in electronics?

Yes; RCA has pioneered in the science of electronics, and its laboratories are a foremost center of radio-electronic research, the key of which is the radio or electron tube. The RCA Victor Division, one of the world's leading manufacturers of electron tubes, makes a wide variety of electronic apparatus.



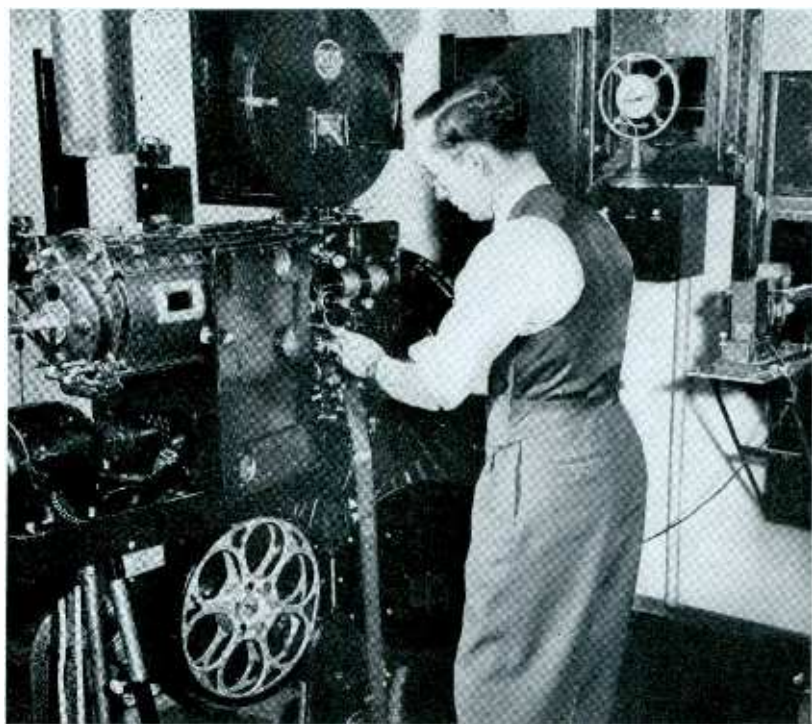
Jinx Falkenberg demonstrates development model of RCA's compact, high-fidelity microphone.

Does RCA have a centralized display of its products and services?

Yes; the RCA Exhibition Hall at 36 West 49th Street, New York, displays the latest RCA radios and "Victrola" radio-phonographs, television receivers, electron tubes, electron microscope, phonograph records and marine radio equipment. In addition, animated exhibits explain the operation of domestic broadcast networks and of world-wide radiotelegraph circuits. Admission to the RCA Exhibition Hall is free.

How many people are employed by RCA and its subsidiaries?

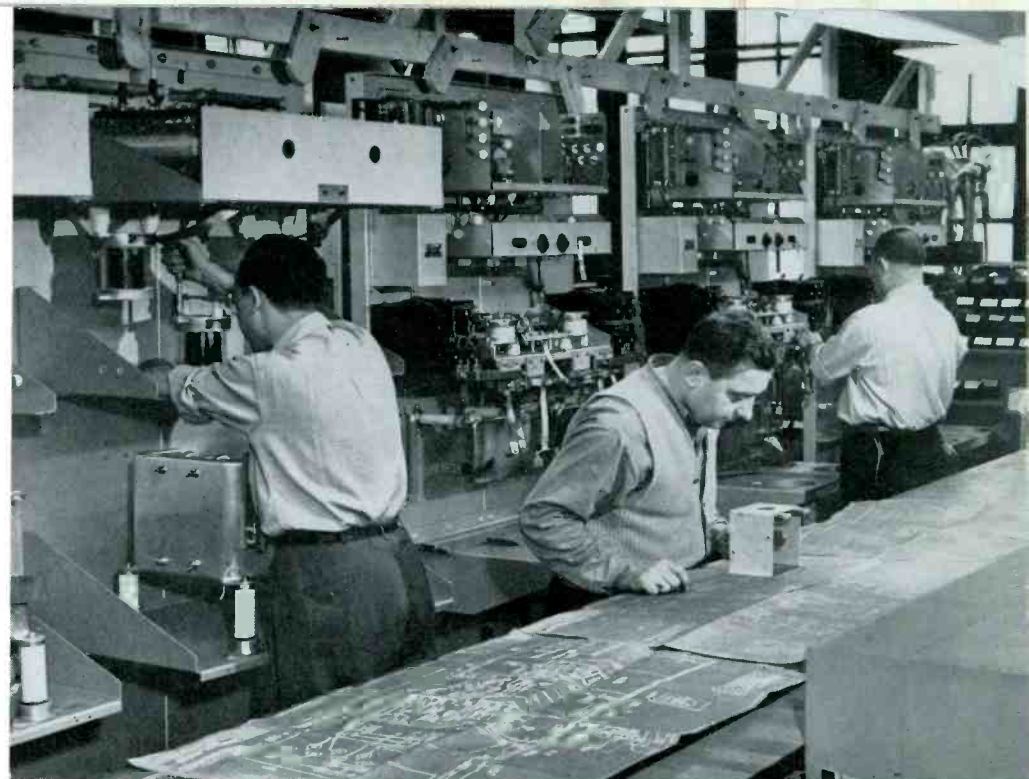
On March 1, 1951, RCA and its associated companies had 55,952 employees.



Projection room at NBC where programs recorded on film are processed for television.



The "Voice of America" uses this RCA-equipped van to pick up and transmit remote programs.



Amplifier units for radio transmitters are assembled on production lines at RCA Victor's Camden plant.

What are RCA's personnel and labor policies?

The management recognizes that the loyal cooperation of employees is of basic importance to the success and progress of RCA. The Company maintains, in all of its units, competent personnel administration, and a wide variety of educational training, social, and recreational facilities is provided. Employment is on the basis of merit and efficiency as determined by such factors as character, dependability, skill, intelligence, and physical fitness. It is the Company policy to pay as high wages, under as favorable hours and working conditions in similar classes of work, as those prevailing in the areas in which the Company's plants are located or operations are carried on. In instances where employees choose to bargain collectively, the employing company deals willingly and frankly with their authorized representatives. At present, there are

in force a number of contracts between the various companies and 53 separate bargaining agencies. Of these, all but 16 independent unions are affiliated with the A. F. of L., or C.I.O.

Edward F. McGrady, who for four years had been Assistant Secretary of Labor, in 1938 became RCA's Vice President in charge of Labor Relations and a member of the Board of Directors.

Who owns Radio Corporation of America?

Ownership of RCA is widely distributed among approximately 188,000 stockholders, in every state of the Union. No stockholder of record holds as much as 4% of the total outstanding voting securities of the Corporation. Less than 5% of the stock is held by foreign stockholders.

What is RCA's capital stock?

There are two classes of RCA stock:

| | Shares Outstanding |
|---|-----------------------|
| \$3.50 Cumulative First Preferred | 900,824 |
| Common | 13,881,016 |

Do RCA stocks pay dividends?

Quarterly dividends have been paid regularly on the First

Preferred stock since it was issued in 1936. In 1950, these dividends amounted to \$3,152,805.

Common stock dividends of 20 cents per share were declared annually from 1937 to 1946. In 1947, the dividend was increased to 30 cents and in each of the years 1948 and 1949, the dividend amounted to 50 cents. For the year 1950, dividends of \$1.00 were declared, consisting of a regular dividend of 50 cents and two extra dividends of 25 cents each, amounting to \$13,857,343.

WHERE IT CAME FROM

| A SUMMARY OF PRODUCTS AND SERVICES SOLD DURING THE YEAR | 1950 | | 1949 | |
|--|----------------------|--------------|----------------------|--------------|
| | AMOUNT | % | AMOUNT | % |
| RCA—Includes Victor, Laboratories and International Divisions and domestic subsidiaries other than those listed here | \$476 091 000 | 81.2 | \$307 309 000 | 77.4 |
| National Broadcasting Company | 92 373 000 | 15.8 | 72 867 000 | 18.3 |
| RCA Communications | 14 929 000 | 2.5 | 13 263 000 | 3.3 |
| Radiomarine Company of America | 7 279 000 | 1.2 | 6 734 000 | 1.7 |
| RCA Institutes | 910 000 | .2 | 893 000 | .2 |
| Less: Inter-company transactions | 5 189 000 | .9 | 3 807 000 | .9 |
| TOTALS | \$586 393 000 | 100.0 | \$397 259 000 | 100.0 |

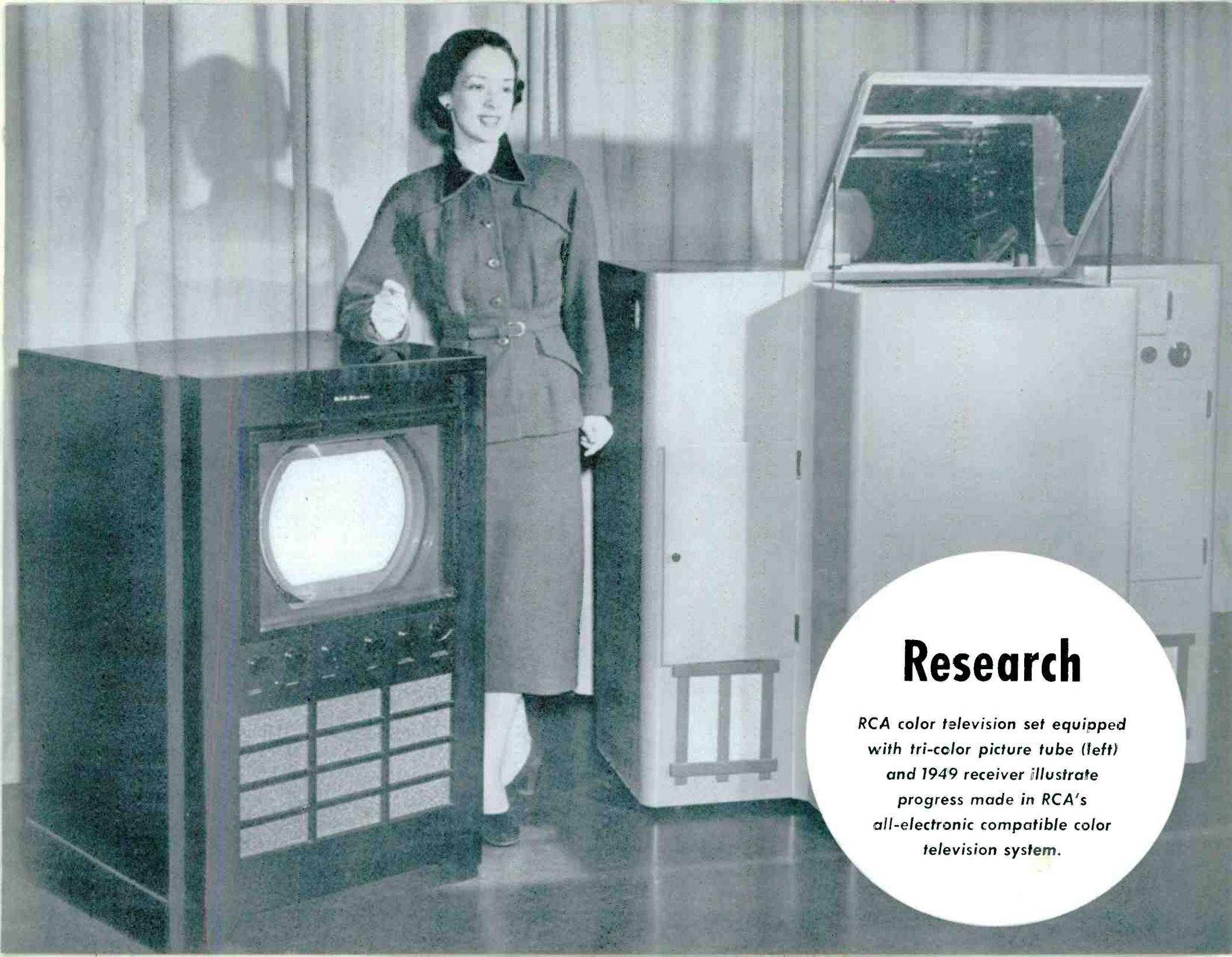
WHERE IT WENT

| HOW THE SALES DOLLAR WAS APPLIED DURING THE YEAR | 1950 | | 1949 | |
|---|----------------------|--------------|----------------------|--------------|
| | AMOUNT | % | AMOUNT | % |
| Materials and services bought from others | \$289 997 000 | 49.5 | \$201 948 000 | 50.9 |
| Wages and salaries | 173 798 000 | 29.6 | 135 149 000 | 34.0 |
| Pensions, social security taxes, insurance and other benefits | 10 387 000 | 1.8 | 5 854 000 | 1.5 |
| Depreciation and patent amortization | 10 302 000 | 1.7 | 8 452 000 | 2.1 |
| Interest on borrowed money | 1 324 000 | .2 | 1 093 000 | .3 |
| Taxes, other than social security | 54 335 000 | 9.3 | 19 619 000 | 4.9 |
| Dividends declared | 17 010 000 | 2.9 | 10 081 000 | 2.5 |
| Retained in the business | 29 240 000 | 5.0 | 15 063 000 | 3.8 |
| TOTALS | \$586 393 000 | 100.0 | \$397 259 000 | 100.0 |

What are the working capital and stockholders' equity of RCA?

RCA's working capital (the excess of current assets over current liabilities) at December 31, 1950, amounted to \$130,902,127. The total assets, liabilities and stockholders' equity of Radio Corporation of America and its domestic subsidiaries, as shown by its consolidated balance sheet on December 31, 1950 were as follows:

| ASSETS | | | LIABILITIES & STOCKHOLDERS' EQUITY | | |
|--|----------------------|----------------------|--|----------------------|----------------------|
| | <u>Dec. 31, 1950</u> | <u>Dec. 31, 1949</u> | | <u>Dec. 31, 1950</u> | <u>Dec. 31, 1949</u> |
| CURRENT ASSETS | | | CURRENT LIABILITIES | | |
| Cash | \$ 67 063 055 | \$ 42 161 084 | Accounts payable and accruals | \$ 72 553 748 | \$ 42 708 311 |
| U. S. Gov't. securities, at cost, less amounts deducted from Federal tax liability | 2 951 577 | 13 356 297 | Federal income and excess profits taxes, less U. S. Gov't securities, 1950 \$50,850,000, 1949 \$15,800,000.... | 5 714 689 | 7 853 566 |
| Receivables, less reserves, 1950 \$2,452,594, 1949 \$2,118,236 | 72 612 212 | 43 695 932 | Dividends payable | 788 202 | 7 716 804 |
| Inventories, at lower of cost or market | 63 267 227 | 51 007 885 | TOTAL CURRENT LIABILITIES | 79 056 639 | 58 278 681 |
| Prepaid insurance, taxes, etc. | 4 064 695 | 4 610 252 | 3% PROMISSORY NOTES, DUE 1970-1974.... | 60 000 000 | 40 000 000 |
| TOTAL CURRENT ASSETS | 209 958 766 | 154 831 450 | RESERVE FOR CONTINGENCIES | — | 3 654 780 |
| INVESTMENTS IN WHOLLY-OWNED FOREIGN SUBSIDIARIES | 3 699 128 | 4 439 128 | STOCKHOLDERS' EQUITY | | |
| OTHER INVESTMENTS, AT COST, | | | \$3.50 Cumulative First Preferred Stock, no par, shares authorized 920,300, outstanding 900,824, (preference on involuntary liquidation \$100 per share or a total of \$90,082,400) at a stated value of | 14 574 441 | 14 574 441 |
| LESS RESERVES, 1950 \$1,363,838, 1949 \$1,568,204 | 1 999 908 | 492 180 | Common Stock, no par, shares authorized 18,500,000 outstanding 13,881,016 at a stated value of | 27 762 032 | 27 762 032 |
| PLANT AND EQUIPMENT, AT COST, LESS DEPRECIATION, 1950 \$68,330,582, 1949 \$62,666,960 | 87 391 928 | 76 464 981 | Capital surplus | 6 651 703 | 5 441 301 |
| PATENTS AND PATENT RIGHTS, | | | Retained earnings | 123 802 071 | 94 562 354 |
| LESS AMORTIZATION, 1950 \$9,509,620, 1949 \$10,606,705 | 4 448 321 | 5 387 961 | TOTAL STOCKHOLDERS' EQUITY | 172 790 247 | 142 340 128 |
| DEFERRED CHARGES | 4 348 835 | 2 657 889 | TOTAL LIABILITIES & STOCKHOLDERS' EQUITY | \$311 846 886 | \$244 273 589 |
| TOTAL ASSETS | \$311 846 886 | \$244 273 589 | | | |



Research

RCA color television set equipped with tri-color picture tube (left) and 1949 receiver illustrate progress made in RCA's all-electronic compatible color television system.

