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1952

RESEARCH

BROADCASTING



MARINE RADIO



FOREIGN TRADE



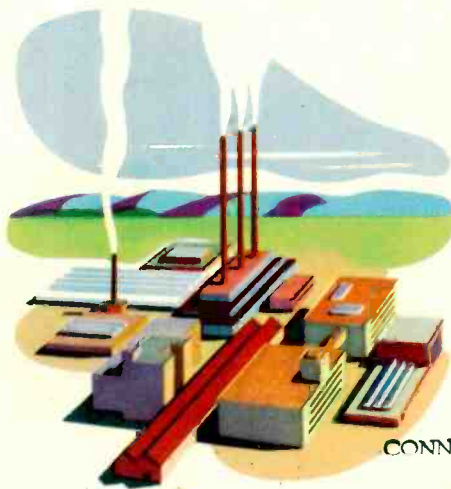
what it is
what it does

1952

COMMUNICATIONS



MANUFACTURING



INSTITUTES



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what it is - what it does

answers to questions

often asked



Scene in
Radio City,
New York

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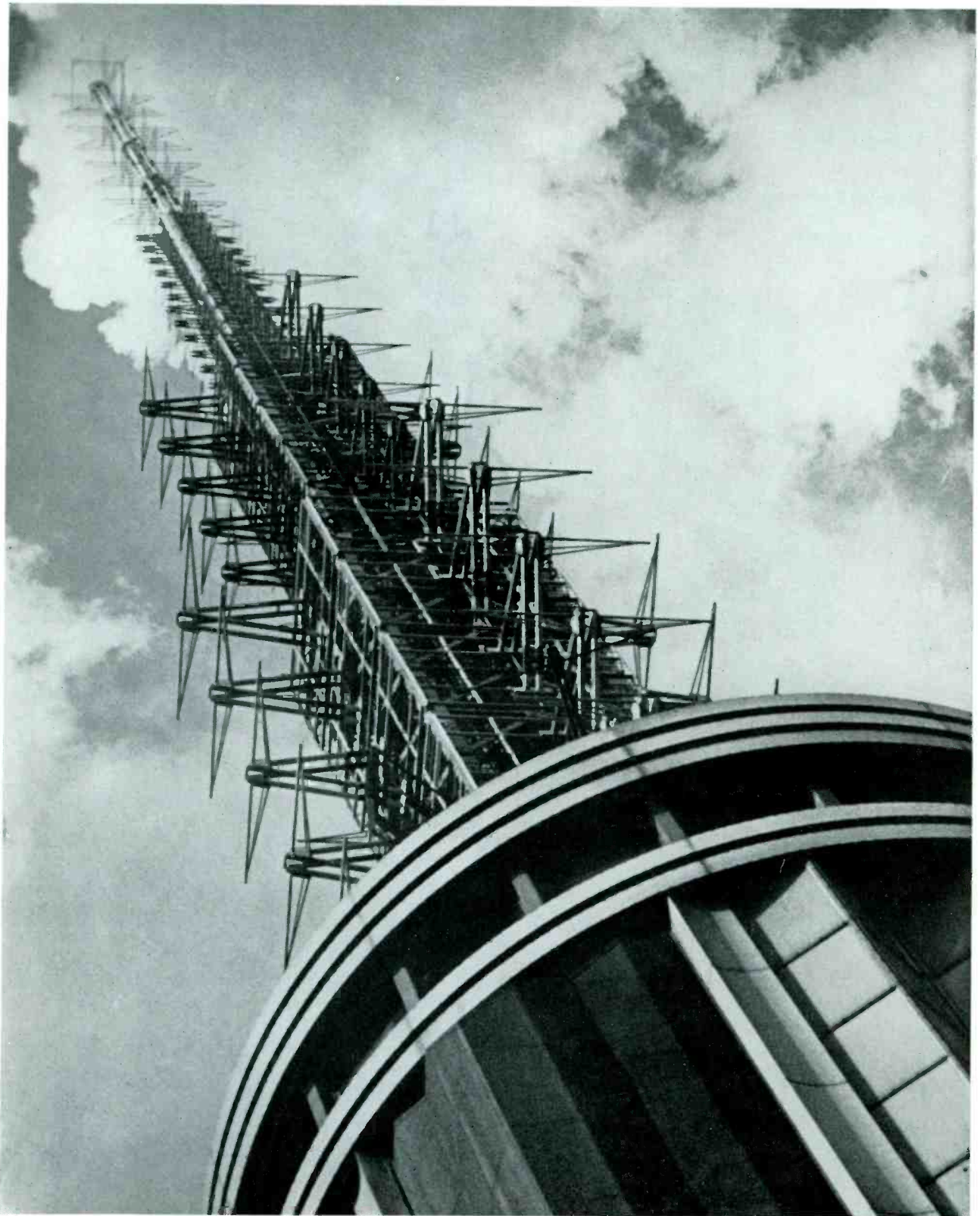
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Published by the Department of Information

RADIO CORPORATION OF AMERICA

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

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The multiple antenna designed and built by RCA engineers for use atop the Empire State Building, serves five VHF television stations and three FM transmitters, which can broadcast simultaneously.

foreword

IN 1951, the Radio Corporation of America had its biggest business year. Gross income reached a new high of \$598,955,000. Employment also set a new record of 57,657. When the Corporation started business on December 1, 1919, employees totaled 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 far-seeing 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 transoceanic 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 empowered to manufacture and sell goods and merchandise and to hold and own patents and copyrights. The Corporation gradually expanded its activities into related fields, including research, manufacturing, sales and services. Radiotelegraph circuits, carrying messages to 68 foreign centers, and 14 manufacturing plants, operating in seven states, 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 teleran. 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 5,000 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

RCA BOARD OF DIRECTORS



JOHN T. CAHILL



GANO DUNN



WALTER A. BUCK



EDWARD F. McGRADY



GEORGE L. HARRISON



DAVID SARNOFF
Chairman of the Board



FRANK M. FOLSOM
President



MRS. DOUGLAS HORTON



NILES TRAMMELL



JOHN HAYS HAMMOND, JR.



CHARLES B. JOLLIFFE



HARRY C. INGLES



what it is - what it does

What is "RCA"?

The letters "RCA" are the initials of Radio Corporation of America, which includes: 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 communications 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 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.

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, technical training and servicing.

Is RCA engaged in electronics?

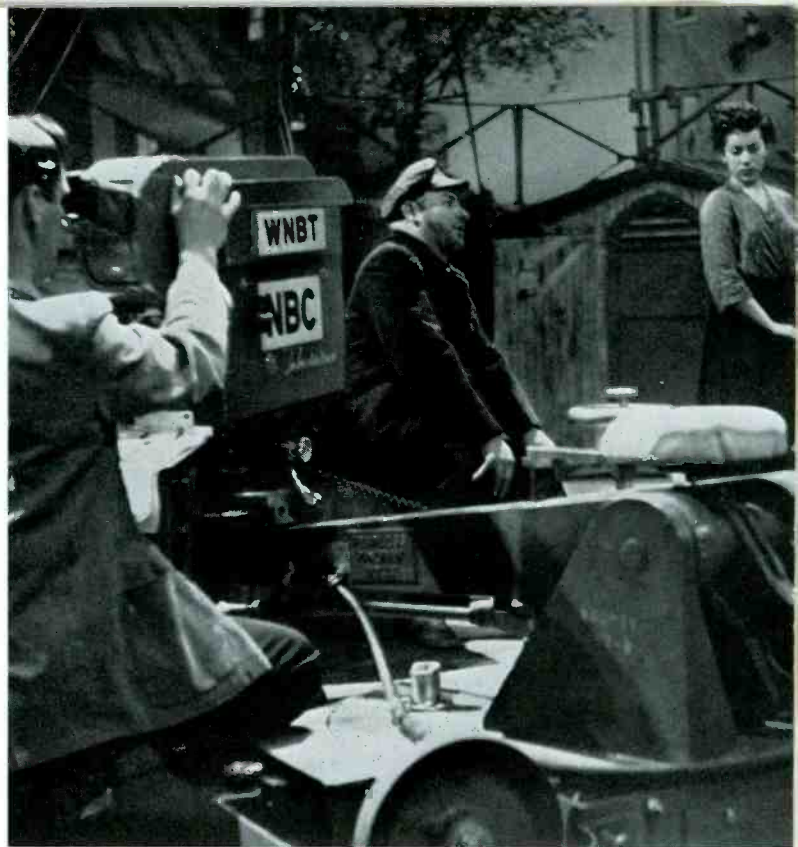
Yes; RCA has pioneered in the science of electronics, and its laboratories are a foremost center of radio-electronic research, the key of which is the radio or electron tube. The RCA Victor Division, one of the world's leading manufacturers of electron tubes, makes a wide variety of electronic apparatus.