Research



DR. C. B. JOLLIFFE
Executive Vice President
in Charge of
RCA Laboratories Division



Research in transmitter tubes at RCA Laboratories leads to continual improvements in radio communications.



Cut-away view of RCA's tri-color television picture tube shows the screen with its 600,000 dots of phosphors.

What is the policy of RCA toward scientific research?

Radio Corporation of America has always recognized that research is a true guarantee of continued progress and a bulwark of national security. Consequently, since the formation of RCA, research has been a major activity. Research is centered in RCA Laboratories Division. The main laboratories are in Princeton, N. J., with others in New York City; Newark, N. J.; Riverhead and Rocky Point, N. Y.; Chicago, Ill.; Hollywood, Calif. and Washington, D. C. RCA Laboratories is recognized as one of the foremost centers of radio and electronic research in the world.

What is the purpose of RCA Laboratories?

The primary aim of RCA Laboratories is to increase the usefulness of radio and electronics to the Nation, to the public and to industry. Scientific investigations conducted by RCA are directed toward gaining new knowledge, toward improvement in methods and devices for every branch of radio, electronics and their production and operation processes, and toward the creation of new products and services.

While developing projects speedily applicable to commercial needs, and conducting research to provide a constant flow of new technical knowledge, RCA continues close cooperation with the military services of the United States, conducting specific research to help guarantee the scientific and technological preparedness and security of the Nation.

Is RCA research confined to radio?

Modern radio is closely allied with many branches of science such as electronics and acoustics and, as radio progresses, new sciences are continually being brought within its horizon. RCA has extended its research into many fields such as optics, chemico-physics, and nucleonics. Studies which have resulted from this work, or as by-products of radio and television research, include research in fluorescent and phosphorescent materials, the electron microscope, plastics and the application of radio-frequency heating to industrial processes.



RCA's industrial television system can be adapted to provide a stereoscopic view of a remote-controlled chemical process.



High-speed facsimile system developed by RCA for the distribution of printed matter at the Oak Ridge National Laboratory.



RCA Laboratories at Princeton, N. J., is recognized as one of the world's foremost centers of radio and electronic research.

Are research and engineering activities of RCA limited to RCA Laboratories?

As a logical adjunct to research, each company and division of RCA has its own engineering department to assist in the solution of engineering problems, to conduct applicable product engineering and to exercise immediate engineering supervision over technical operations. These engineering departments include staffs at the National Broadcasting Company headquarters in Radio City, as well as at each NBC-owned broadcasting station, at each plant of the RCA Victor Division, at RCA Communications, Radiomarine Corporation of America, and RCA International Division. In addition, the staff of RCA Service Company and the faculty of RCA Institutes consist almost entirely of engineering personnel.

What are the functions of the RCA Frequency Bureau?

The Bureau is a service agency on technical matters for all subsidiaries and Divisions of RCA. It represents the Corporation at international conferences on communications, and handles appli-

cations for radio licenses and frequency allocations. The RCA Frequency Bureau collects and classifies information concerning radio stations of the world. Its records are available to the Federal Communications Commission and other government agencies, and to the communications industry. Offices are located in Washington and New York.

Does RCA publish information concerning the results of its research and engineering?

Scientists and engineers of RCA are active contributors to leading technical journals, and also present technical papers at engineering meetings throughout the country. In addition, RCA Laboratories Division publishes for the Corporation the quarterly technical journal, *RCA Review*, as well as various technical and engineering books, indexes and pamphlets.

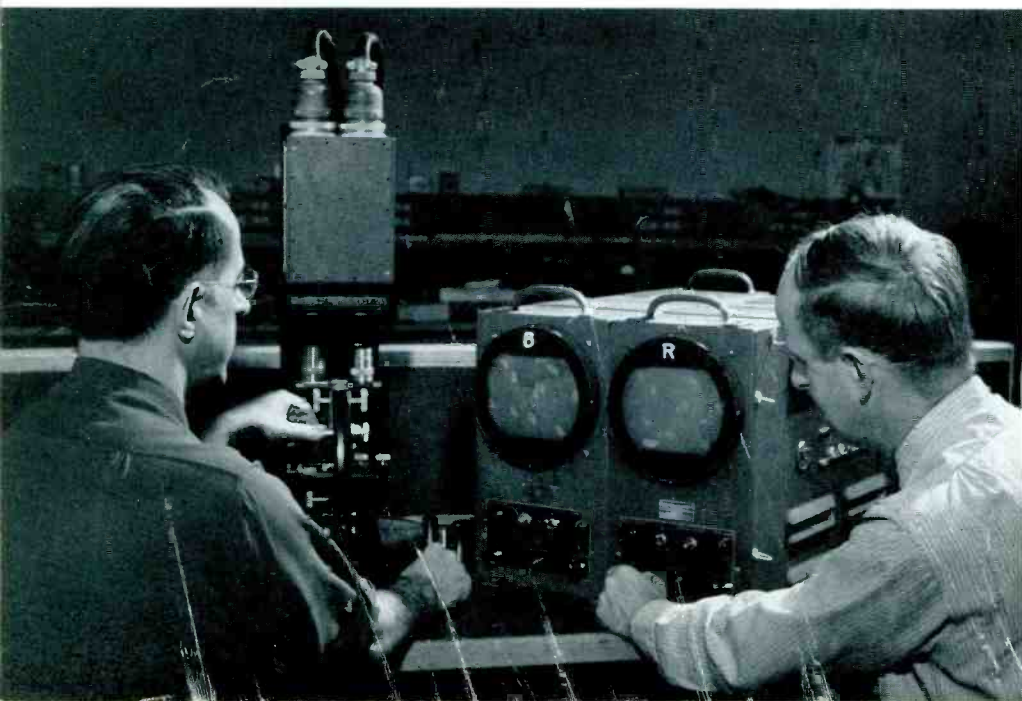
Does RCA make its inventions and patents available to other manufacturers?

RCA makes available to competitive manufacturers of radio



RCA color television cameras focus on a demonstration of household products in the studio of WNBW, Washington, D. C.

Living cells can be observed through this combination of industrial television cameras and a light microscope.



and other apparatus its inventions and patents by means of patent licenses at moderate royalty rates. By this means the accomplishments of RCA scientists are promptly made available to serve the government and the public in the most efficient manner. To assist its licensees, RCA Laboratories Division maintains an Industry Service Laboratory through which licensees are kept informed of new technical developments, advised how best to apply them, and given assistance in the solution of technical problems. In addition to several completely equipped laboratories, the Industry Service Laboratory maintains a mobile field laboratory which provides test and measuring equipment that can be employed under all conditions in any location, for studies in relation to television, frequency modulation, facsimile and standard broadcasting.

What is the tri-color picture tube?

The RCA tri-color kinescope, or picture tube, is a direct-view tube on which color television images appear in their natural hues and brilliance. The screen of the tri-color tube consists of approximately 600,000 dots of red, green and blue phosphors. These dots are arranged in groups of three — one of each primary color — so positioned that the electrons from each of three electron guns in the neck of the tube always hit the dots of their own color. The dot groups are so close together that when illuminated by the electron streams they present a continuous, smooth full-color picture.

What are some of the other outstanding developments of RCA research?

RCA pioneering research has been responsible for many of the outstanding contributions in radio and electronics. High on the list of developments is all-electronic, high-definition black-and-white television, which has rapidly become a major broadcasting service. Of equally great significance was the development by RCA Laboratories of an all-electronic, high-definition, fully-compatible color television system. This system maintains the standards established for black-and-white television and would not make obsolete the millions of black-and-white receivers now in use.

Another achievement in the field of television is an industrial system which combines excellent performance with simplicity and compactness. It employs a new, diminutive pickup tube—the Vidicon—in a camera no larger than a 16-millimeter personal movie camera. The versatility of this equipment has been proven in the past year by its use in microscopy by biologists and physicists at Princeton University both in research and in the classroom.

Ten years of research on electronic computers culminated in the demonstration of "Project Typhoon"—the largest and most accurate analogue computer ever built. Designed for the Navy's guided missile research program, the calculator employs approximately 4,000 electron tubes and a new set of super-accurate components, exact to better than one part in 25,000.

In further pursuing original investigations in ultra-high frequencies, new applications have been made in the spectrum of microwaves, including uses in television, radar, and in automatic radio-relay stations.

Research in television, which led into the realm of electron optics, has brought numerous outstanding developments, including the RCA electron microscope, an instrument that enables the human eye to see deep into the world of the infinitesimal. Recent research in this field has been concentrated on specimen-handling techniques which, when combined with a specially-developed lens, make it possible to follow some of the structural changes occurring in growing bacteria.

A method of preparing for micrography consecutive slices of tissue, each four-millionths of an inch thick, was developed by Laboratories' physicists in co-operation with medical scientists of Sloan-Kettering Institute, in New York. This technique is expected to increase significantly the importance of the electron microscope in cancer research.

Greater versatility for the electron microscope has been attained by the development of an intermediate electronic lens, which permits magnification by the instrument to be varied over a much

wider range than heretofore had been possible without changing components.

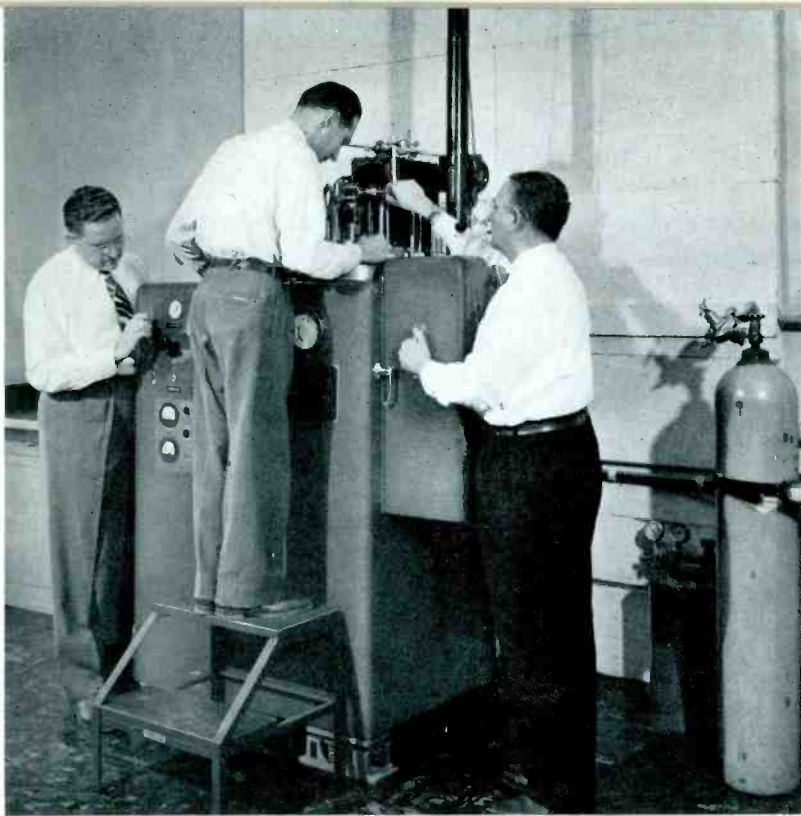
Many types of vacuum tubes have been created for myriad uses in radio and industry. The supersensitive pickup tube, or "eye", for the television camera—the image orthicon—permits the televising of scenes even when illumination is provided only by a single candle.

A new multiplier phototube has been developed which enhances the performance of the scintillation counter in the detection of radioactivity. The tube multiplies a million times the signals received as flashes from a fluorescent crystal under bombardment, and the counter can distinguish between radioactive particles striking the crystal less than one 100-millionth of a second apart.

A trigger-grid thyratron tube that holds great promise as a control mechanism for alternating currents of high voltages and which operates in exceedingly brief time intervals is another product of RCA research.



Model of missile used to demonstrate operation of an electronic analogue computer developed at RCA Laboratories as an aid in the design of airborne craft and devices essential to national defense.



Scientists at RCA Laboratories conduct research in a sub-zero laboratory where special equipment provides temperatures down almost to absolute zero (-460°F).

Research in the field of amplifier tubes has resulted in the successful combination of the highly efficient electron multiplier with the conventional cathode-and-grid tube structures to provide a new type of tube which probably will find extensive application in the near future.

Electrical signals that exist for periods as brief as a billionth of a second now may be "stored" for as long as a minute by the Graphophon, a visual "memory" tube. A recently developed storage oscilloscope, employing this tube and a television kinescope, is envisaged as a valuable tool in research and industry for the observation of electrical phenomena which until now required photographing before they could be examined.

For use in high-speed digital computing machines and other information-handling machines, the selective electrostatic memory tube has been evolved. This tube can hold 256 memory elements of the "yes-no" variety, any one of which can be electronically taken out of the tube in a matter of a few millionths of a second.

An FM circuit, called a "ratio detector", developed by RCA, aids in counteracting interference and its use reveals superior merit over circuits previously used for FM reception, particularly in low-priced receivers.

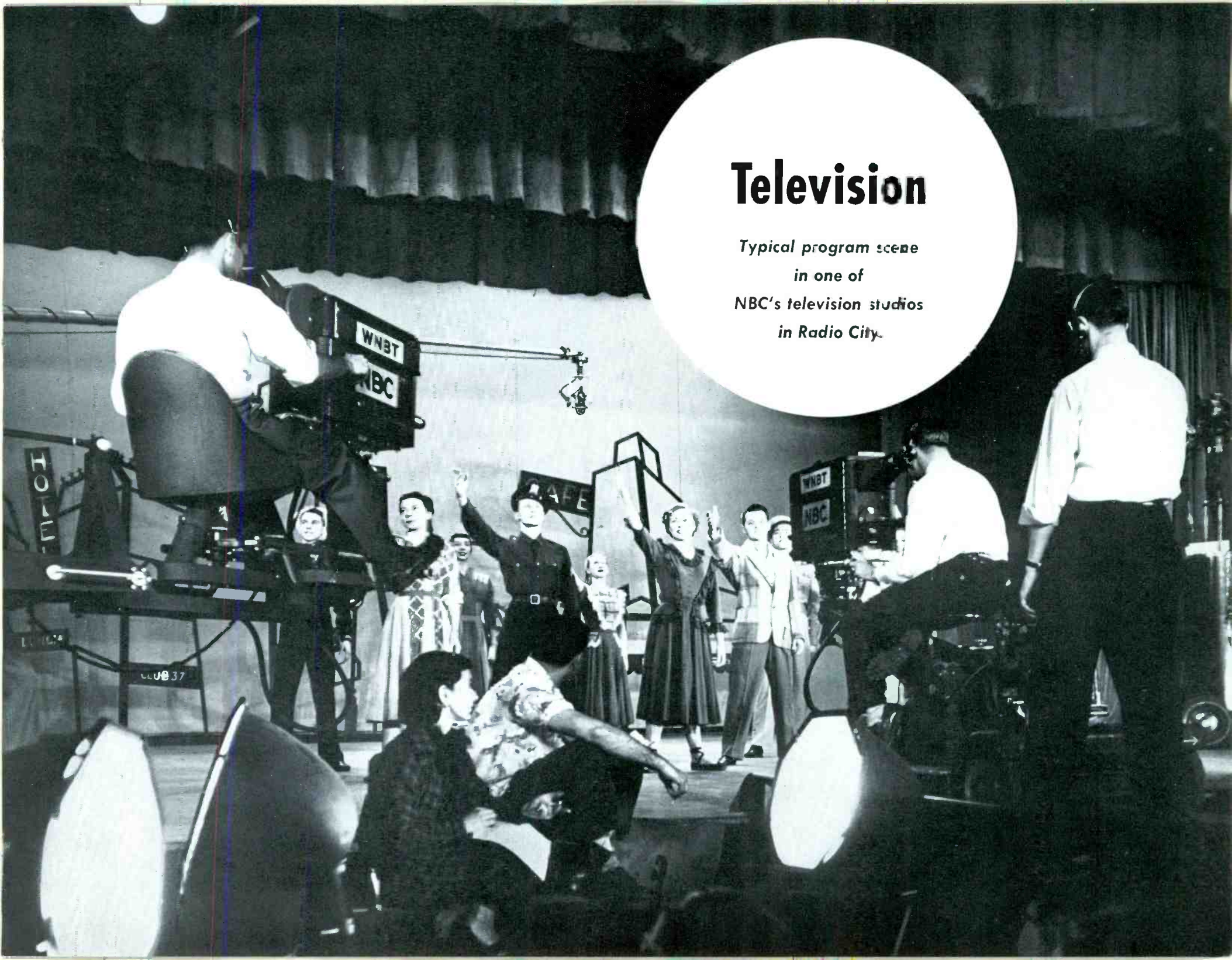
Research in the field of electronic counters has made available a commercial counter capable of measuring time in units as small as one-millionth of a second. A special electronic counter chronograph, capable of measuring time in units as small as one ten-millionth of a second, has been developed for the government.

Combining the elements of television and facsimile with the latest techniques in radio relaying and high-speed photography, a new communication system known as Ultrafax has been developed which is capable of transmitting written or printed messages and documents and receiving them in recorded form at the rate of a million words a minute. An experimental facsimile system, with a cathode-ray flying-spot scanner permitting the transmission of images from flat surfaces, was designed for Atomic Energy Commission library services at Oak Ridge.

The Starmaker microphone was designed for the television studio as an unobtrusive pickup device having no sacrifice in sensitivity although only one-quarter of standard microphone size. Two new loudspeakers of the duo-cone type have been added to the family of RCA high-quality loudspeakers. Design was completed of a small personal receiver, weighing less than two pounds and one-quarter of the size of existing commercial receivers but with comparable performance from the acoustical and sensitivity standpoint. Further progress in the field of acoustics is promised by the design of an electronic transducer tube which converts mechanical vibrations into corresponding electrical impulses.

Television

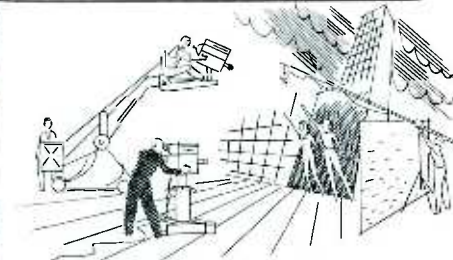
*Typical program scene
in one of
NBC's television studios
in Radio City.*



Television



JOSEPH H. McCONNELL
President,
National Broadcasting
Company



How long and to what extent has NBC operated television as a service to the public?

Since 1939, the pioneering of the National Broadcasting Company has brought to the public an era of new entertainment, information, news and education made possible through the facilities of the video medium.

Limited in its expansion during the years of World War II, television experienced a rebirth in 1946 and by 1950 had become a truly major national service. At the beginning of 1951, NBC was supplying visual programs to a network of 63 stations, of which 47 were interconnected by coaxial cable, the remainder being serviced by kinescope recordings. The network already reaches nearly one-third of all homes in the United States, representing an estimated potential audience of 50,000,000 persons.

What types of programs are telecast by NBC?

Those who have had television in their homes for the past year will recall the thrills of many program highlights.

President Truman made five appearances on NBC television in addresses on matters of national interest. Talks by the Secretary of State, telecasts from the United Nations, exclusive film stories from Korea and other nerve centers of world happenings were presented during the year.



Top stars of the entertainment world appearing on NBC television have built high ratings for the network's programs.

With the beginning of the Korean conflict, news played an ever-increasing part in television. For the first time, NBC television assigned its own film correspondents to a war front.

During 1950, NBC introduced numerous innovations in television programming, one of the most important being the idea of rotating the appearance of outstanding stars of the entertainment world.

The "Comedy Hour" and "Four Star Revue" programs brought to television audiences Eddie Cantor, Fred Allen, Bob Hope, Bobby Clark, Jimmy Durante, Ed Wynn, Danny Thomas, Jack Carson, and the comedy team of Dean Martin and Jerry Lewis. Groucho Marx launched his popular TV version of "You Bet Your Life" over NBC in 1950.

The famed "Saturday Night Revue", starring Sid Caesar and Imogene Coca, made its debut in 1950 and became one of NBC television's most popular offerings. A hit also was scored by Jerry Lester and Dagmar on "Broadway Open House", presented late in the evening, Monday through Friday.

Another NBC innovation was the presentation of high quality shows for the afternoon audience. For this purpose, Kate Smith was signed exclusively for a daily hour show. Bert Parks and Ransom Sherman also made their bows in daytime television over NBC.

Advertisers are aware of the experience of Texaco, whose NBC television program series is drawing an almost unbelievable sponsor identification and the highest rating ever received in either radio or television. Advertisers also know that research surveys in New York show NBC with the largest average evening audiences. As in radio advertising, it will make possible an increasing wealth of fine programs on television.

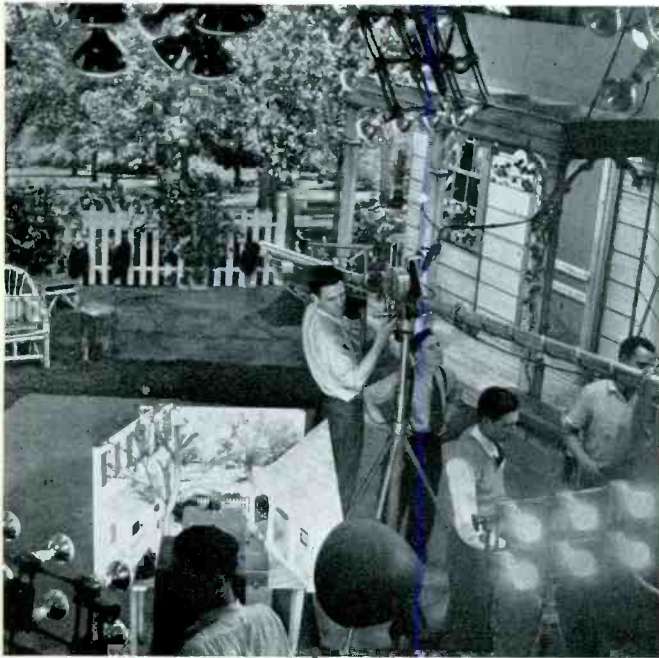
Television already is one of the most effective of all advertising media. It affords unlimited opportunities to the commercial sponsor

to present sales, service and public relations messages in a manner informative, interesting, and entertaining.

What television stations does NBC own and operate?

NBC owns and operates five television stations: WNBT, New York; WNBW, Washington, D.C.; WNBQ, Chicago; WNBK, Cleveland, and KNBH, Hollywood.

W2XBS, predecessor of WNBT and the first NBC station to go on the air, inaugurated a regular program service to the public on April 30, 1939. Station WNBT began commercial operation on July 1, 1941; WNBW went on the air in June, 1947; WNBQ and WNBK began transmissions the latter part of 1948, and KNBH went into regular operation early in 1949.



Small scale models (foreground) are copied in detail in building stage settings for NBC's television productions.



Fran Allison talks with the two other name stars in NBC's highly-rated television program, "Kukla, Fran and Ollie".



Using a telephoto lens, a cameraman is able to bring the action at a golf match close to the television viewer.



Robert Montgomery, film star, has turned his acting and production talents to television with outstanding success.

Are any programs transmitted simultaneously over radio and television networks?

Yes; several NBC programs are simulcast over the radio and television networks of the Company. Simulcasts have included: "Voice of Firestone", "The Horn and Hardart Children's Hour" (locally, in the New York area), and occasional NBC Symphony programs. Several NBC series have separate radio and television presentations at different times. These include: "The Big Story", "Break the Bank", "The Aldrich Family", and "One Man's Family".

What does TV mean to industry?

The fantastic growth of TV has lifted radio and television to a multi-billion-dollar-a-year industry—one which may join the nation's top enterprises by 1953.

It means, also, that NBC has led in the economic advances of the new medium, as shown by the use of its facilities by nearly twice as many advertisers as the next network.

Has NBC expanded its production facilities to pace the growth of television?

Yes; during 1950 NBC vastly expanded its production facilities to keep pace with the growing medium. The network acquired the Center and Hudson Theatres in New York, and rebuilt famed Studio 8-H in Radio City for television.

NBC's TV Staging Services Division supplemented its Radio City quarters with a spacious new Central Shop, in New York City. The unit now has three additional floors of working space in which to produce the scenery, as well as every conceivable type of special effect, required in the presentation of more than 100 NBC television programs each week.

In line with its expanded TV film program, the network's Production Film Department has taken over offices in the Film Exchange Building for processing, handling and storing thousands of feet of TV film.



Orchestra, stage settings, principals and equipment crowd the studio space for NBC's "Garroway at Large", which originates in Chicago.

The Big Show



Radio

Tallulah Bankhead plays hostess to a galaxy of stars on "The Big Show," NBC's popular new radio series.

Radio



How did the idea of broadcasting to the public originate?

David Sarnoff was the first man to propose that programs be broadcast over the air for public consumption. In 1916, when he was Assistant Traffic Manager of the Marconi Wireless Telegraph Company of America, Mr. Sarnoff suggested the manufacture of "radio music boxes" so that purchasers could enjoy "concerts, lectures, music, recitals, etc." His memorandum to E. J. Nally, Vice President and General Manager of the Company, said: "I have in mind a plan of development which would make radio a household utility in the same sense as a piano or a phonograph. The idea is to bring music into the house by wireless. . . . For example, a radio telephone transmitter having a range of say 25 to 50 miles can be installed at a fixed point where instrumental or vocal music or both are produced. . . . The receiver can be designed in the form of a simple 'radio music box' and arranged for several different wave lengths, which should be changeable with the throwing of a single switch or pressing of a single button. . . . The same principle can be extended to numerous other fields—as for example—receiving lectures at home which can be made perfectly audible; also events of national importance can be simultaneously announced and received. This proposition would be especially interesting to farmers and others living in outlying districts removed from cities. By the purchase of a 'radio music box' they could enjoy concerts, lectures,



Newsroom in Radio City where bulletins from all news centers are prepared for NBC radio networks.

music, recitals, etc., which may be going on in the nearest city within their radius. . . . Should this plan materialize, it would seem reasonable to expect sales of 1,000,000 'radio music boxes' within a period of three years."

Demonstration of the practical value of the Sarnoff plan was delayed by World War I. However, on November 2, 1920, when the Westinghouse station, KDKA, Pittsburgh, broadcast the Harding-Cox election returns, the "radio music box" became a reality. The 90,000,000 radio sets in use today attest to the impressive growth of this medium.

When did RCA enter the broadcasting field?

The first broadcast program presented by RCA was the Dempsey-Carpentier heavyweight championship boxing match in Jersey City on July 2, 1921. Major J. Andrew White telephoned a blow-

by-blow description from the stadium to a station in Hoboken which RCA had installed especially for this occasion. White's words were typed as they came over the phone and were read over the air by J. O. Smith to an estimated 200,000 listeners. Commenting on this event a few weeks later, the RCA magazine *World Wide Wireless* stated: "In the future, it is proposed to employ the radio-
phone to report all events of national and international importance, such as elections and big sporting events. Indeed, we are living in the age of miracles and the day is not far off when almost every home will be equipped with its own wireless telephone receiver."

RCA's first regularly operated broadcasting station, WDY in Roselle Park, N. J., was licensed September 19, 1921, and went on the air December 14 of that year to provide programs to the New York metropolitan area. Use of this station was discontinued in February, 1922, when RCA entered into an arrangement with Westinghouse Electric & Manufacturing Company for the operation of Station WJZ at Newark. RCA acquired full ownership of this station in the spring of 1923, and up-to-date studios were installed in Aeolian Hall, New York. The Company also constructed Station WRC in Washington, D. C., which went on the air August 1, 1923.

When was the National Broadcasting Company formed?

The National Broadcasting Company was established by RCA in the fall of 1926. It was NBC's announced purpose "to provide the best programs available" to the five million American homes then equipped with radio receivers. NBC's inaugural network program, on November 15, 1926, was broadcast by 24 stations in 21 cities extending from the eastern seaboard as far west as Kansas City. Initially, NBC owned one station, WEAJ (now WNBC), New York, which it had purchased from the American Telephone & Telegraph Company. It also operated the two RCA stations, WJZ and WRC, acquiring ownership of these stations from the parent company in 1931.

Where are NBC studios located?

The National Broadcasting Company's main offices and studios are located in the RCA Building, Radio City, New York. NBC also has offices and studios in Washington, Cleveland, Chicago, Denver, Hollywood, and San Francisco.