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

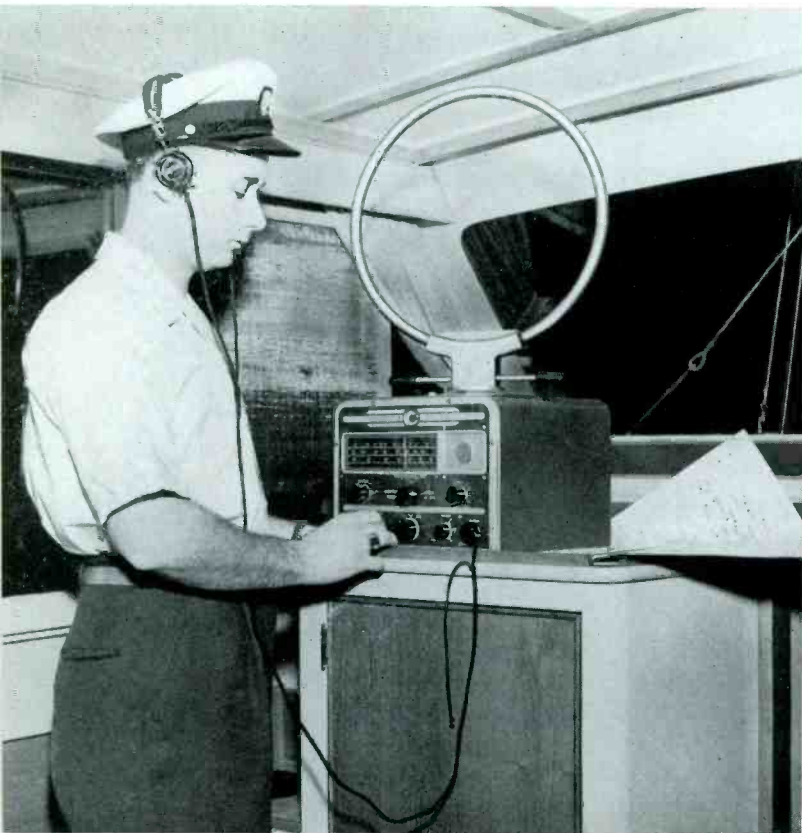
Yes; the RCA Exhibition Hall at 36 West 49th Street, New York, displays the latest RCA radios and



Preparing phosphor screen for RCA color TV picture tubes.



Scene in NBC Television studio, in Radio City.



Radiomarine direction finder for pleasure craft.



RCA portable TV camera-transmitter.



Modern manufacturing plant of the RCA Victor Division in Cincinnati where highly developed automatic machines produce miniature and sub-miniature tubes for radio and television.

“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 December 31, 1951, RCA and its associated companies had 57,657 employees.

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 de-

termined 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 58 separate bargaining agencies. Of these, all but 15 independent unions are affiliated with the A. F. of L., or C.I.O.

Who owns Radio Corporation of America?

Ownership of RCA is widely distributed among approximately 185,000 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, at the rate of \$3.50 per share per annum, have been paid regularly on the First Pre-

ferred stock since it was issued in 1936. In 1951, these dividends amounted to \$3,153,000.

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 was increased to 50 cents. During the year 1950, dividends amounting to \$1.00 were declared, a rate of payment which was continued in 1951. On April 4, 1952, a dividend of 50 cents was declared, payable May 29, 1952.

WHERE IT CAME FROM				
A SUMMARY OF PRODUCTS AND SERVICES SOLD DURING THE YEAR	1951		1950	
	Amount	%	Amount	%
RCA — Includes RCA Victor, RCA Laboratories and RCA International Divisions and domestic subsidiaries other than those listed here . . .	\$440 135 000	73.5	\$476 091 000	81.2
National Broadcasting Company	137 156 000	22.9	92 373 000	15.8
RCA Communications	17 438 000	2.9	14 929 000	2.5
Radiomarine Corporation of America	9 120 000	1.5	7 279 000	1.2
RCA Institutes	817 000	.1	910 000	.2
Less: Inter-company transactions	5 711 000	.9	5 189 000	.9
TOTALS	\$598 955 000	100.0	\$586 393 000	100.0

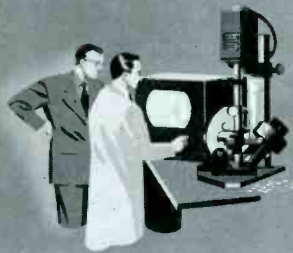
WHERE IT WENT				
HOW THE SALES DOLLAR WAS APPLIED DURING THE YEAR	1951		1950	
	Amount	%	Amount	%
Materials and services bought from others	\$300 864 000	50.3	\$289 997 000	49.5
Wages and salaries	204 157 000	34.1	173 798 000	29.6
Pensions, social security taxes, insurance and other benefits	13 859 000	2.3	10 387 000	1.8
Depreciation and patent amortization	12 257 000	2.0	10 302 000	1.7
Interest on borrowed money	2 295 000	.4	1 324 000	.2
Taxes on income and property	34 330 000	5.7	54 335 000	9.3
Dividends declared	17 010 000	2.8	17 010 000	2.9
Retained in the business	14 183 000	2.4	29 240 000	5.0
TOTALS	\$598 955 000	100.0	\$586 393 000	100.0

ASSETS

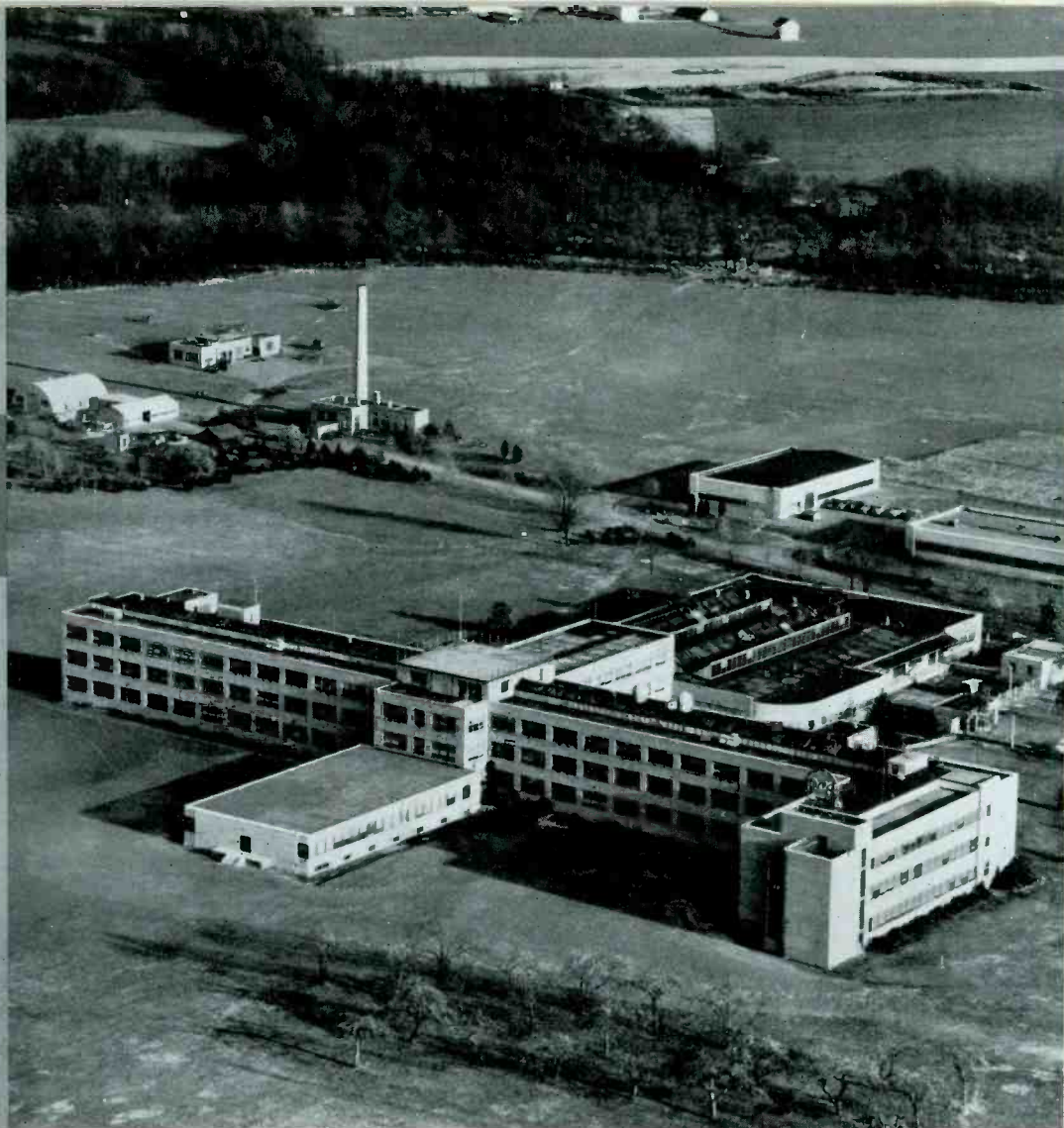
CURRENT ASSETS	<u>Dec. 31, 1951</u>	<u>Dec. 31, 1950</u>
Cash	\$ 48 437 716	\$ 67 063 055
U. S. Gov't. securities, at cost, less amounts deducted from Federal tax liability	39 801 530	2 951 577
Receivables, less reserves, 1951 \$2,660,057, 1950 \$2,452,594	76 991 149	72 612 212
Inventories—lower of cost or market	84 130 023	63 267 227
Prepaid insurance, taxes, etc.	<u>6 633 277</u>	<u>4 064 695</u>
TOTAL CURRENT ASSETS	255 993 695	209 958 766
INVESTMENTS IN WHOLLY-OWNED FOREIGN SUBSIDIARIES	3 593 127	3 699 128
OTHER INVESTMENTS, AT COST, LESS RESERVES, 1951 \$1,494,372, 1950 \$1,363,838	1 675 631	1 999 908
PLANT AND EQUIPMENT, AT COST, LESS DEPRECIATION, 1951 \$76,421,492, 1950 \$68,330,582	101 080 135	87 391 928
PATENTS AND PATENT RIGHTS, LESS AMORTIZATION, 1951 \$9,285,642, 1950 \$9,509,620	3 651 182	4 448 321
DEFERRED CHARGES	<u>4 208 255</u>	<u>4 348 835</u>
TOTAL ASSETS	<u>\$370 202 025</u>	<u>\$311 846 886</u>