TRANSMISSION TOWERS OF BROADCASTING STATIONS OWNED AND OPERATED BY NBC

WNBC, New York

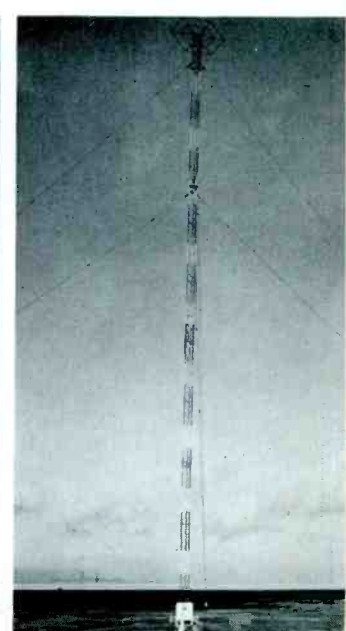
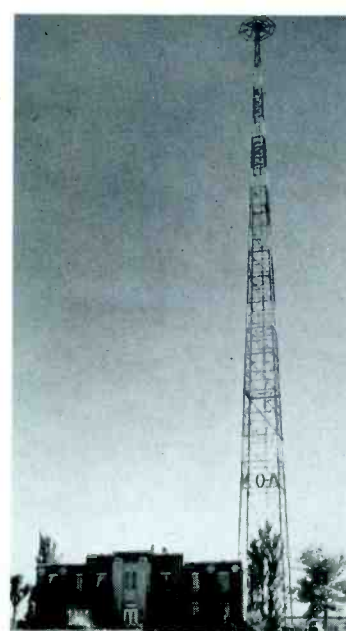
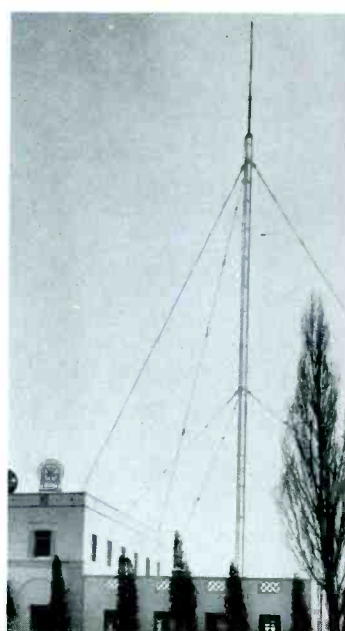
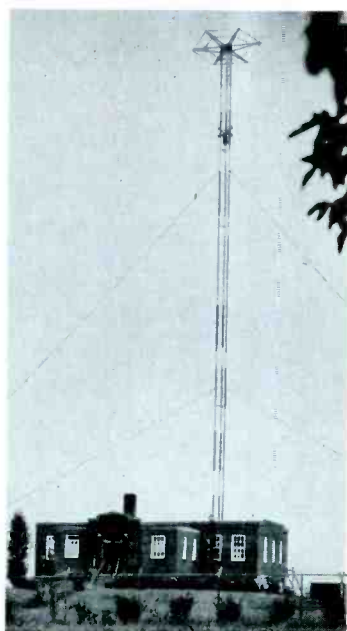
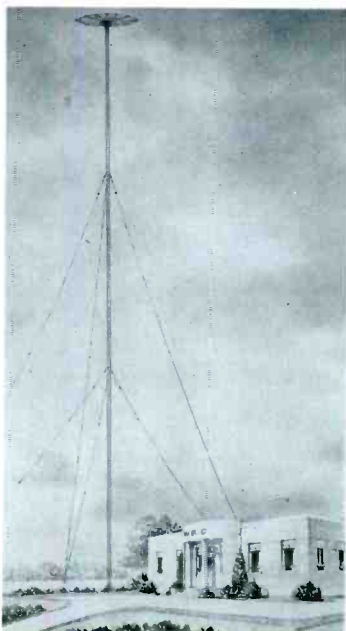
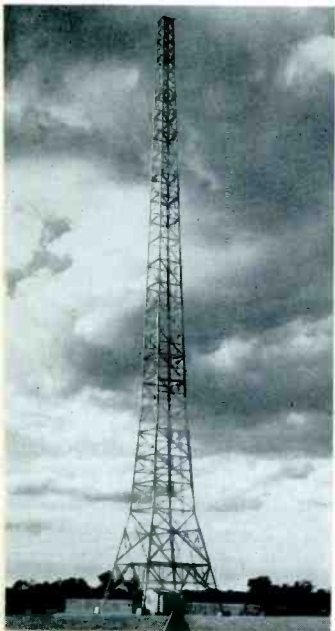
WRC, Washington

WMAQ, Chicago

WTAM, Cleveland

KOA, Denver

KNBC, San Francisco



Did NBC have a coast-to-coast network when it started?

No; there was no coast-to-coast network until January 1, 1927, when the first transcontinental network was arranged by NBC to broadcast a football game from the Rose Bowl at Pasadena, California.

How many stations are affiliated with the NBC network?

The NBC radio network now comprises 181 stations. Six of these are owned by the Company: WNBC, New York; WRC, Washington; WTAM, Cleveland; WMAQ, Chicago; KOA, Denver; KNBC, San Francisco.

How is the NBC network interconnected?

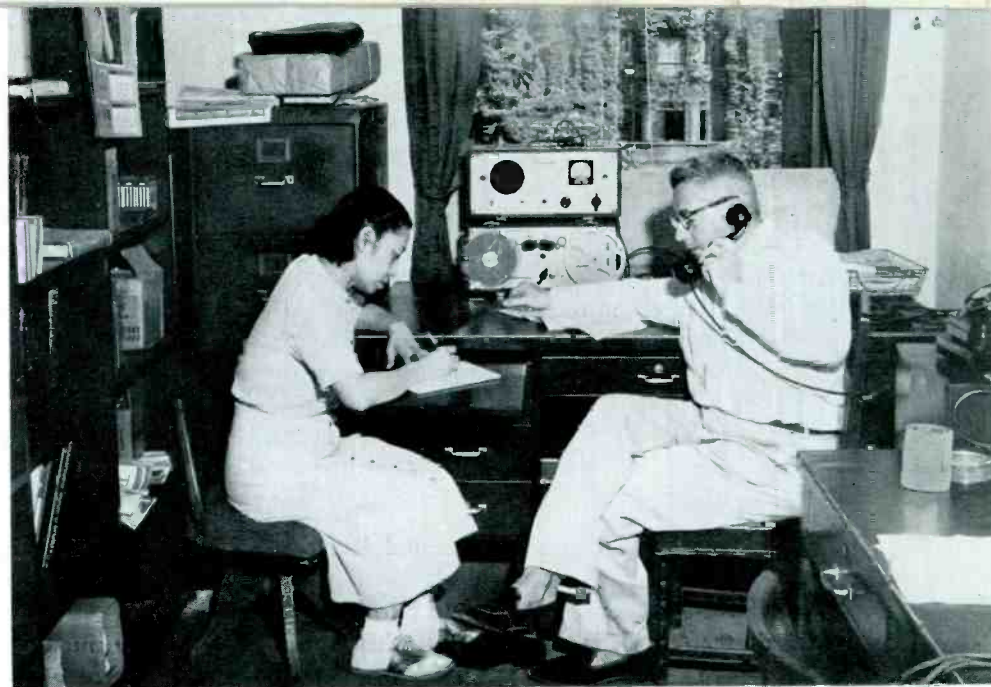
The network consists of over 16,000 miles of leased telephone circuits especially engineered for the transmission of broadcast programs. These circuits are available for NBC use for 24 hours a day and they are used for periods varying from 16 to 18 hours a day in different parts of the country. In addition to these circuits, temporary facilities are purchased on a per-occasion basis, primarily for program transmission of pickups outside NBC studios.

What is the seating capacity of NBC studios in Radio City?

The seating capacity of all NBC studios in Radio City is approximately 4,600. Radio's continuous growth and the demands of television have made it necessary to secure supplementary studio space in New York locations outside of Radio City.

How may tickets be obtained for admission to broadcast programs?

By writing at least two weeks in advance to the Guest Relations Division of NBC. Cards of admission, if available, will be supplied.



From this NBC newsroom in Tokyo, up-to-the-minute reports on the Korean fighting are filed by George Thomas Folster and other noted radio correspondents.

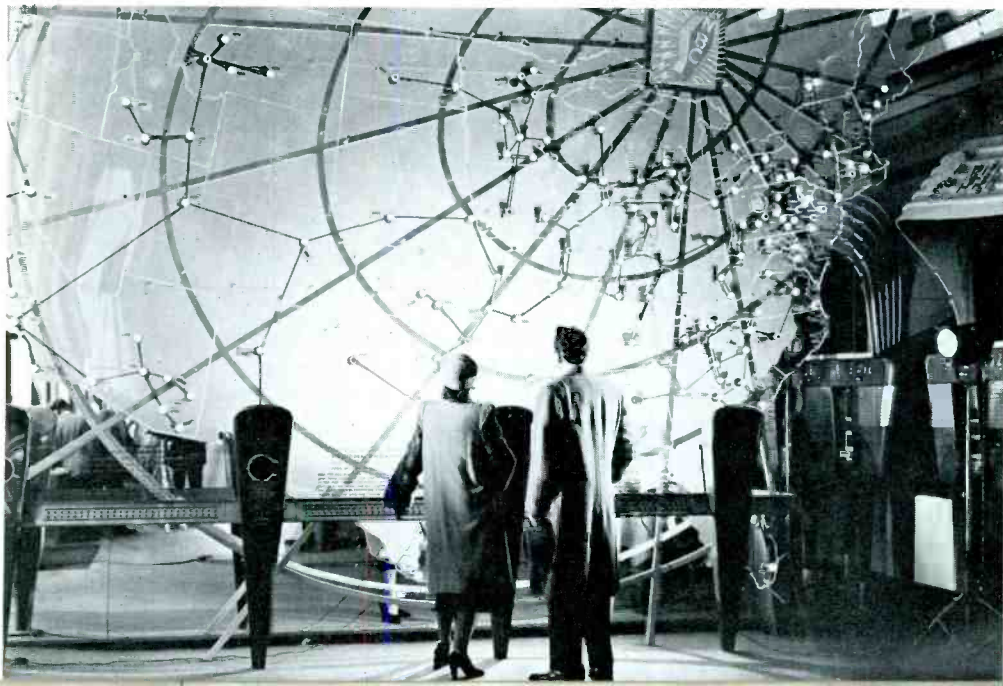
NBC's award-winning "Voices and Events" programs, are first recorded on magnetic tape, then checked by editor James Fleming (standing).





Re-creation of an atomic bomb blast was a complicated task undertaken by the NBC sound effects staff.

Route of network programs to each NBC affiliate station is indicated on this animated map at RCA Exhibition Hall.



What proportion of NBC programs is sponsored by advertisers?

Approximately half of the total program hours of the NBC network are commercially sponsored. The remaining half are filled with non-commercial programs, that is, programs for which NBC and its affiliated stations supply time, facilities and frequently program content, without remuneration.

How should an idea for a radio script or program be presented for consideration?

NBC welcomes new ideas for radio programs as well as constructive criticism intended to improve programs already on the air. All program ideas must be submitted in writing to the Program Department and must be accompanied by a signed release form which is readily obtainable from the Program Department. They will not be accepted orally. Ideas for programs, as well as specific scripts, are given prompt consideration by the Script Division.

Does the NBC network conduct auditions to find new talent?

NBC has an extensive system of auditions set up for the express purpose of getting a proper appraisal on talent. The audition system is open to anyone who applies. A specialist in drama and another in music first conduct interviews with applicants, then hear auditions of those with proper background and experience. Those who are approved in the preliminary audition are heard by dramatic and musical producers; they are placed on a list which is made available to advertising agencies and given full consideration in casting NBC programs.

How does one arrange for an audition?

Application should be made to the Production Division of the Program Department. This applies to actors, announcers, and vocalists. All instrumentalists are considered by the Music Division of the Program Department.



This light-weight field amplifier, developed by NBC engineers, is used to pick up remote radio broadcasts. The unit, including batteries, can be carried in a briefcase.

A tape recorder picks up a street interview which will become part of an NBC newscast after the recording is checked and edited.



Where does NBC get its news?

From NBC's accredited reporters on all world news fronts and from Associated Press, United Press and International News Service teletype machines which give 24-hour service to the NBC News Room. NBC maintains offices and news bureaus or correspondents in principal American cities and in foreign capitals including London, Paris, Berlin, Rome, Ankara, Stockholm, Manila, Honolulu, Tokyo, Rio de Janeiro, Buenos Aires, and "somewhere in Korea". Each correspondent is equipped with a tape recorder to bring on-the-spot recordings from news sources direct to the radio audience. At the end of 1950, NBC radio newsrooms were producing 441 news programs weekly for local and network consumption.

How many NBC programs originate overseas?


Annually nearly 3,000 pickups and programs are originated in foreign lands and broadcast over the NBC network. Throughout the year, the NBC staff of news analysts, commentators, and reporters regularly broadcast up-to-the-minute, first-hand reports from strategic locations all over the globe.

When was the first overseas program broadcast in the United States?

On March 12, 1925, RCA's station, WJZ, New York, broadcast the chimes of Big Ben atop Parliament House in London. The signals were picked up by the RCA station at Belfast, Maine, from a British broadcast on the 1600-meter waveband originating in Chelmsford, England, and were relayed by short wave to New York.

Is the National Broadcasting Company active in frequency modulation (FM) broadcasting?

Yes; NBC owns and operates FM stations in New York, Washington, Cleveland, Chicago, Denver, and San Francisco, where all programs are broadcast simultaneously over both standard (AM) and FM facilities. Eighty-eight NBC affiliates operate FM sister stations.



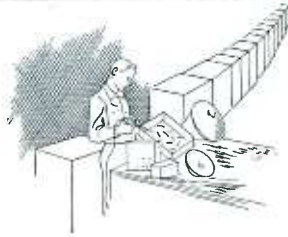
Manufacturing

*Automatic 45-rpm record player
and vinyl plastic records appeal
to all members of the family.*

Manufacturing



WALTER A. BUCK
Vice President and
General Manager of the
RCA Victor Division



When was RCA Victor, the manufacturing division of RCA, organized?

When Radio Corporation of America was formed in 1919, its primary activities consisted of international and marine radio communications. Shortly thereafter, radio broadcasting began and RCA initiated the sale of radio products manufactured by General Electric Company and Westinghouse Electric & Manufacturing Company. The rapid development of this new industry made it necessary for RCA so to organize its business in 1929 that it could combine manufacture and sales under a unified management.

To obtain manufacturing facilities, RCA acquired the Victor Talking Machine Company—a company which had been in operation since 1898. In the latter part of 1934, the various units engaged in the manufacture and sale of RCA products were unified as the RCA Manufacturing Company. On December 31, 1942, this company was merged into Radio Corporation of America as the RCA Victor Division.

Where are RCA Victor manufacturing plants located?

RCA Victor Division plants are located in Camden and Harrison, New Jersey; Indianapolis, Bloomington, Monticello, and

Marion, Indiana; Canonsburg and Lancaster, Pennsylvania; Detroit, Michigan; Pulaski, Virginia; Hollywood, California; and New York City. Another plant, at Cincinnati, Ohio, is scheduled to begin operations in 1951.

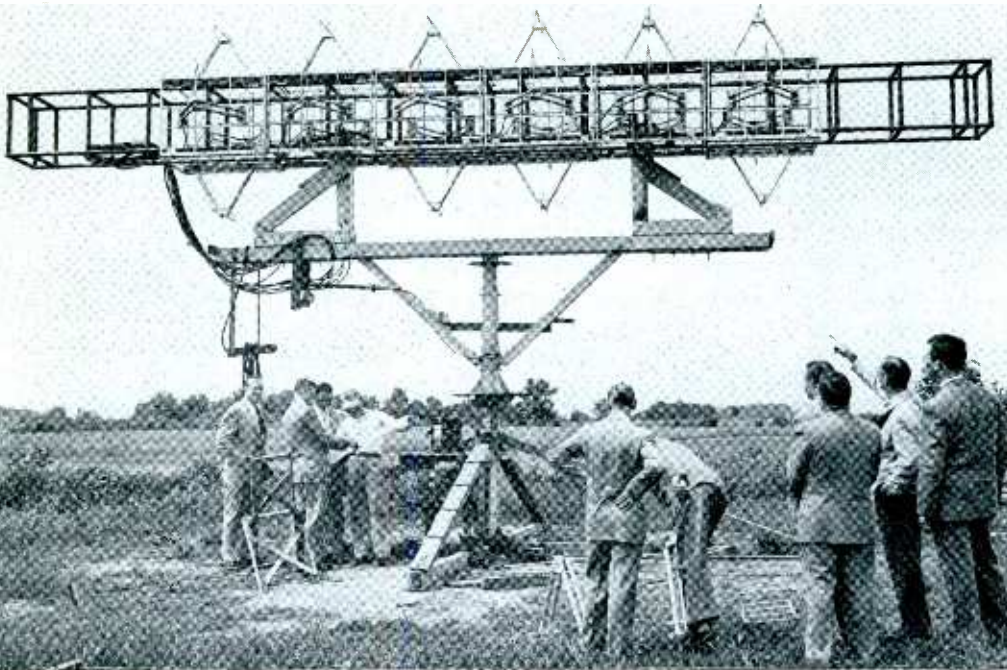
How did the RCA Victor dog trademark originate?

As one of the most famous trademarks in advertising history, the painting by Francis Barraud, entitled "His Master's Voice", is familiar to millions of people throughout the world wherever RCA Victor products are sold.

The dog in this picture was a real dog, a fox terrier named "Nipper", who belonged to the artist. The picture was painted by Barraud in England. The Victor Talking Machine Company acquired rights to the painting, and this trademark, which now



Marion, Ind., plant of RCA Victor Division, opened in 1950 for the manufacture of television picture tubes.



Full-scale model of one of five television antennas, designed by RCA for the new Empire State Bldg., tower array, undergoes field tests in Camden, N. J.

identifies "Victrola"* phonographs, RCA Victor records, RCA Victor radios, television receivers, electron tubes, and other home products, has become one of the best known symbols of dependable quality in the world.

What types of home instruments are manufactured by RCA Victor?

RCA Victor makes a wide variety of home television and radio receivers, and "Victrola" phonographs, to meet every need. Direct-view television receivers include 14-inch, 17-inch and 19-inch sizes, in both table and console models. The new 45-rpm phonograph is available in a variety of models, singly and in combination with radio, television and other phonograph speeds. Console combina-

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

tions include models to play all three types of records—45, conventional 78, and long-playing $33\frac{1}{3}$. They employ two separate playing mechanisms—one for 45, and the other for 78 and $33\frac{1}{3}$ —to take fullest advantage of the unique features of each system.

Where can RCA Victor home instruments, records and other products be purchased?

RCA Victor home instruments and records are sold through approximately 37,000 dealers in the continental United States. Many of these outlets also carry RCA Electron Tubes and other RCA products. Dealers sell RCA Victor television receivers in those areas in which television broadcasting stations are located. The number of television dealers is increasing as new stations go on the air and customer needs expand.



Technician at RCA's Indianapolis, Ind., plant examines grooves of a high-quality recording.

How has the RCA Victor 45-rpm system of recorded music been accepted by the public?

The RCA Victor 45-rpm phonograph system has become firmly established as a superior method of reproducing recorded music. Fourteen leading manufacturers, in addition to RCA Victor, are producing and selling 45-rpm instruments at the rate of thousands every week. At the end of 1950 there were approximately 3,500,000 45-rpm record players in use. As an indication of the public's appreciation of its advantages, fifty-seven companies were producing 45-rpm records, 48 of which entered the "45" manufacturing field in 1950. Sales are at the rate of 50 million records a year.

What are the advantages of the 45-rpm system?

The record player is simple, compact, relatively trouble-free. It is the lowest-priced automatic record changer ever manufactured by RCA Victor. It is also trigger-fast in action—the world's fastest changer. Records are small (7-inch diameter), yet they play as long as conventional 78-rpm discs. They are made of non-breakable vinyl plastic, wearing up to ten times longer than shellac records. Storage is no longer a problem, since the 7-inch wafer-thin discs can be placed on ordinary bookshelves, 150 to the foot. Best of all, 45-rpm records provide the finest quality of music yet achieved. The quality of music is not only higher as such—it is also completely distortion-free, a feature achieved by recording only in the "quality zone", that portion of a record where distortion is not a problem. In contrast to long-playing records, "45" allows the listeners complete freedom in the choice and order of playing the shorter works (under 5 minutes) which comprise 90 per cent of all recorded music.

Does RCA Victor also manufacture long-play records?

Yes; for more than a year RCA Victor has recorded and issued new and improved long-play ($33\frac{1}{3}$ -rpm) records, thus bringing the great artists in the RCA Victor catalog to those who prefer suitable works in the long-playing form. Most of these releases are issued on the classical "Red Seal" label. Because of a special process used in their manufacture, these records are considered the finest of their type obtainable.

What does RCA consider "the phonograph system of the future"?

Based on past experience, as well as on the overwhelming acceptance of "45", RCA Victor believes this will be the system preferred by the great majority of music lovers; and further, that it will eventually replace "78" as the standard system. RCA Victor also expects that " $33\frac{1}{3}$ " will continue as a supplementary service for those desiring the long-play feature.

What types of RCA Victor records are available in each of the three record speeds now in use?

Every type of music being issued by RCA Victor (with the exception of a few children's albums which are on 45 only) is on 78-rpm, and each category will continue to be available at this speed as long as a reasonable demand for 78-rpm records continues to exist. Every type of music being produced by RCA Victor also is obtainable on 45-rpm records. RCA Victor's entire catalog of records is rapidly being converted to 45. By the end of 1951, it is expected RCA Victor will have a catalog of approximately 6,000 selections in this category. At present appropriate "Red Seal" albums and some selected popular music are being released on the long-play, $33\frac{1}{3}$ rpm, as well.

What kinds of tubes does RCA manufacture?

RCA makes a complete line of electron tubes, from the smallest subminiature to the largest power type. These include a wide variety for use in the television industry, ranging from the image orthicon camera tube to kinescope picture tubes for home receivers. The ultra-modern plants at Lancaster, Pennsylvania, and Marion, Indiana, produce several types. Unique precision methods for mass-producing kinescope picture tubes at these plants have contributed to television's rapid growth by making low-cost tubes available to the industry which in turn have resulted in moderate-priced receivers. RCA electron tubes also are manufactured at plants at Indianapolis, Indiana, Harrison, New Jersey, and, soon, at Cincinnati, Ohio.

What is the RCA Factory Service Contract?

The RCA Victor "Factory Service Contract", makes available to RCA Victor television set owners an installation and maintenance service administered by the RCA Service Company, Inc., enabling set owners to obtain the finest performance from their instruments. The contract provides for complete installation, parts replacement, customer instruction and maintenance for the period of the contract, all for one fixed price. RCA television service also is available on a per-call basis.

What progress is being made by RCA in theatre-type television?

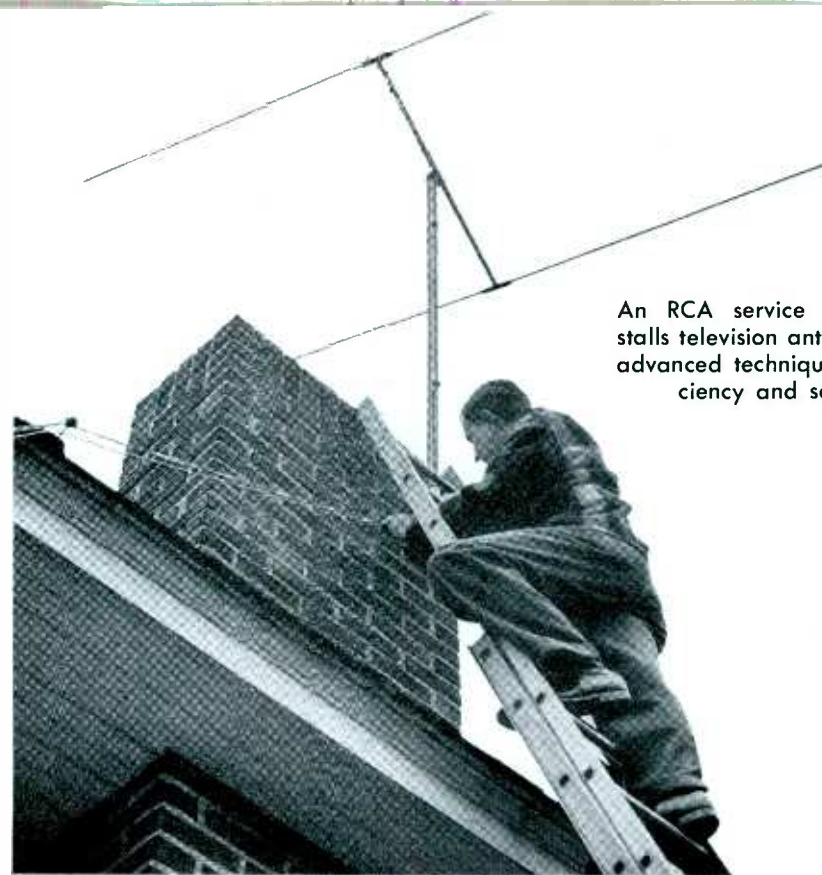
The first permanent installations of RCA large-screen theatre television were made in 1949 in two theatres in Brooklyn and Boston. The first theatre-television network broadcast was that of the 1949 World Series baseball games, with Chicago, Milwaukee, and Scranton being added to the Boston and Brooklyn installations. During 1950, sixteen theatres installed RCA television equipment. A great future for the telecasting of important events direct to motion-picture audiences is envisioned as a result of these pioneering installations.

Does RCA also manufacture television station equipment?

Yes; RCA manufactures a complete line of equipment for television as well as radio broadcasting stations. Associated apparatus includes television cameras, antennas, microwave relays, film-recording and film-reproduction equipment, and test equipment for servicing. RCA's image-orthicon camera is ultra-sensitive, virtually eliminating the need for intense studio illumination.

Does RCA supply equipment for AM and FM broadcast stations?

RCA manufactures a complete line of AM and FM broadcasting equipment, including transmitters, antennas, test equipment, microphones, monitoring units, loudspeakers, studio turntables,



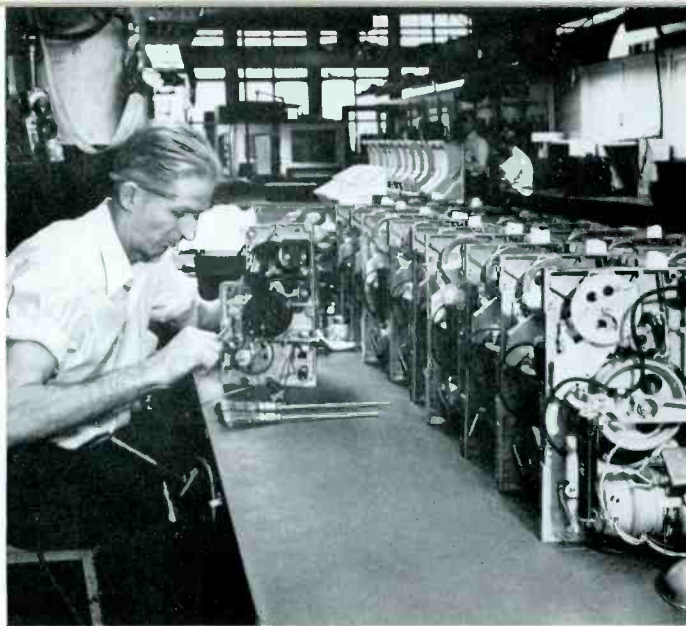
An RCA service expert installs television antenna using advanced techniques for efficiency and safety.



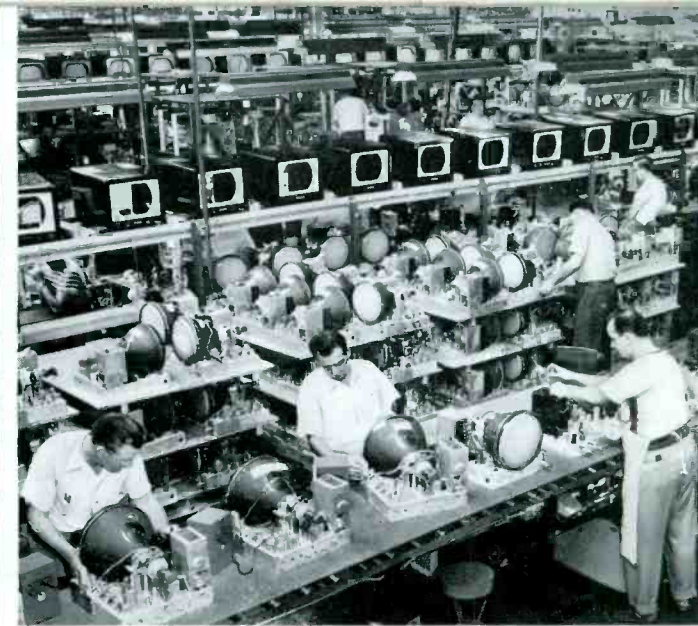
RCA television serviceman checks equipment carried by truck after receiving installation order.



RCA's book-size personal radio sets undergo final inspection as they move down production line at Canonsburg, Pa.



RCA's 16-mm sound film projectors widely used in America's schools pass inspection point at Camden.



Large-screen television chassis near completion on production line at RCA Victor's Camden factory.

disc and tape recorders and many other types of broadcasting studio apparatus.

What facilities does RCA Victor offer for the manufacture of custom records?

The RCA Victor Custom Record Division offers a complete service for the production of every type custom-made record, including radio transcriptions, slide film recordings, brand label phonograph records. Complete recorded program services for radio and television broadcast stations are available.

What products are manufactured by RCA for industry?

RCA manufactures a large number of electronic products for industrial use. Many modern industrial plants throughout the nation are using RCA equipment to produce new products, to perform manufacturing operations better, more safely and at less cost. Beverage inspection machines, industrial television, metal detectors,

high-frequency heating equipment, automatic counters, nuclear radiation detection equipment, time and fire signal generators and test-measuring equipment are just a few of the RCA electronic products which are serving American industrial plants.

Does RCA manufacture sound-film motion picture projectors and equipment?

Yes; RCA makes sound-film motion picture projectors for both 35-mm and 16-mm film. The 35-mm RCA projector is accepted as the finest available to the motion picture industry. It is used in many theatres in the United States and foreign countries.

RCA's line of 16-mm sound projectors, introduced to meet the growing use of sound films in education, commerce and industry, consists of portable machines of one- and two-case types. They provide professional-quality pictures and sound. An adaptation of the 16-mm machine was introduced by RCA for operation with television equipment for televising films.

RCA also provides equipment for recording television pro-



Loud speakers for RCA's Drive-in Theatre installations are inspected before shipment to customers.



Table model electron microscope, only 30 inches high, opens new areas of scientific exploration.

grams on film from the face of kinescope tubes for re-broadcasting. RCA also makes many other commercial theatre products, including drive-in theatre equipment.

What equipment does RCA make in the sound distribution field?

Another major product manufacturing line is that of sound-distribution systems. This equipment provides methods for the broadcast of music, radio programs, paging calls, announcements, etc., from central or remote locations in industrial plants, churches, hospitals, schools and public buildings. More than 5000 RCA systems are in use now, including many units in new Veteran hospitals. The flexibility of the systems makes them valuable in the operation of many types of installations.

What is RCA motion picture sound?

The sound portion of motion pictures is recorded in the studio at the time the picture is made, and reproduced in the theatre

from the sound track which parallels the pictures on the film. Many fundamental improvements in sound-on-film, both in recording and reproducing, have been pioneered by RCA engineers. The Academy of Motion Picture Arts and Sciences has recognized a number of them by awarding them the famous "Oscar".

Are recording facilities and equipment available through RCA?