LIABILITIES AND STOCKHOLDERS' EQUITY

CURRENT LIABILITIES		
Accounts payable and accruals	\$ 72 599 471	\$ 72 553 748
Federal income and excess profits taxes, less U. S. Gov't. securities, 1951 \$27,375,000, 1950 \$50,850,000	9 841 644	5 714 689
Dividends payable	<u>788 239</u>	<u>788 202</u>
TOTAL CURRENT LIABILITIES	83 229 354	79 056 639
3% PROMISSORY NOTES, DUE 1970-1974	100 000 000	60 000 000
STOCKHOLDERS' EQUITY		
\$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
Common Stock, no par, shares authorized 18,500,000. outstanding 13,881,016 at a stated value of	27 762 032	27 762 032
Capital surplus	6 651 703	6 651 703
Retained earnings	<u>137 984 495</u>	<u>123 802 071</u>
TOTAL STOCKHOLDERS' EQUITY	<u>186 972 671</u>	<u>172 790 247</u>
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	<u>\$370 202 025</u>	<u>\$311 846 886</u>



research



Aerial view of David Sarnoff Research Center of RCA, at Princeton, N. J., one of the world's foremost centers of radio and electronic research.

DR. E. W. ENGSTROM
*Vice President in Charge
RCA Laboratories Division*

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 laboratory is the David Sarnoff Research Center 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 are recognized as 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.

To this end RCA Laboratories engages in research on specific projects, the results of which will be applicable to our products and services, and also in pure pioneering research on the thresholds of those branches

of science which relate to radio and electronics. In addition to this 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.

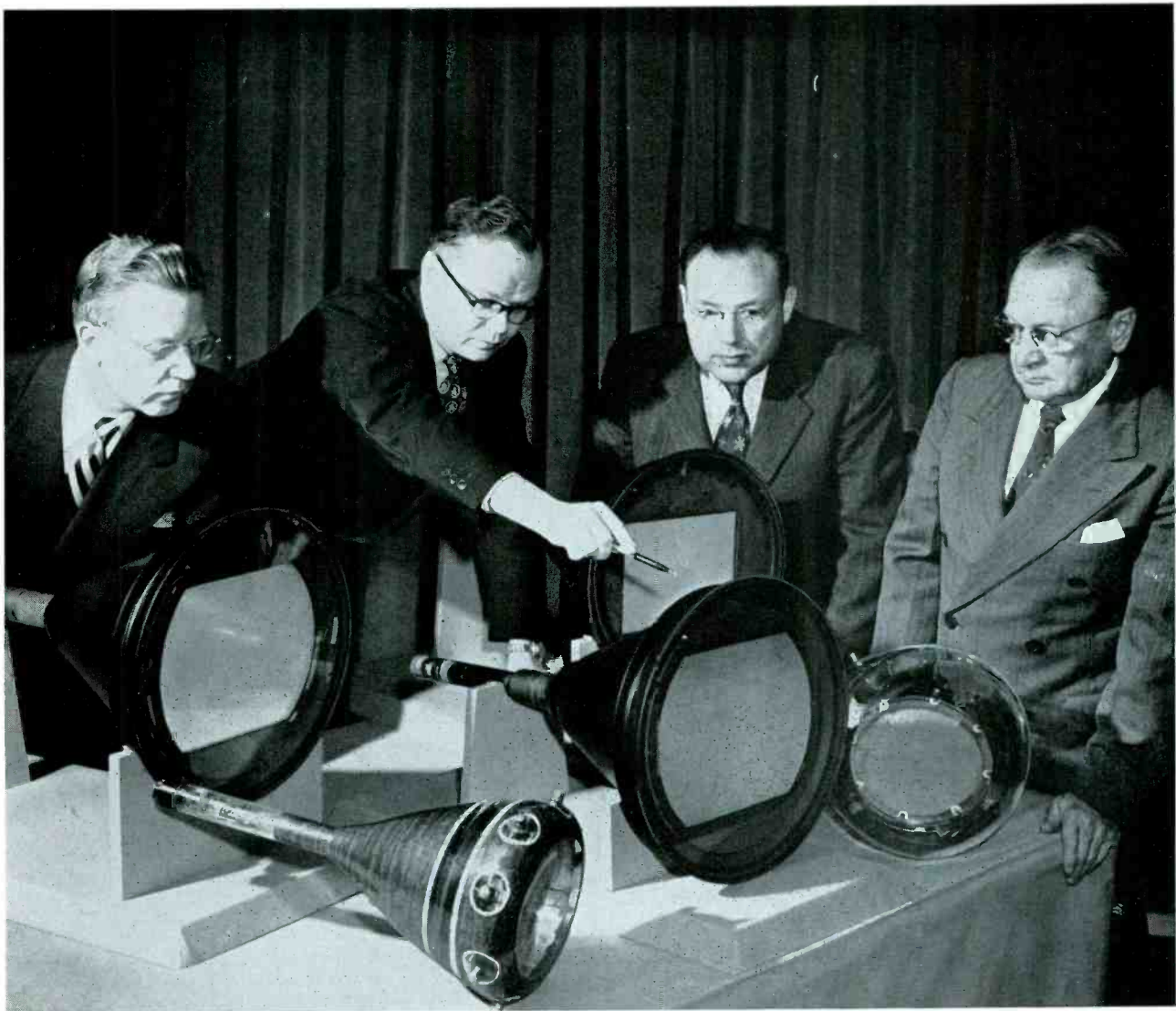
Is RCA research confined to radio?

Modern radio is closely allied with many branches of science such as electronics, acoustics, and physics, and, as radio progresses, new sciences are continually being brought within its horizon. RCA has extended its research into many fields such as optics, chemistry, and nucleonics. Studies which have resulted from this work, or as by-products of radio and television research, include research in fluorescent and phosphores-

cent materials, the electron microscope, plastics and the electronic behavior of solid materials.

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

As a logical adjunct to research, each subsidiary 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, Radio-



Scientists of RCA, E. W. Herold, Dr. E. W. Engstrom, H. B. Law and Dr. V. K. Zworykin examine five types of tri-color picture tubes developed for the RCA compatible all-electronic color television system.

marine 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 applications 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?