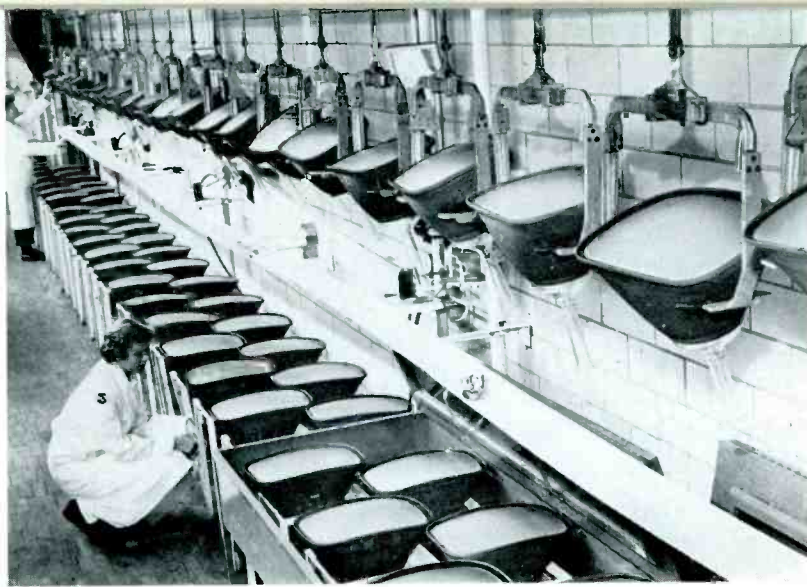
RCA Victor maintains seven recording studios throughout the United States. Five are disc recording studios in Chicago, Hollywood and New York, and two are film recording studios in Hollywood and New York. Professional disc, film and magnetic tape recording equipment is manufactured for use in motion picture, recording and radio broadcasting studios.

How widely is the RCA electron microscope being used?

More than 300 RCA electron microscopes now are being used by leading manufacturers, government bureaus, foundations, hospitals, college laboratories, and other important centers of research throughout the world. This amazing scientific instrument extends man's seeing power many times beyond the range of light microscopes. Magnifications of 100,000 diameters and upwards have been achieved; for example, a single tuberculosis germ can be enlarged to the size of a saucer. RCA is the principal supplier of this remarkable scientific tool to research, medical and industrial users.

What RCA instruments are available to the aviation industry?

RCA long has been engaged in the development of aviation equipment for the U. S. Air Force and Bureau of Aeronautics, as well as commercial airlines and private planes. Utilizing radar principles, RCA has developed two forms of highly-accurate altimeters, both of which are widely used by the Army, Navy, and commercial airlines. These altimeters enable planes to fly safely through overcast, making use of prevailing winds.



Fluorescent screen surfaces of television picture tubes are quick-dried in these special racks at Lancaster, Pa.

RCA also produces large quantities of loran units, a system using radio signals from a base station to provide navigators with positions at long range. Teleran is another RCA development for the Air Force. This is a system which combines radar and television, giving the pilot a "picture" of terrain, landmarks and weather conditions. RCA manufactures a line of aircraft transmitters and receivers, as well as supplementary equipment.

What is the new RCA "Antenaplex" equipment?

With television expanding so rapidly throughout the country and the number of home and commercial receivers increasing daily, RCA was quick to realize the complexities involved in program reception in large apartment houses, hotels, hospitals, department stores and similar locations where many receivers are in operation in the same building. RCA developed the "Antenaplex" system, which is a central antenna system for all-channel television reception. This equipment eliminates the need for individual roof antennas for each receiver in the building. Many "Antenaplex" system installations already have been made in hotels and apartments. FM-AM reception also is available on the "Antenaplex" system.

What is the RCA Service Company, Inc.?

The RCA Service Company, Inc., is a nation-wide organization of technical specialists devoted to the correct installation, maintenance and servicing of RCA products and equipment. It operates in technical and industrial fields, but its principal manifestation to the public is in connection with home television receivers. This service is offered to owners of RCA Victor television instruments by way of a "Factory Service Contract", covering installation, service and guarantee of parts for a specified period. Service also is available to RCA Victor instrument owners who do not hold contracts. To assure adequate service to its television customers, the RCA Service Company maintains service branches in all TV areas.

What is an electron tube?

The electron tube was known as a radio tube until its uses expanded far beyond radio. It is a highly flexible device which liberates and controls the flow of electrons within a glass or metal envelope. RCA tube developments have spearheaded many major advances in the field of radio and electronics.

What products does RCA Victor offer for schools and colleges?

RCA Victor offers a wider range of audio-visual equipment for schools and colleges than any other manufacturer. It includes school sound systems, 16-mm sound film motion picture projectors, recording equipment, electron microscopes, electron tubes, scientific test and measuring equipment, FM and AM radio receivers, television receivers, phonographs, record libraries, and transcription players.

To what extent does RCA depend on outside suppliers for materials?

RCA Victor's active suppliers number 4,800 located in 42 states. These vendors range from small manufacturers to America's largest corporations. Four-fifths of RCA's suppliers have less than 500 employees. About half of them have less than 100.



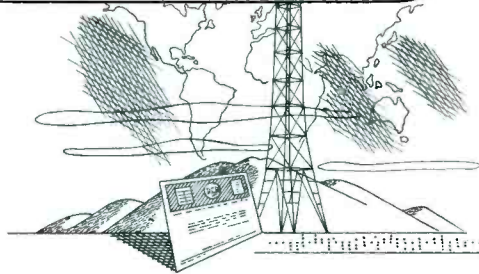
Communications

Incoming radiograms on tape are routed to RCA Communications' branch offices for delivery.

Communications



HARRY C. INGLES
President,
RCA Communications, Inc.



What is RCA Communications, Inc.?

One of the first activities of Radio Corporation of America was the establishment of a worldwide radiotelegraph system to provide the United States with an adequate and independent international communications service. As American in concept as the Constitution and adaptable like it in meeting the needs of a fast-growing nation, this system has been expanded and improved continuously throughout the years since the founding of RCA in 1919. Its growth by 1929 warranted its organization as a separate company—RCA Communications, Inc.—wholly-owned by Radio Corporation of America and engaged primarily in international radiotelegraph (Radiogram) communications as a service to the public.

Where are RCA's main transmitting and receiving stations?

RCA's main transmitters on the east coast are situated at Rocky Point, N. Y. The main receiving station is at Riverhead, sixteen miles away. Supplementary transmitting stations are located at New Brunswick and Tuckerton, N. J. All are linked directly with New York and are operated by remote control from the Company's Central Radio Office at 66 Broad Street. Incoming signals received at Riverhead pass automatically to the Central Radio Office.



Messages between U. S. and Tangier are moved quickly and accurately via RCA's automatic tape-relay system.

Overseas programs to and from U. S. radio stations pass through this console at Radio Central, N. Y.

The main transpacific office of RCA is at 28 Geary St., San Francisco, and transmitting and receiving stations are situated respectively at Bolinas and Point Reyes, Calif. Similar RCA installations are in Honolulu, Manila, Ciudad Trujillo (Dominican Republic), Port-au-Prince (Haiti), San Juan (Puerto Rico), Havana (Cuba Transatlantic Radio Corporation), and Tangier. Stations in New York, San Francisco, Honolulu, Manila and Tangier comprise a trunk-line belt of RCA semi-automatic relay points for transmissions around the world.

How does one send a radiogram?

In the cities of New York, Washington, D.C., and San Francisco messages may be sent most efficiently through one of the many traffic offices conveniently maintained by RCA in business districts. At these offices messages are processed promptly and sent overseas by radiotelegraph with the speed of light. Many of the better hotels

and travel agencies in these "gateway" cities are authorized RCA agents. In other U. S. cities the local telegraph offices of the Western Union Company accept and deliver RCA radiograms. However, when messages are filed with Western Union, the free routing indicator "Via RCA" must be written after the city of destination, as follows:

John Jones
13 London Terrace
London (England) *Via RCA*

What other communication services are operated by RCA?

RCA offers radiophoto service for handling pictorial and other information not easily converted to telegraph message form. Provided the type is at least typewriter size, any black-and-white material is suitable for radiophoto transmission.

Radiophoto circuits are operated between either New York or San Francisco and the cities indicated in the following countries:

| | |
|--|---|
| Argentina, Buenos Aires | Italy, Rome |
| Australia, Melbourne | Japan, Tokyo |
| Bermuda, Hamilton | Korea, Seoul |
| Brazil, Rio de Janeiro | Malta—via London |
| Ceylon, Colombo—Via London | (westbound only) |
| China, Shanghai | New Zealand, Wellington |
| Czechoslovakia, Prague — via Paris | Philippine Islands, Manila |
| Denmark, Copenhagen — via Stockholm | Portugal, Lisbon |
| Egypt, Cairo | Straits Settlement, Singapore— via London (westbound only) |
| Formosa, Taipeh | Sweden, Stockholm |
| France, Paris | Switzerland, Berne |
| Germany, Frankfurt, Berlin | Transjordanian, Amman— via London (westbound only) |
| Great Britain, London | Union of South Africa, Capetown |
| Greece, Athens | Durban, via Capetown |
| Hawaiian Islands, Honolulu | Johannesburg, via Capetown |
| India, Bombay—via London | U. S. S. R., Moscow |

TEX Service, RCA's Overseas Teleprinter Exchange, is a new development in international radiotelegraph service which provides direct connections between teleprinters in New York City and Washington, D. C., and the Netherlands, Germany (Western Zone) and Denmark. This service enables subscribers of the European Telex System to communicate directly from their offices in Europe to the offices of their associates in New York and Washington. The European Telex System is similar to the American domestic teleprinter service, known as TWX. The new equipment, developed by RCA and Dutch technicians, eliminates intermediate processing, permits the immediate confirmation of the information exchanged and provides a confidential, written record of the transaction. Expansion of TEX service to other European countries is expected in the near future.

RCA also maintains a Frequency Measuring Service which is performed at the Riverhead and Point Reyes receiving stations. Upon request, measurements are made to ascertain whether or not transmitters are broadcasting on allotted frequencies. The service is performed singly or at specified intervals, and is available to operators of all types of radio transmitters.

RCA Program Transmission Service offers facilities for the exchange of broadcast studio and press programs between the United States and foreign points. Through this service, programs originating in foreign studios are received by RCA and are distributed to American broadcasting networks for transmission to the American public. Similarly, American programs are transmitted overseas to foreign broadcasting agencies.

Facilitating a freer exchange of news between the United States and other countries, RCA has inaugurated a Volume Press Service by which large quantities of press dispatches may be sent at low word rates. Scheduled Press Transmission Service enables press associations and news centers to make use of RCA facilities on a time basis and reach a number of destinations simultaneously. Special transmissions of press to overseas points are also handled for the State Department. Daily news bulletins are relayed via Tangier to listening posts in Europe and the Near East for the

State Department's Information Service. Similar to this service are special circuits originated for commercial users — such as the overseas airways — for the conduct of large volumes of overseas message traffic.

What technical advances have been made recently in the field of international radiotelegraphy?

Applying new operating techniques and methods developed during and since World War II, RCA Communications, Inc., has pioneered the modernization of radio's international services. The answer to greater speed and efficiency in handling increased volumes of traffic is the mechanical processing of messages and world-girdling, automatic radio relays. The advanced system employs time- and motion-saving tape relay operation. Its aim is to achieve maximum speed of service at low unit cost with minimum risk of errors. This is accomplished by eliminating letter-by-letter manual processing except at the point where a message is prepared for original transmission.

Messages are handled through relay points in a tape relay network by a simple physical transfer of message tapes. The original processing can be done at any convenient location — customer's office, branch office, or central office. At the ultimate destination a page printer is substituted for tape reception and the message is received in printed form, ready for delivery.

The success of RCA's modernization program is demonstrated by the fact that today it is possible to deliver a radiogram originat-



ing in New York to correspondents in such far-off places as Stockholm, Paris, and Buenos Aires within five or ten minutes. By the older Morse system the average elapsed time was greater.

What is the extent of RCA's radiotelegraph service?

RCA Communications operates modern radiotelegraph circuits to 65 countries terminating in the principal cities of the countries listed below:

- | | | |
|--------------------|-----------------------|---------------------|
| Argentina | Greenland | New Zealand |
| Australia | Guatemala | Norway |
| Austria | Haiti | Okinawa |
| Belgian Congo | Hawaii | Pakistan |
| Belgium | Hong Kong | Panama |
| Bermuda | Iceland | Philippines |
| Brazil | Indo-China | Poland |
| Canada | Indonesia | Portugal |
| Chile | Iran | Puerto Rico |
| China | Iraq | Spain |
| Colombia | Israel | Surinam |
| Cuba | Italy | Sweden |
| Czechoslovakia | Japan | Switzerland |
| Dominican Republic | Korea | Tahiti |
| Ecuador | Lebanon | Tangier |
| Egypt | Liberia | Thailand |
| Finland | Macao | Turkey |
| France | Martinique | U. S. S. R. |
| French West Africa | Mexico | Union of So. Africa |
| Germany | Netherlands | Venezuela |
| Great Britain | Netherlands, Antilles | Yugoslavia |
| Greece | New Caledonia | |

RCA also provides service of superior quality to countries other than those listed here by carefully planning the routing of its worldwide traffic in a way that takes fullest advantage of the best available connecting facilities.

Four units of a mobile radio station sent to the Korean fighting front by RCA Communications.



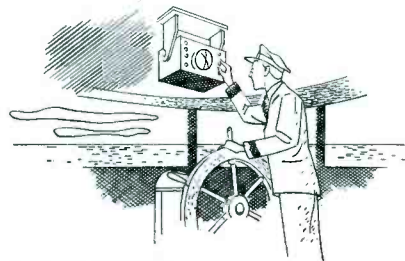
Marine Radio

*Officers aboard Coast Guard
Cutter "Sumac" use Radiomarine
radar on river patrol duty.*

Marine Radio



T. P. WYNKOOP
President,
Radiomarine Corporation
of America



Does Radiomarine operate branch offices outside of New York?

Radiomarine has 30 service depots and offices located in principal seaports of the United States. Many of these service stations have been established for more than 25 years. They render a competent installation, inspection, maintenance, and repair service on all types of radiotelephone, radiotelegraph, and marine electronic equipment, including radar and loran. These offices serve the Atlantic, Pacific, and Gulf areas as well as the Mississippi River and Great Lakes. Service also is available in foreign ports.

Small-craft radiotelephone and radio direction finders also are sold and serviced through a nationwide chain of authorized Radiomarine dealers.

What is the Radiomarine Corporation of America?

Radiomarine maintains, for public use, an efficient long-range radiotelegraph communication system for contact with vessels in all parts of the world. It also is engaged in the development, production and servicing of marine radio communication equipment and electronic navigational devices. It manufactures shipboard radar, loran receivers, radiotelephone and radiotelegraph transmitters and receivers, automatic radio alarms, radio direction finders, and specialized electronic equipment. Radiomarine engineers have contributed much to the development and design of high-quality marine radio and electronic equipment. Many American and foreign flag merchant ships, as well as thousands of work boats and pleasure craft, are equipped with Radiomarine apparatus.

When was Radiomarine organized?

Marine radio communication has been a service of RCA since its founding in 1919. As this business expanded, the Radiomarine Corporation of America was formed on December 31, 1927, as a wholly-owned subsidiary of RCA, entirely devoted to marine radio activities.



What is the extent of Radiomarine's communication service?

Radiomarine is engaged in commercial shore-to-ship, ship-to-shore and ship-to-ship radiotelegraph communication, maintaining 11 coastal stations and two affiliated stations on the Atlantic, Pacific and Gulf Coasts, the Mississippi River and its tributaries, and the Great Lakes, which includes radiotelephone service at Buffalo, St. Louis, and Pittsburgh. This nationwide network of coastal stations handles radiograms, government weather reports, press bulletins and free medical advice for the benefit of sick and injured persons on vessels not carrying doctors. Radiomarine's "Gifts-by-Radio" service, available to ship's passengers and personnel, enables them to have flowers, candy, fruit or magazine subscriptions delivered to any address in the continental United States. The charge for the service is the value of the gift selected plus a flat rate for the radiogram, which includes a personal greeting to accompany the

delivered gift. Airline passengers are able to send radiograms to persons ashore by means of Radiomarine's global plane-to-shore communications system. Transmissions are received by coastal stations and relayed to their proper destinations.

Where may radiograms be filed for ships at sea?

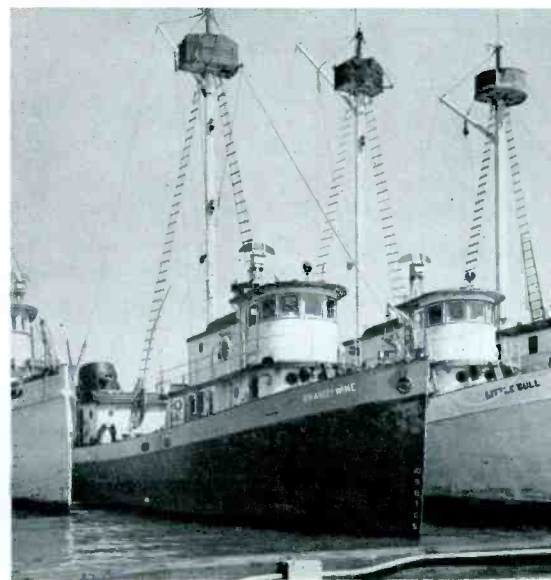
Radiograms to ships on the seven seas may be filed at any RCA Communications or Western Union office. They should be marked "Via RCA".

How much does it cost to send a radiogram to a ship?

If the radiogram is to be sent to an American ship the usual charge via any Radiomarine coastal station is 21 cents a word including address and signature; the rate to a foreign vessel is usually 26 cents a word. From inland states the message charge is slightly higher.



Radio direction finder, designed and built by Radiomarine, is installed in the chart room of an ocean freighter.



Menhaden trawlers, plying off the Delaware Coast, have small radar antennas atop their wheelhouses.

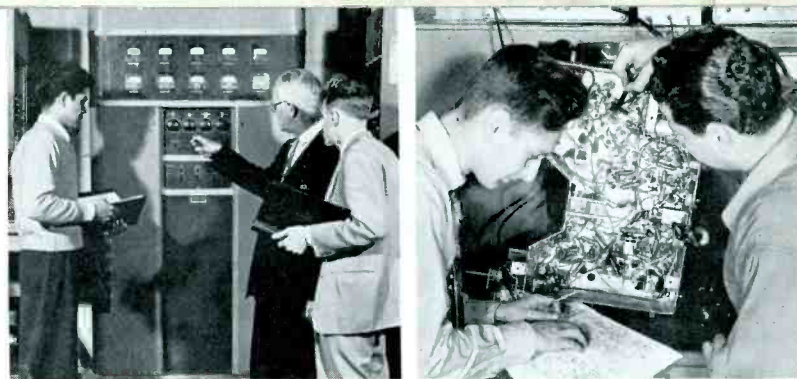
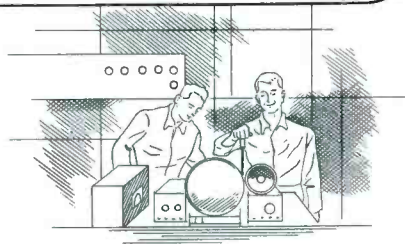


Attaching terminal blocks to the metal shields of 12-inch scopes of Radiomarine's large radar units.

Technical Training



GEORGE L. VAN DEUSEN
President,
RCA Institutes, Inc.



Transmitters are part of the modern equipment at RCA Institutes.

Students at RCA Institutes study complex wiring of a television receiver.

What is RCA Institutes, Inc.?

RCA Institutes is a technical training school which offers comprehensive courses in radio and television. These courses include: Radio Servicing—prepares the day student in nine months for servicing radio, television, and FM receivers; Radio Operating—trains the day student in nine months for station operations in marine, mobile, and point-to-point communication service; Radio Broadcasting—instructs the day student in 18 months for the operation and maintenance of all types of radio receivers and transmitters, and provides station operating experience in television, broadcasting and other communications services; Advanced Technology—provides the day student in 27 months with a thorough engineering knowledge of the radio industry, with practical and complete training in specialized branches. All courses include laboratory experience.

How is the school year at RCA Institutes divided?

Classes are in session for 50 weeks each year, closing only for two weeks preceding Labor Day. New terms start approximately the first of March, June, September, and December.

Does RCA Institutes conduct evening classes?

Yes; evening classes are conducted in all courses. Evening

courses are three times as long as the corresponding day courses, because of the smaller number of class hours per week.

What instruction does RCA Institutes offer in television?

Instruction in television receiver maintenance, adjustment and operation is given in the Radio Servicing Course, and television transmitter maintenance and operation are included in the Radio Broadcasting Course. The design, maintenance and operation of a complete television system are covered in the Advanced Technology Course.

What are the qualifications for a student to enter RCA Institutes?

Some high school education is necessary for all courses. Candidates for the Advanced Technology Course must be high school graduates. Those who lack sufficient high school work may qualify by taking the Institutes' preparatory term which includes high school algebra, geometry and physics. The courses at RCA Institutes are open to men and women, 17 years of age and older.

How may detailed information about the courses be obtained?

Write for a catalog, or visit the school from 9 a.m. to 8 p.m. on school days (Monday through Friday). Completely equipped classrooms and laboratories at 350 West 4th St., New York City, are open to visitors.

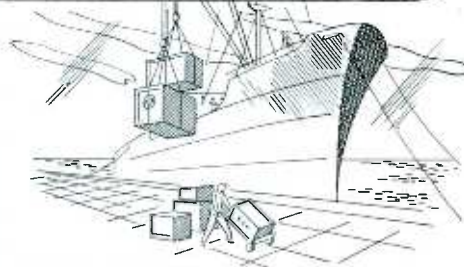


International

*A Mexican family eagerly
watches the arrival of an RCA
Victor television receiver.*



International



MEADE BRUNET
*Vice President of RCA, and
Managing Director,
RCA International Division*

How does RCA conduct its international business?

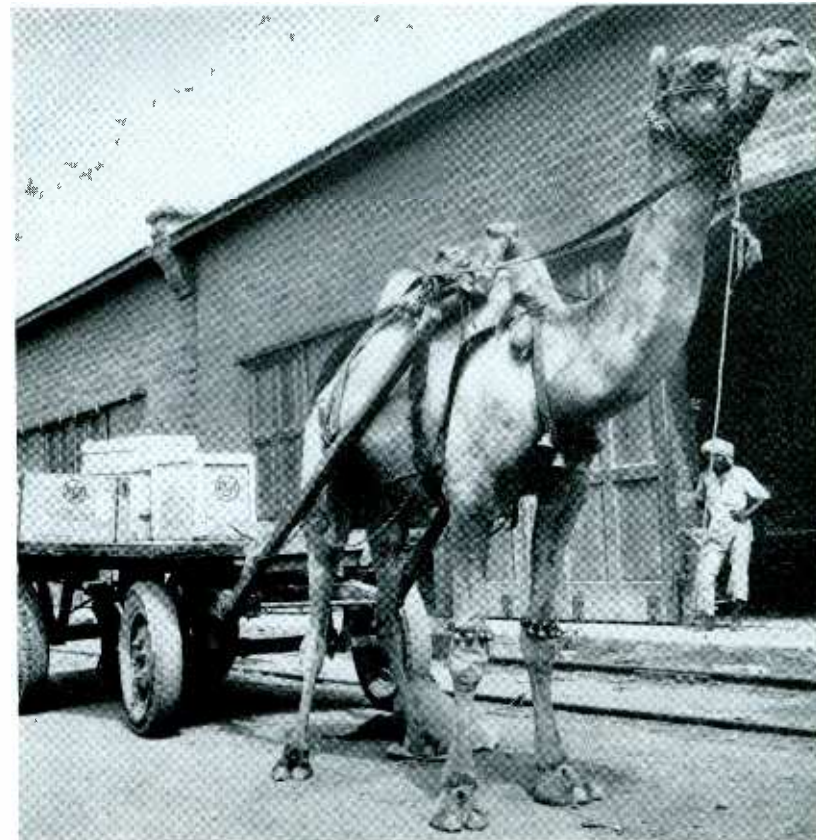
RCA's international business is conducted through RCA International Division. Operating through more than 130 major distributors, field representatives and associated companies, the Division sells RCA products in all markets of the world open to trade. Headquarters for RCA International Division are at 30 Rockefeller Plaza, New York.

What are RCA's associated companies in other countries?

The associated companies for which RCA International Division provides management counsel are: RCA Victor Argentina, S. A., in Buenos Aires; RCA Photophone of Australia, Proprietary Ltd., in Sydney; RCA Victor Radio, S. A., in Rio de Janeiro, Brazil; RCA Victor Company, Ltd., in Montreal, Canada; Corporacion de Radio de Chile, S. A., in Santiago; RCA Victor Company of China, in Hong Kong; RCA Photophone, Ltd., in London, England; Photophone Equipments, Ltd., in Bombay, India; RCA Victor Mexicana, S. A., de C. V., in Mexico, D. F.

What products and services are handled by RCA's associated companies?

Companies in Argentina, Canada and Chile manufacture and distribute records, radio receivers, some broadcast transmitters, special communications apparatus for both transmitting and receiving, and sound apparatus. Plastic products are also made in the Argentine factory. The Montreal factory manufactures television receivers for Canadian cities that can receive American programs.



Old meets new in Karachi as a camel-drawn lorry transports an exhibit of RCA electronic products to the Pakistan fair.

The Brazilian company's factory in São Paulo produces phonograph records and radio receivers and is preparing to assemble television receivers for that market. A new building in Rio de Janeiro completely houses all activities there: offices, laboratories, recording studios and warehouses. The Brazilian company is the distributing organization for RCA apparatus and sound products manufactured in the U.S.A., and other countries. The Mexican company manufactures radio receivers and phonograph records, and has facilities for the assembly of television receivers. It distributes motion picture equipment, sound products and transmitting and communications products manufactured in the United States.

The Australian, Indian and English companies handle distribution of RCA motion picture and sound equipment, and some other products. They install and service equipment in theatres and supply technical service to the motion picture studios and to their film recording licensees.

Does RCA export products from this country?

Yes; RCA sells abroad all products manufactured by RCA, wherever export, import and exchange regulations allow. The products sold range from miniature tubes supplied to distributors and manufacturers, to complete communications networks supplied to governments, and marine radio installations for commercial fleets. RCA International also sells a line of refrigerators and deep-freeze units, and handles export sales for a number of other companies whose products include industrial power equipment, aircraft navigation and airport control equipment, and such appliance lines as electric air circulators, washers, ironers, toasters, vacuum cleaners and heaters.

What part is RCA playing in bringing television to countries abroad?

Four RCA-equipped television stations are in operation outside of the U.S.A. These are in São Paulo, Brazil; Havana, Cuba; and Mexico City, and are the first stations in their respective countries. A fifth station is expected to go on the air in Cuba during 1951.



Mexico City's first television station XHTV is RCA-equipped from antenna to studio auditorium.



Mobile unit designed by RCA begins its journey to PRF3-TV, a new Brazilian television station.



Rio de Janeiro's 200,000 seat stadium, largest covered stands in the world, is completely equipped with RCA sound systems.

Pioneering in Radio

some RCA 'firsts' in the Radio World

World-wide communication inaugurated by RCA in 1920 was greatly extended in 1921 with the opening of "Radio Central" at Rocky Point, Long Island, featuring the 200-kilowatt Alexanderson alternators.

Dempsey-Carpentier fight on July 2, 1921, broadcast by RCA from Boyle's Thirty Acres in Jersey City, as the first heavyweight championship bout on the air.

High-speed transmitters and automatic receivers installed on ocean liners in 1923 to handle increased radio traffic.

Short waves applied in 1924 to RCA transatlantic communication featuring vacuum tubes rated at 20 kilowatts.

First radiophoto transmitted by RCA across the Atlantic was of Charles Evans Hughes, sent on July 6, 1924, from New York to London where it was radioed back across the sea and recorded in New York.

First rebroadcast from London heard on February 14, 1925, through RCA stations WJZ, New York, and WRC, Washington.

Broadcasting transmitters of RCA participated in 24 station hook-up for Coolidge inaugural in 1925, first event of its kind on the air.

Initial international broadcast program transmitted from Chelmsford, England, picked up at Belfast, Maine, and relayed by short wave to New York, for rebroadcast by RCA's station WJZ, March 1925.

Radio facsimile messages, maps and pictures sent by RCA radiophoto system on May 7, 1925, from New York to Honolulu.

Picturegram of a check sent from London to New York by RCA radiophoto on April 20, 1926, was honored and cashed in New York.

National Broadcasting Company organized as a service of RCA on September 9, 1926, to conduct nationwide network broadcasting.

World series baseball games broadcast for the first time by WJZ in October 1926.

Play-by-play description of Rose Bowl football game in Pasadena, Cal., on January 1, 1927, broadcast by NBC over coast-to-coast hook-up, was America's first transcontinental network program.

Radio receiving sets and tubes designed for complete alternating current operation, introduced by RCA for home use in 1927.

Radiomarine Corporation of America—a service of RCA—was organized on December 31, 1927, to operate in the marine communication field.

The diversity reception system, which contributes to the stability and reliability of short-wave communication, was introduced by RCA in 1928.

RCA in 1928 successfully demonstrated motion pictures with sound on 16 mm. film, a development previously considered impossible.

RCA Communications, Inc., organized January 3, 1929, to conduct RCA's international radio-telegraph service.

RCA inaugurated an international program transmission service as a regular operation in 1931.

New noiseless system of sound recording introduced to the motion picture industry by RCA in 1931.

RCA perfected, in 1931, the velocity microphone, which became the standard of world-wide broadcasting stations; in 1934 it introduced the unidirectional microphone, used widely in film and phonograph recording as well as broadcasting and television.

Self-contained, portable ultra-high-frequency knapsack transmitter built by RCA in 1932 for use in broadcasts of outdoor events and for military scouts in the field.

Jack Dempsey listens to radio broadcast before his championship bout in 1921, broadcast by RCA from Boyle's Thirty Acres.



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

RCA, at the Navy's request, began development work on sonar, an underwater sound system, in 1934, following considerable independent research by RCA scientists and engineers. Sonar was credited by the Navy with the destruction of nearly 1,000 enemy submarines during World War II.

Electron multiplier tube, developed by RCA Laboratories, demonstrated in 1935, multiplies amplification hundreds of thousands of times within a single tube.

Automatic SOS alarm for use on vessels not having a radio operator on constant watch, introduced by RCA in 1935.

First ultra-high-frequency automatic relay circuit opened by RCA in 1936, between New York and Philadelphia, transmits simultaneously facsimile and multiple radiotelegraph messages.

First full-size symphony orchestra organized exclusively for broadcasting introduced by NBC under Maestro Arturo Toscanini, conductor, in 1937.

A radio altimeter embodying radar principles was developed by RCA in 1937 during research on collision prevention apparatus.

Receivers for recording radio-broadcast newspapers and other graphic material in the home were demonstrated by RCA in February, 1938, before the National Association of Broadcasters.

Dr. V. K. Zworykin of RCA Laboratories, in December 1939, at the annual meeting of the American Association for the Advancement of Science, announced that he and his associates were working on the development of an electron microscope; in April 1940 he announced

the completion of the instrument which has attained magnifications of more than 100,000 diameters.

NBC station W2XWG, the first FM station established in New York by any network broadcaster, began operation on January 11, 1940.