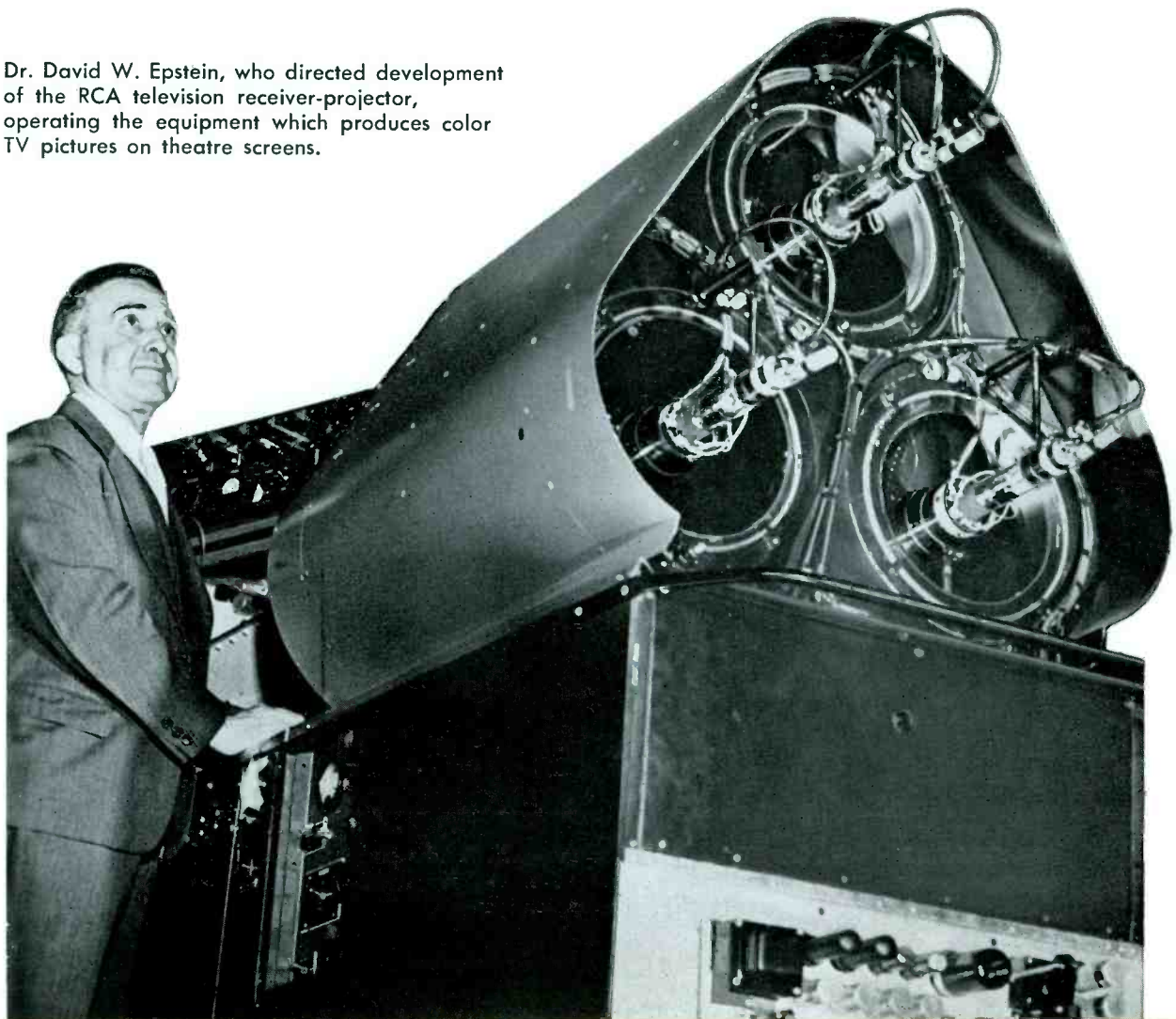
Scientists and engineers of RCA are active contributors to leading technical journals, and also pres-

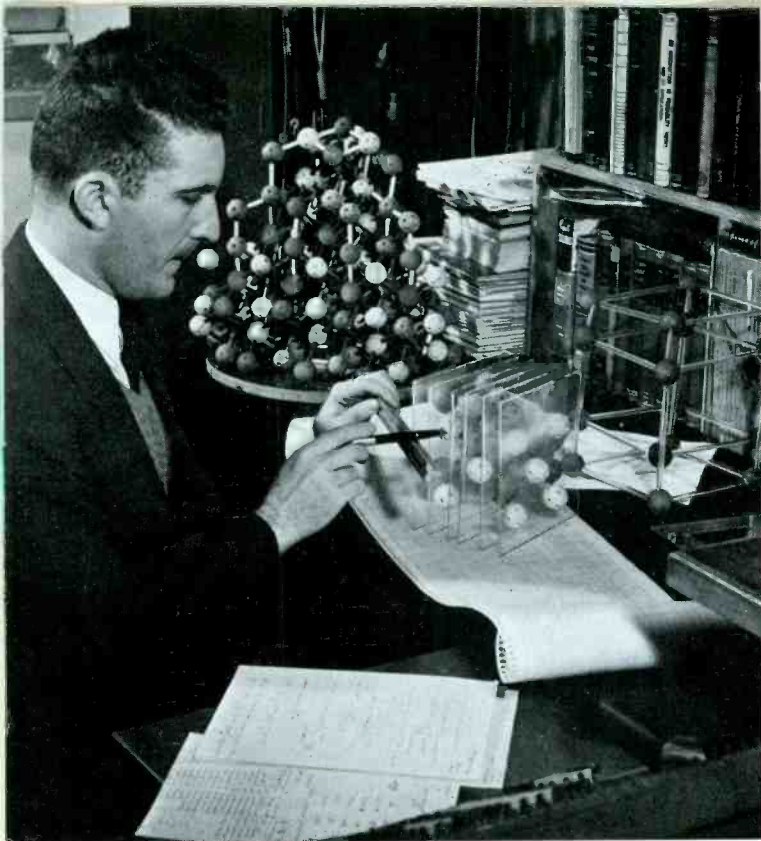
ent technical papers at engineering meetings throughout the country. In addition, RCA Laboratories Division publishes for the Corporation the quarterly technical journal, *RCA Review*, as well as various technical and engineering books, indexes and pamphlets.

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

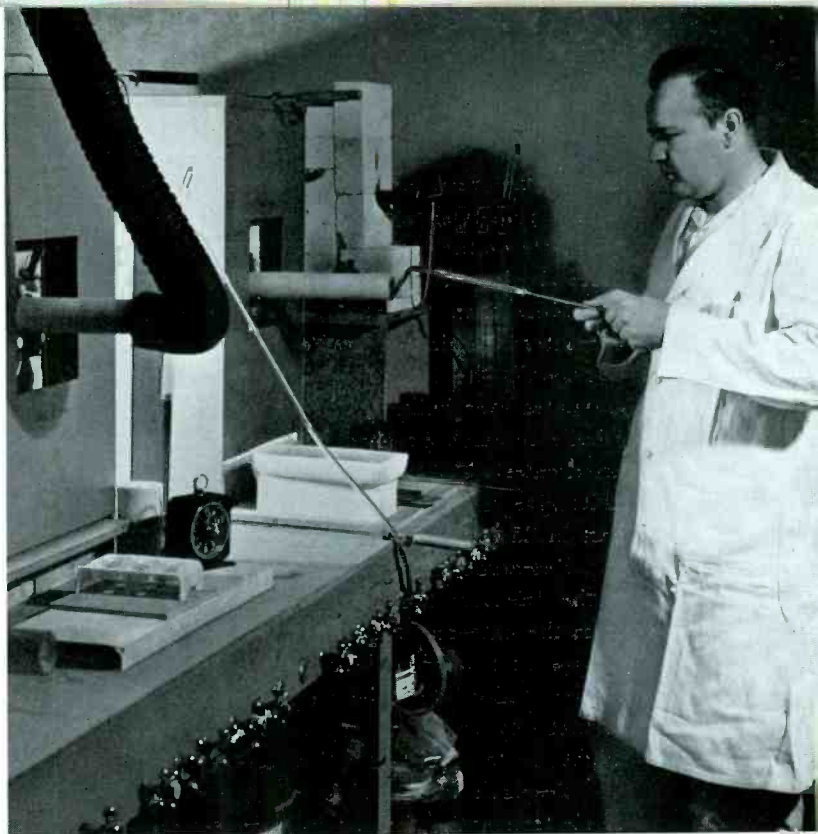
RCA makes available to competitive manufacturers of radio and other apparatus its inventions and patents by means of patent licenses at moderate royalty rates. By this means the accomplishments of RCA scientists are promptly made available to serve the government and the public in the most efficient 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 con-

Dr. David W. Epstein, who directed development of the RCA television receiver-projector, operating the equipment which produces color TV pictures on theatre screens.





Electronic structure of diamond and germanium crystals is studied at David Sarnoff Research Center.



Germanium crystals, used in research on electronics of solid materials, are grown in this apparatus.

ditions 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.

During the past year, compatible color television programs were field-tested over coaxial cable and radio-relay facilities between New York and Washington, D. C. By means of a projector developed at RCA Laboratories, RCA color television pictures were shown in New York on a 9 x 12-foot theatre screen.

A device called a tristimulus photometer was developed for measuring simultaneously the strength of the three basic color components in a light source under study. This instrument provides the desired information accurately and quickly without involving the considerable computation necessary when using previously available methods.

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 by its use in microscopy by biologists and physicists at Princeton University both in research

and in the classroom. A mobile camera of this type with a pack-type portable transmitter were developed to enable on-the-spot pickup of special events and remote viewing of industrial processes.

More than ten years of research on electronic computers culminated in the development 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 the computing units give results which are exact to better than one part in 25,000.

Research in ultra-high-frequency propagation led to the discovery that by directing the radiated energy from the antenna of a UHF television station slightly downward toward a desired city, the signal strength of the station could be very considerably increased in that city while the interference, which the signals might create at distant cities, was reduced.

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.

Electron Microscope

The year 1951 resulted in an unusually large number of refinements of the electron microscope. Improved illumination, lenses and viewing systems made it possible to make a visual examination of the image at magnifications approaching the million mark. The improved instrument has already revealed a fine structure in carbon black, and a number of new details regarding the destruction of bacteria by viruses.

The development of clinical applications of the electron microscope was continued in collaboration with a number of the nearby medical and biological institutions. Of particular importance in this field is the development of a technique for the rapid examination of blood samples with the electron microscope.

A method, developed earlier by Laboratories physicists in cooperation with the medical scientists of the Sloan-Kettering Institute in New York, in which consecutive slices of tissue are prepared for micrography, was improved so that slices only two millionths of an inch thick can be cut. This technique already is being used in cancer research.

Many types of vacuum tubes have been created for myriad uses in radio and industry. The super-sensitive pickup tube, or "eye", for the television

camera—the image orthicon—permits the televising of scenes illuminated by a single candle.

New Types of Tubes

A new multiplier phototube, developed by RCA Laboratories, 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.

Another product of RCA research is the Plasmatron—a continuously controllable gas-discharge tube. It holds great promise for use as a high-speed control mechanism for alternating currents, a high-frequency oscillator, a direct-current inverter, and an audio power amplifier.

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 Graphechon, 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 observation of electrical phenomena which had required photographing before they could be examined.

Much research effort is being directed toward the study of the electronic behavior of solid materials. Until recently, interest in the radio-electronic field centered in the flow and control of electrons in vacuum (vacuum tubes). Within the past few years, however, interest has been turning to a new field which is rapidly growing in importance. This is the field concerned with the actions of electrons and their control in solid materials. Research in this new field is being pursued along a broad front since the effects are important in such devices as amplifiers, oscillators, light valves, television camera tubes and picture tubes, and capacitors. A few examples showing the results obtained to date through studies of this field are as follows:

In the field of television, research on photoconductive materials (materials which change the amount of electric current flowing through them depending on the intensity of light falling on them) has led to the development of the Vidicon tube used in RCA industrial television equipment. Study of bombardment-induced conductivity in solids has resulted in the de-

velopment of new storage tubes for possible laboratory measurement and radar purposes. The semi-conductor germanium, properly arranged with three contact wires (transistor), can be made to perform many of the functions of the three-element electron tube with great saving in power consumption and space occupied. This device, which controls the flow of electrons through solids, is expected eventually to lead to many new types of electronic apparatus, in many cases for fields in which electronics does not now play a part. Studies in other solid materials, such as the groups known as titanates and columbates, show promise of possible new and more efficient types of radio circuit elements.

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.

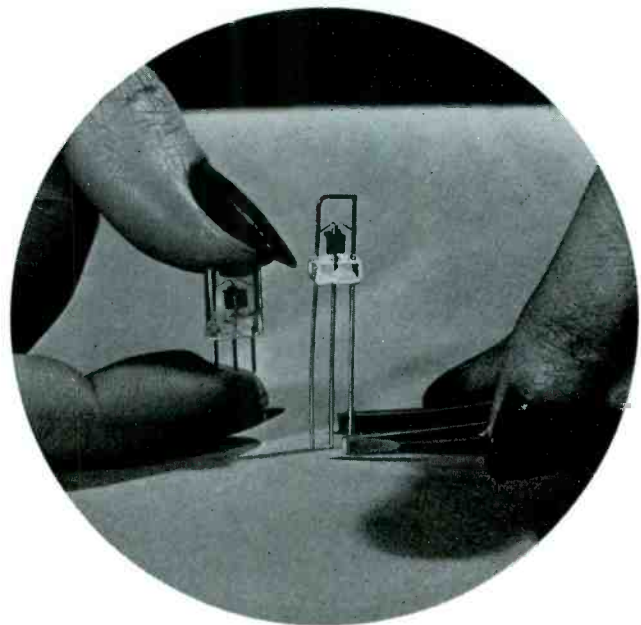
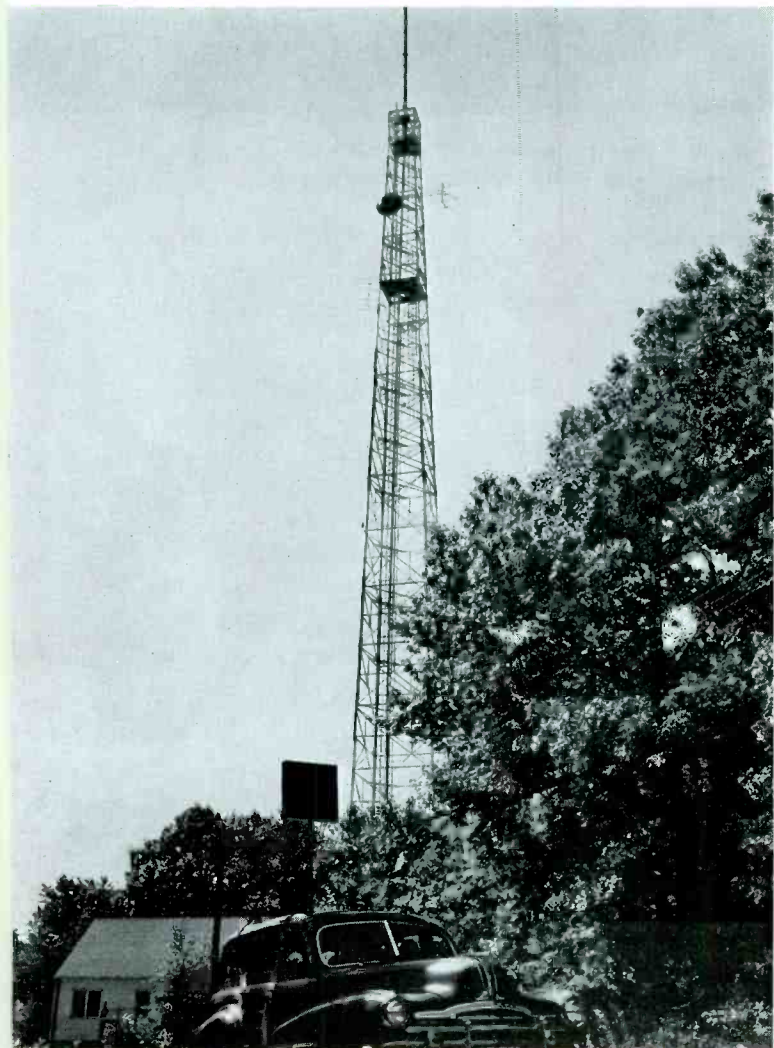
Research in the field of electronic counters has made available a commercial counter capable of meas-

uring 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.

Through the development of a new principle known as the compound direct-radiator loudspeaker, it is now possible to provide improved low-frequency response in small radio cabinets. Another acoustic development of the year was a heated cutting stylus for making master phonograph recordings. Use of this stylus has resulted in greater freedom from surface noise in RCA's records.



The tiny transistor is shown above (right) before it is encased (left) in its protective covering of plastic.

Left: Antenna tower and transmitter house of the RCA-NBC experimental UHF station near Bridgeport, Conn.



television



Dave Garroway who acts as "Communicator" on NBC's early morning television program of world news and entertainment.

JOSEPH H. McCONNELL
*President,
National Broadcasting Company, Inc.*

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

Since 1939, pioneering of the National Broadcasting Company has brought to the public an era of new entertainment, information, news and education made possible through 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 1952, NBC was supplying visual programs to a network of 64 stations, of which 52 were interconnected by microwave relay and coaxial cable, the remainder being serviced by kinescope recordings and films. By mid-1952, all but four stations

will be interconnected, thus bringing "live" shows to 99% of the nation's TV families. The network reaches more than one third of all homes in the United States.

What types of programs are telecast by NBC?

Television set owners will recall the thrills of many program highlights during the past year.

President Truman made eleven appearances on NBC television in addresses on matters of national interest. There were three talks by Vice President Barkley and 30 talks by cabinet members. Featured also on NBC-TV were telecasts from the United Nations and exclusive film stories from Korea and other centers of world happenings.

From the beginning of the Korean conflict, news has played an ever-increasing part in television. In 1951, NBC television enlarged its own staff of film correspondents on the war front.