Utilizing the space-saving advantages of its miniature tubes, RCA introduced the pocket-size "personal" radio receiver in 1940.

RCA Alert Receiver, turned on and off by a special signal from broadcast transmitter, rings bell, lights electric lamp or blows siren to summon listeners, demonstrated on July 28, 1941, for possible use in civilian defense.

Ground broken on August 8, 1941, for new RCA Laboratories at Princeton, N. J., to be one of the foremost centers of radio and electronic research in the world; cornerstone laid on November 15, 1941.

RCA electron microscope at the University of Pennsylvania magnified the influenza virus 65,000 times, making possible the first photograph ever taken of the virus, as announced on November 22, 1941.

Advanced types of miniature tubes, were introduced by RCA beginning in 1942.

The electron micro-analyzer growing out of research on the electron microscope, was a new development at RCA Laboratories in 1943.

First direct radiophoto circuit between Australia and United States opened by RCA (March 20, 1942); between New York and Cairo (June 24, 1942); New York and Stockholm (February 22, 1943); New York and Berne (September 21, 1943); direct radiotelegraph circuits between New York and Dakar (March 10, 1943); between New York and Naples (February 1, 1944). For the New York-Italy circuit, RCA set up the first American owned-and-operated commercial station on the continent of Europe.

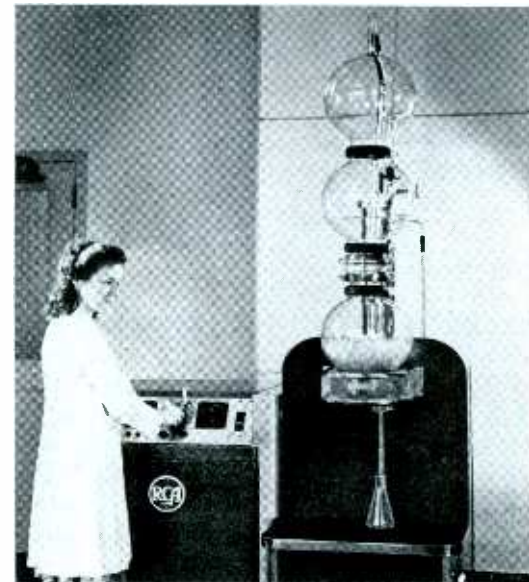
Radio-frequency equipment for the bulk hydration of penicillin was developed and installed by RCA at the plant of E. R. Squibb & Sons, New Brunswick, N. J., on May 5, 1944.

Development of necessary tube and transmitter to provide, for the first time, five kilowatts of output power at 300 megacycles for a television transmitting or relay station was announced by RCA in October, 1944.

Special equipment to measure the muzzle velocity of projectiles was developed by RCA Laboratories in 1944.

RCA International Division was formed February 5, 1945, "to supervise foreign sales and other activities of the Company and its subsidiaries outside the United States."

First unit of electronic drying system, developed by RCA to speed production of penicillin.





"Memory" tube for calculating machines that solve mathematical problems with lightning speed.

Capable of operating over distances of 1,000 miles or more, new lifeboat radio equipment that automatically transmits SOS and radio direction finder signals was announced by Radiomarine Corporation of America, April 3, 1945.

After eleven years of research, RCA introduced a non-breakable high-fidelity phonograph record which was demonstrated to the press on August 30, 1945.

Two radio-relay systems, developed by RCA Laboratories in collaboration with the Camp Cole Ground Signal Agency, which provide as many as eight channels on a single carrier, were demonstrated October 1, 1945, by the U. S. Signal Corps.

A new FM radio circuit, called the Ratio Detector, invented by Stuart W. Seeley, manager of RCA Industry Service Laboratory, was revealed at a meeting of the Institute of Radio Engineers, October 3, 1945.

First link in an automatic microwave relay system, using equipment developed by RCA,

was announced jointly by Western Union Telegraph Company and RCA on October 22, 1945.

A new system of air navigation, proposed by RCA, based on wartime developments in radar and television and known as "teleran", was described before a technical symposium in New York City on December 8, 1945.

Shoran, a precision-radar system developed by RCA as an aid to blind bombing in war, was revealed on January 22, 1946, to have widespread peacetime applications as a "yard-stick" for world-mapping of uncharted areas. So precise is shoran that it can measure distances up to 250 miles with almost pinpoint accuracy.

Development of an improved projection kinescope or picture tube with a gain of about 50% in light efficiency, obtained by coating the back of the tube's luminous surface with a layer of metal 2- to 8-millionths of an inch thick, was revealed by RCA research engineers at a meeting of the Institute of Radio Engineers on January 24, 1946.

Army headquarters, on April 21, 1946, revealed use in the Pacific theatre of the sniper-scope, an effective night-fighting device which uses an electronic infra-red image tube developed by RCA Laboratories in 1930, during television research on the image orthicon. A corresponding combat aid, the snooperscope, was used by the armed forces as an invisible spotlight for reconnaissance and for night signalling.

The "Pocket Ear", developed in 1946 by NBC, is a miniature radio receiver, small enough to carry in a coat pocket and conveying sound through a replaceable ear plug. Used for communication between control rooms and studio stages, it provides a means of "talk-back" free from the trailing wires inherent in former systems.

A new electron tube with a "memory", developed by RCA Laboratories for use in calculating machines that will solve complex mathematical problems with lightning-like speed, revealed to I.R.E. on March 4, 1947.

A method of making river navigation charts using a mosaic of photographs of radar images taken from the scope of Radiomarine's 3.2-centimeter radar equipment was revealed by the U. S. Army Corps of Engineers, Ohio River Division, on June 4, 1947.

Development of a revolutionary system of high-speed communications capable of transmitting and receiving written or printed messages and documents at the rate of a million words a minute was disclosed by RCA-NBC on June 23, 1947 and demonstrated to the public for the first time, October 21, 1948 at the Library of Congress, Washington, D. C. Called "Ultrafax", the new system is a development of RCA Laboratories and the Eastman Kodak Company.

Infra-red image tube, developed by RCA, is the heart of this sniper-scope which permits riflemen to see targets in total darkness.



New methods of highly accurate microwave frequency control for transmitter circuits, based on the effects of radio on certain gases were described by Hershberger and Norton of RCA Laboratories, in March, 1948.

A new electron tube, which acts as a "transducer" in converting mechanical vibrations into electrical pulses that can be studied as audible or visual signals, was announced by RCA, October 20, 1948.

A new form of electronic reading aid, which scans individual letters and reproduces their sounds through a loudspeaker, was developed by RCA Laboratories and demonstrated to the New York Electrical Society, Oct. 26, 1948.

An entirely new system for the reproduction of recorded music in the home, based on a vinylite record $6\frac{7}{8}$ inches in diameter and a fast-changing record player operating at 45 r.p.m., was announced January 11, 1949, by RCA Victor Division. The combination of record and record-player provides completely distortion-free music of unprecedented brilliance and clarity of tone.

A new highly-directional stationary microphone for use in television studios was announced to the Audio Engineering Society on October 25, 1949. By mixing and fading the output of the various fixed units the effect of several mobile boom-type microphones is achieved.

RCA developed an electronic counter which measures radiations emanating from the hands and feet of personnel engaged in production and research on radioactive materials. First demonstrated on October 31, 1949.

A new visual memory tube, the Graphophon, which can reproduce for as long as a minute traces or other electrical signals occurring in as short an interval as a billionth of a second, was announced to the Institute of Radio Engineers on March 10, 1949. An associated device,

a storage oscilloscope, was revealed to the same organization on November 2, 1949.

Development of a new pencil-type triode transmitting tube for use at frequencies up to 3,000 megacycles was announced by RCA on November 15, 1949.

A new photo-multiplier tube six times more sensitive than its predecessor was revealed by RCA on November 21, 1949.

Development by RCA of a new transmitting tube capable of delivering 500 kilowatts of radio-frequency power was announced on February 1, 1950.

A pocket-size superheterodyne radio receiver, smaller than any previously designed with a loudspeaker was disclosed by RCA Laboratories engineers at a meeting of the I.R.E. on March 9, 1950.

For the first time in communications history, direct teleprinter contacts on an international scope were made available to the public on May 15, 1950, when RCA inaugurated two-way, customer-to-customer overseas radio teleprinter exchange service, called TEX, between New York and Holland.

RCA scientists announced on September 15, 1950, the development of a compact, high-fidelity unobtrusive pressure microphone called the "Starmaker", which employs a small ribbon pickup unit, for use in radio and television studios.

RCA, on October 26, 1950, revealed the "tristimulus photometer", an instrument which enables quick and accurate measurement of color coming from a direct light source.

The largest and most accurate electronic analogue computer ever built to evaluate performance of guided missiles, airplanes, ships and submarines was demonstrated by RCA on November 21, 1950. Designated "Project Ty-



RCA's "Super-Power Beam Triode" is capable of delivering 500 kilowatts of radio-frequency power.

phoon", the computer employs approximately 4,000 electron tubes and several miles of wiring. In a few seconds it is able to solve problems that would require months of computation by a mathematician.

A new high-speed facsimile system, capable of transmitting copies of books, line drawings and documents, was developed by RCA for the Atomic Energy Commission and installed at the Oak Ridge National Laboratory on December 13, 1950.

RCA-NBC 'Firsts' in Television

1923

Dr. V. K. Zworykin, now Vice-President and Technical Consultant 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- by 8-foot screen was shown by RCA at RKO-Proctor's 58th Street Theatre, New York. (January 16)

1931

Empire State Building, world's loftiest skyscraper, was selected as new site for RCA-NBC television transmitter W2XBS. (June)

RCA initiated field tests for 120-line, 30-frame television between New York and Harrison, N. J. Signals from station W2XF were transmitted on 44 megacycles. Receiver was all-electronic. A rotating scanning disk was used at the transmitter. (November 16)

W2XBS began regular television and facsimile operations. (December 22)

1932

First television demonstrations for RCA officials and sales engineers. (January 11)

NBC began experimenting from W2XBS with live talent. (February 6)

First television demonstration for members of the Federal Communications Commission. (May 7)

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- by 10-foot screen. (May 12)

Mobile television vans developed 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)

Portable television equipment demonstrated to FCC by RCA, supplemented with motor truck mobile stations. (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 City televised from the air for the

Dr. V. K. Zworykin, Vice President and Technical Consultant, RCA Laboratories, invented the iconoscope, TV's electronic "eye."



first time by a plane equipped with RCA portable television transmitter. (March 6)

Television pictures on 4½- by 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 on return voyage 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 21)

NBC made first test of 507-line pictures. (July 23)

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 13½ by 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- by 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 pickups 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 pro-

jection-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 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 nationwide television network to be completed possibly by 1950. (March 1)

1945

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

Supersensitive RCA image orthicon tube was introduced as solution to major problems in illumination of 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 31)

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 U. S. Naval Air Station, Anacostia, D. C. (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. (September 17)

Color television pictures on 15- by 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 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. (October 30)

1947

Philadelphia audience saw color television pictures produced on 10-foot theatre screen by RCA all-electronic system. (April 30)

First showing of American television in Europe conducted by RCA at Milan (June 9), and at the Vatican where Pope Pius XII was televised. (July 12)

Televised pictures of surgical operations were transmitted through the air for the first time by RCA Victor from operating room in New York hospital to television receivers viewed by members of the American College of Surgeons at the Waldorf-Astoria Hotel, presaging television as "medical lecture hall" of future. (Sept. 7 to Sept. 12)

Intensified NBC television activities included the following historic pickups: first telecast from Congress (Jan. 3); first pickup from White House (Oct. 5); first televising of World Series (Sept. 30 to Oct. 6); arrangement with Theatre Guild to telecast dramatic adaptations, starting with St. John Ervine's "John Ferguson"; the Louis-Walcott championship prize-fight in Madison Square Garden, New York. (December 5)

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 religious service. *(February 22)*

NBC Symphony Orchestra with Maestro Arturo Toscanini conducting an all-Wagnerian broadcast concert, telecast for the first time. *(March 20)*

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)*

Telecasts of Republican and Democratic National Conventions at Philadelphia enabled more people to eyewitness the events than the total of all who attended presidential nominating conventions in the past 100 years. *(June and July)*

Combat maneuvers of the carrier *USS Leyte*, 20 miles off Long Island, were televised by NBC and its east coast network, reaching an estimated audience of two million. *(August 29)*

RCA, in cooperation with NBC, instituted simultaneous tests of television program transmissions on 67 and 505 megacycles from station WNBW, Washington, D. C., as part of a continuing study of propagation characteristics of ultra-high-frequency waves. *(September)*

The first split-screen television image, in which two pictures from different originating points appeared side-by-side on the same kinescope picture tube, was displayed by NBC during Television Broadcasters Association Clinic in New York. *(December 8)*

First practical method of reducing co-channel interference of television stations by synchronizing their carrier waves was put into regular use between WNBT, New York, and WNBW, Washington, D. C. The control system was developed at RCA Laboratories. *(December 16)*

1949

Newly developed direct-view metal-cone television picture tube, 16 inches in diameter, disclosed by RCA Victor Division. *(January 3)*

Scenes at inaugural of President Truman were transmitted from Washington, D. C., over the 15-station NBC television network extending from Boston to St. Louis and viewed by an audience estimated at 10,000,000. *(January 20)* Improved reception of television stations operating on the same frequency was achieved by a new system, developed at RCA Laboratories, of offsetting one or more of the conflicting carrier frequencies. *(June)*

Large-screen theatre television was successfully introduced on a commercial basis with the signing of a contract between Fabian Theatres, Inc., and RCA for the first permanent installation of instantaneous, theatre-size TV projection equipment. *(July 27)*

A new all-electronic, high-definition, fully-compatible color television system was announced by RCA to the Federal Communications Commission. The system maintains the standards of black-and-white service and will not make obsolete receivers now in use, since they can receive RCA color telecasts in high-definition black-and-white without touching the receiver. *(August 25)*

RCA introduced a new 16-inch metal-cone television picture tube approximately six inches shorter than its predecessor, making possible the design of smaller television receiver cabinets. *(October 21)*

A new television receiver developed by RCA International in conjunction with the RCA Victor Division to operate on power supplies of various frequencies was demonstrated in Milan, Italy. *(October)*

The RCA television Antenaplex System — multiple-outlet master device which offers solution of TV antenna problems for apartment

houses, hotels, stores, schools, hospitals and office buildings — was made commercially available. *(November)*

1950

NBC's experimental ultra-high-frequency satellite television station, KC2XAK, in Bridgeport, Conn., was placed in operation. *(December 30)*

A new system of industrial television, simpler, more compact and less costly was demonstrated before the Institute of Radio Engineers. The system incorporates a diminutive pickup tube, the Vidicon, which operates in a camera no larger than a 16-millimeter movie camera. *(March 7)*

Color kinescopes (direct-view type) demonstrated by RCA to members of the FCC at Washington, D. C.; one tube utilized a single electron gun, the other three electron guns, one for each primary color. *(March 23)*

NBC engineers developed the "Orthogam Amplifier", a device which improves the quality of images transmitted from television films. *(February)*

RCA-NBC engineers designed, developed and tested a multiple antenna system, first of its kind, to permit five TV stations and three FM stations to operate from atop the Empire State Building in New York. *(September)*

1951

Extension of the range, power and versatility of the light microscope by use of industrial television cameras was demonstrated by RCA and Princeton University. *(January 9)*

A new portable television camera and transmitting station, designed by RCA Laboratories to operate in the field as a one-man back-pack unit, was demonstrated at a meeting of the Institute of Radio Engineers. Weighing only 53 pounds, the back-pack station is planned to function with its own battery-power supply. *(March 22)*