NBC-TV programs are encyclopedic in scope, not only offering top-flight entertainers, but talks, forums, news and religious programs, as well as other public service features. Recognizing that "the play's the thing," NBC has more than 200 stars under exclusive television contracts. Among the contract performers are Jimmy Durante, Martin and Lewis, Eddie Cantor, Abbott and Costello, Milton Berle, Sid Caesar, Imogene Coca, Ezio Pinza, Kate Smith and Ted Collins, Jack Carson, Paul Winchell, William Gargan, and Olsen and Johnson.

Spanning continental U.S.A. for the first time in 1951 via the American Telephone and Telegraph Company's coaxial cable and radio relay circuits, NBC Television brought many added features into millions of homes. West Coast-originated programs included the Japanese Peace Conference at San Fran-

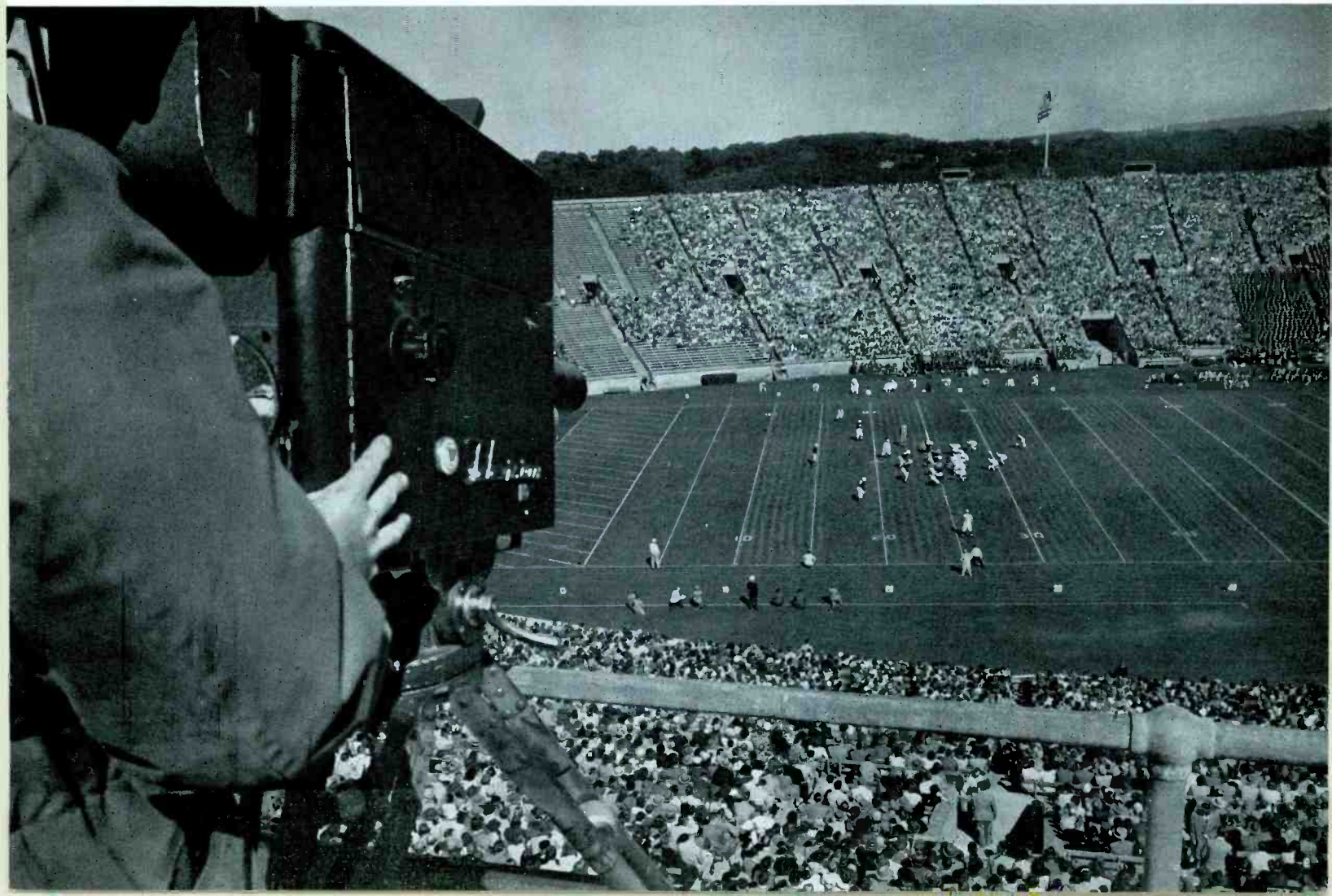
cisco, and variety shows, originating at NBC Hollywood.

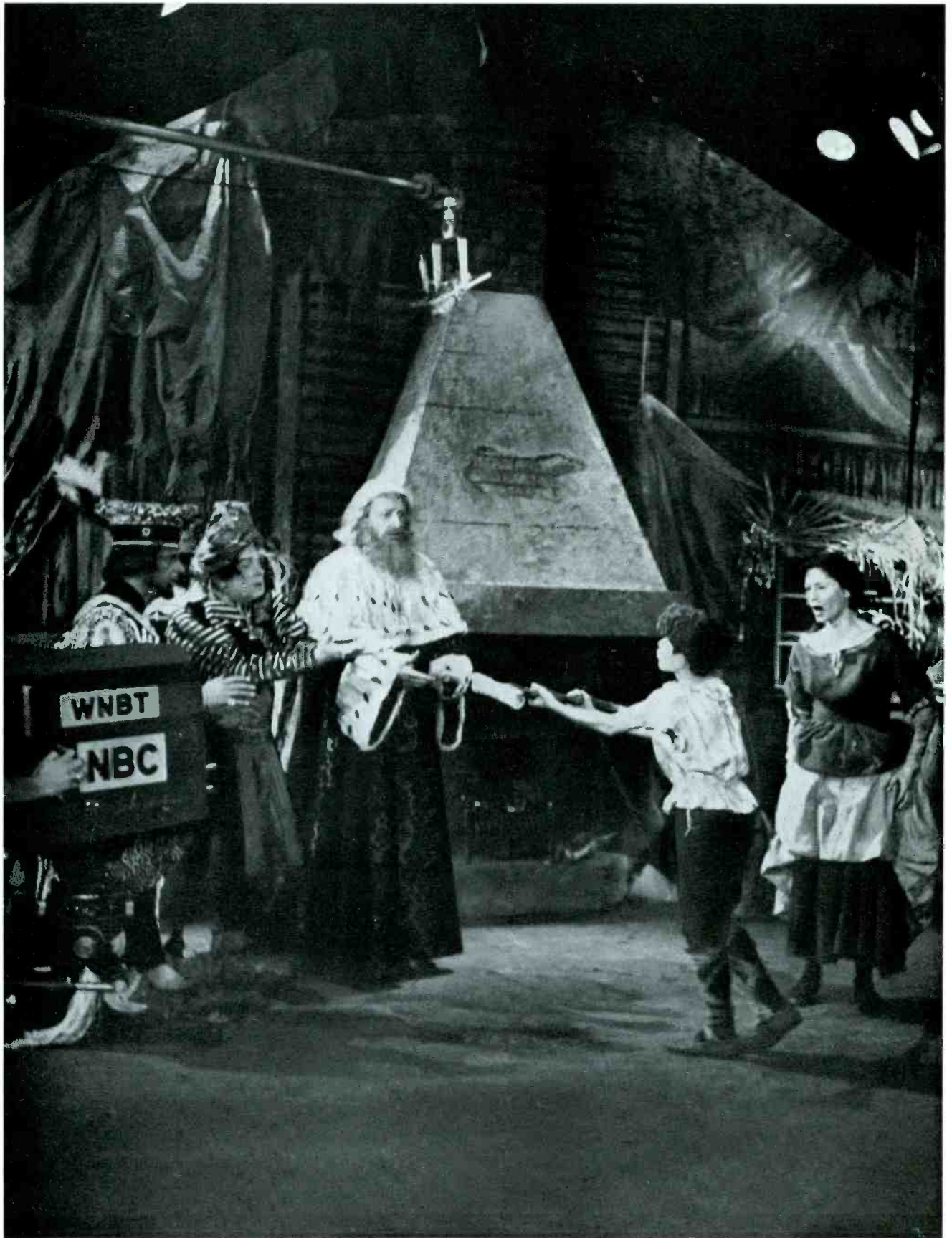
Indicative of television's great growth in 1951 is the estimate that 60,000,000 people saw one or more of the World Series baseball games over NBC. The Martin and Lewis show on Nov. 4, 1951 attracted the largest audience on record for a regularly-scheduled TV program, with a nationwide tabulation of 28,900,000 viewers.

NBC-TV was accorded enthusiastic acclaim from viewers and critics for the premiere presentation on December 24 of Gian-Carlo Menotti's "Amahl and the Night Visitors," the first opera written especially for television. By popular request, the opera was repeated on Easter Sunday.

The network scored in developing daytime programs that commanded huge audiences. "Today"—a two-hour early morning presentation of news, reviews, music interviews and other service features, with Dave Garroway in the role of "communicator," started in January, 1952.

Television makes it possible for millions to watch outstanding sports events.





Scene from telecast of Gian-Carlo Menotti's opera "Amahl and the Night Visitors."

Television has proved to be 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.

Are any programs transmitted simultaneously over radio and television networks?

Yes; several NBC programs are simulcast over the Company's radio and television networks. Simulcasts include "The Voice of Firestone", "The 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", 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 second network.

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

Yes; during 1951, NBC vastly expanded its production facilities to keep pace with the growing medium. The network leased the New Amsterdam Roof and Colonial Theatres in New York, and acquired the Warner Bros. studio building in Brooklyn. In Hollywood, NBC leased the El Capitan Theatre for TV program use.

Hollywood's El Capitan Theatre is the originating point of many NBC-TV programs.





radio



"The Band of America", with Paul Lavalle conducting over NBC.

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, 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, 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 105,300,000 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 radiophone to report all events of national and international importance, such as elections and big sport-

ing 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?

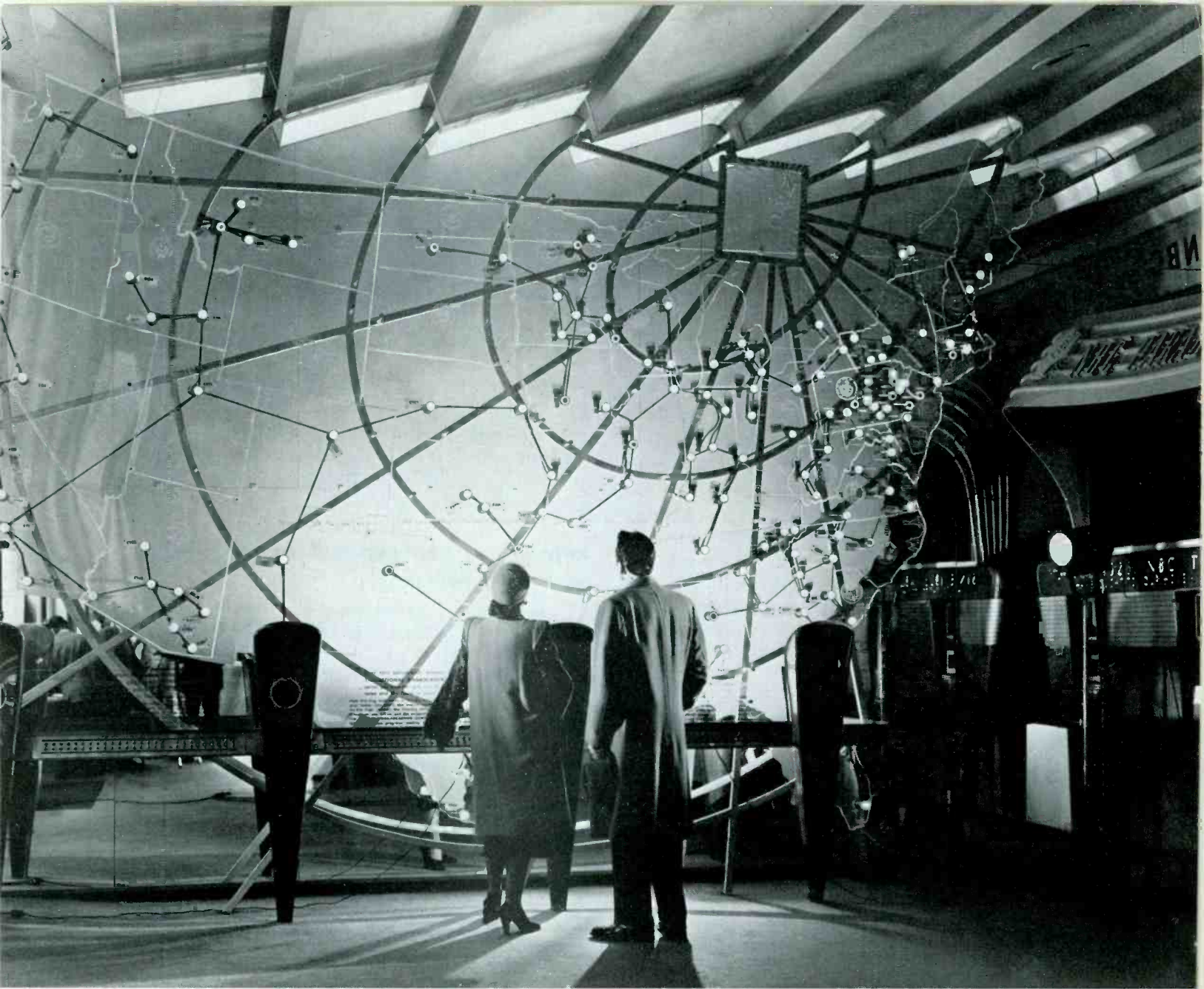
The National Broadcasting Company was established by RCA in the fall of 1926. It was NBC's an-



Action in radio is not visible but it is conveyed to listeners with the aid of sound effects.



Programs of folk tunes are among the most popular broadcasts in America.



An animated map in the RCA Exhibition Hall pin-points all NBC radio stations and emphasizes the network's thorough coverage throughout the nation.

nounced 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.

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 net-

work was arranged by NBC to broadcast a football game from the Rose Bowl at Pasadena, California.

How many stations are affiliated with the NBC radio network?

As of April, 1952, the NBC radio network comprised 194 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 more than 16,000 miles of leased telephone circuits especially engineered for the transmission of broadcast programs. These circuits are available for NBC use 24 hours a day and 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 transmission of program 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 obtain supplementary studio space in New York locations outside of Radio City.

How may tickets be obtained for admission to broadcast programs?

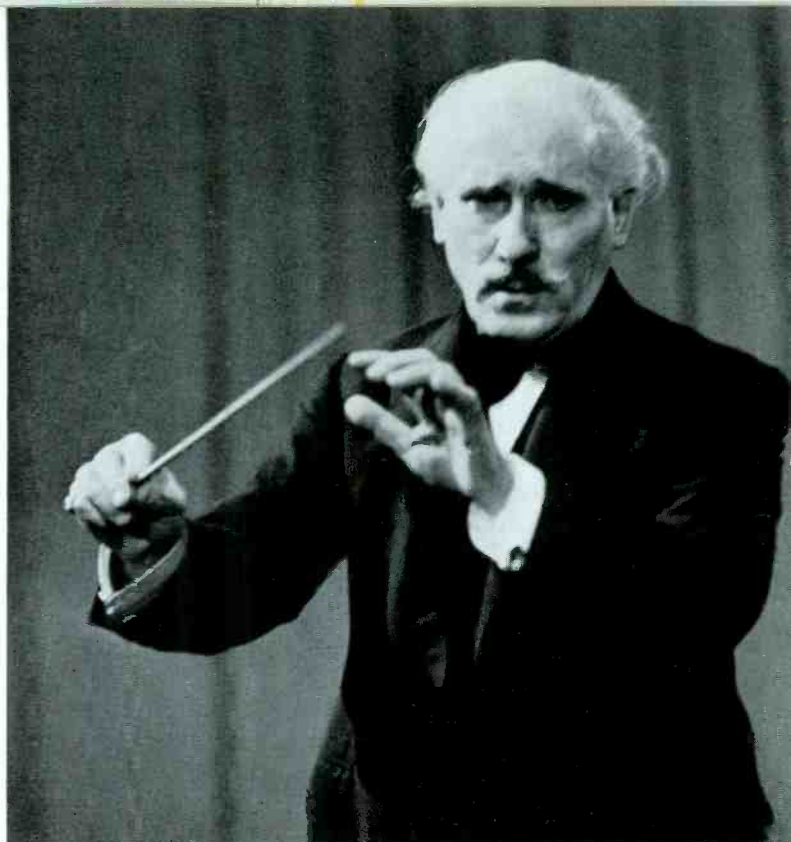
By writing at least two weeks in advance to the Guest Relations Department of NBC. Cards of admission, if available, will be supplied.

What proportion of NBC programs is sponsored by advertisers?

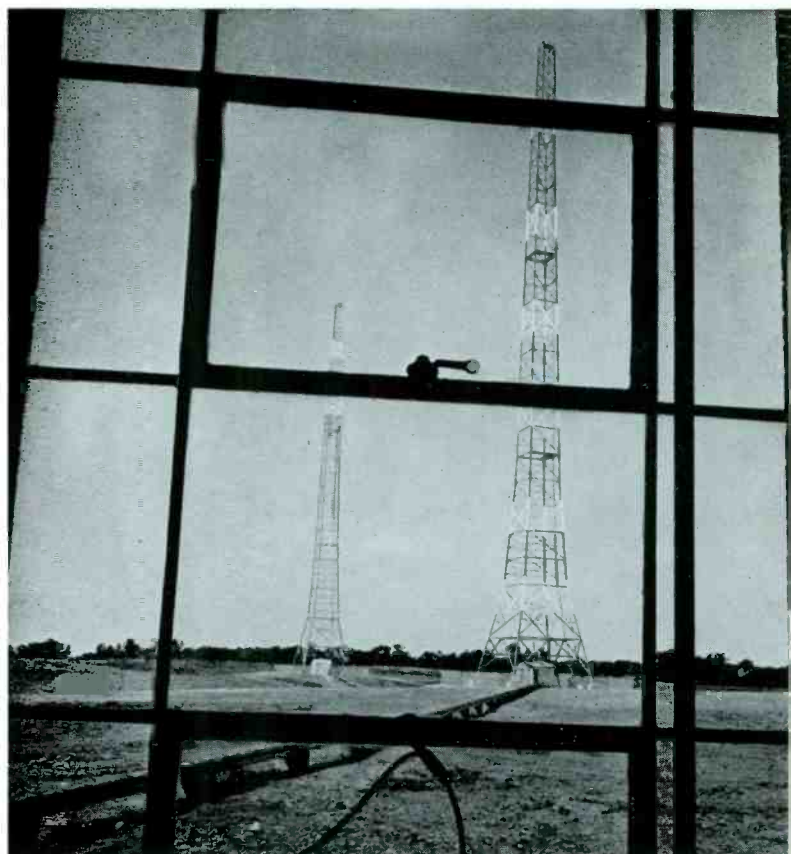
Approximately half of the total program hours of the NBC network are commercially sponsored. The remaining half are filled with non-commercial programs, that is, programs for which NBC and its affiliated stations supply time, facilities and frequently program content, without remuneration.

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



Maestro Arturo Toscanini, conductor of the NBC Symphony Orchestra.



Two towers of NBC's key station WNBC viewed through window of the transmitter building at Port Washington, N. Y.

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.



NBC engineers demonstrate the "gun-shot reinforcer" for use on radio and television 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.

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 1951, NBC radio newsrooms were producing 509 news programs weekly for local and network consumption.

How many NBC programs originate overseas?

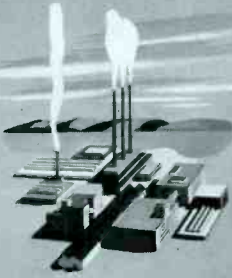
Annually nearly 3,000 pickups and programs are originated in foreign lands and broadcast over the NBC network. Throughout the year, the NBC staff of news analysts, commentators, and reporters regularly broadcast up-to-the-minute, first-hand reports from strategic locations all over the globe.

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

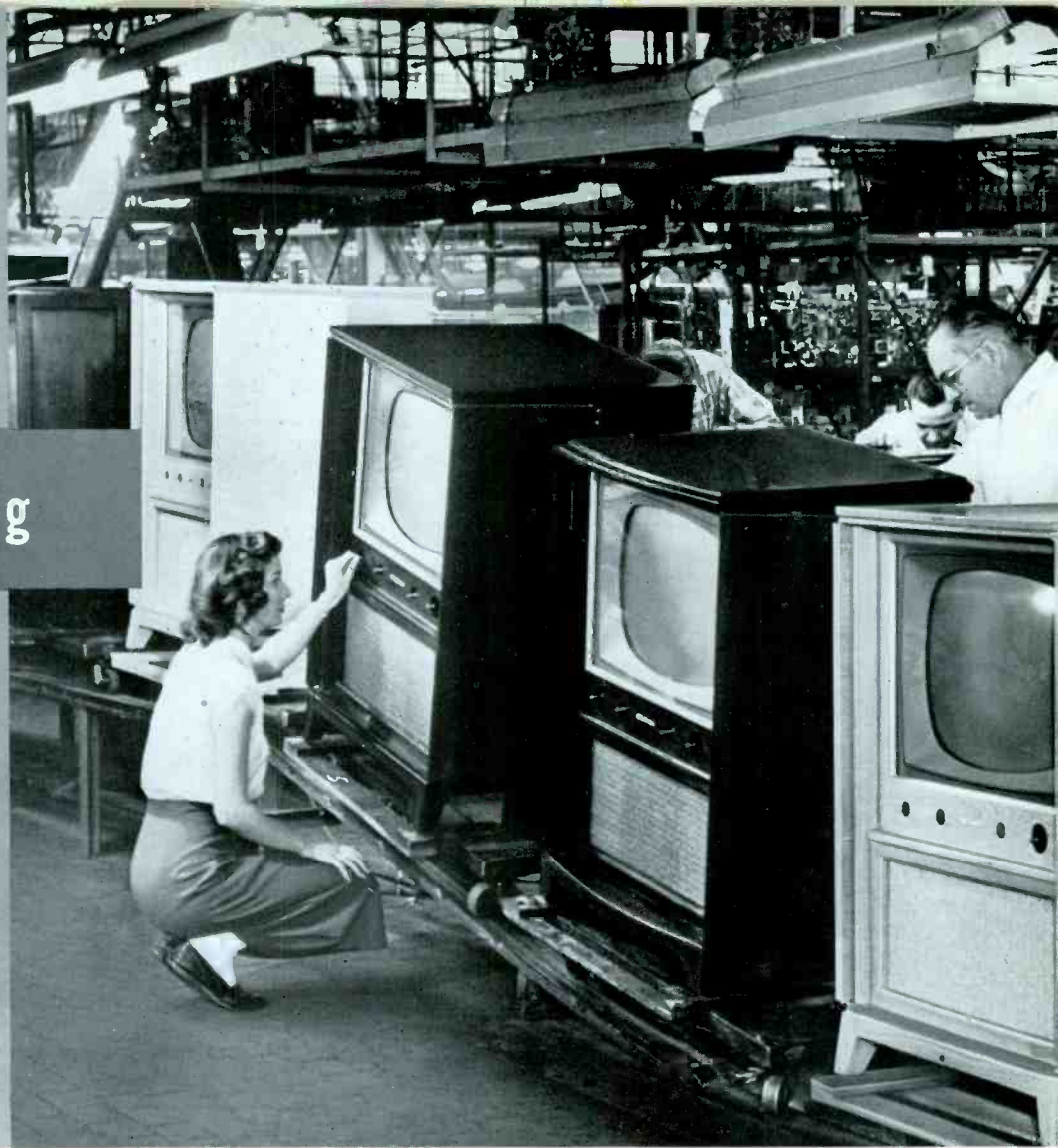
On March 12, 1925, RCA's Station WJZ, New York, broadcast the chimes of Big Ben atop Parliament House in London. The signals were picked up by the RCA station at Belfast, Maine, from a British broadcast on the 1600-meter waveband originating in Chelmsford, England, and were relayed by short wave to New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



manufacturing



Television consoles move down a production line at the RCA Victor plant in Indianapolis, Indiana.

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

When was RCA Victor Division, the manufacturing unit 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

whose beginning dates back to 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; Hollywood and Los Angeles, California; New York City and Cincinnati, Ohio. Headquarters of the RCA Victor Division are in Camden, New Jersey.



More than 16,000,000 American homes now receive television programs.

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 identifies "Victrola"® phonographs, RCA Victor records, RCA Victor radios, television receivers, 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. Direct-view television receivers include 17-inch and 21-inch screen sizes in both table and console

models. RCA Victor's new Super Sets with Picture Power have set a new standard for television performance. The 45-rpm phonograph is available in a variety of models, singly and in combination with radio.

Has television resulted in decreased public interest in radio and recorded music?

Contrary to common belief, radios and phonographs have not lost ground with the public as a result of television. Sales of these instruments are very healthy indeed, and during 1951 RCA Victor improved its position in this important field. Sales of RCA Victor home radios and "Victrola" phonographs were greater than for any year in the pre-television era, showing an increased public interest in both radio and recorded music.

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

RCA Victor home instruments and records are sold through approximately 38,000 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.

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. At the start of 1952, there were 14 leading manufacturers of 45-rpm players. This number was expected to increase to 30 or 35 by the end of the year. On the same date there were approximately 5,650,000 45-rpm record players in use. Acceptance of the system has been so widespread that virtually all manufacturers in the industry are now making and selling 45-rpm records.

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. Records are small (7-inch diameter). They are made of non-breakable vinyl plastic,

wearing up to 10 times longer than shellac records. Storage problems are greatly reduced; the small, wafer-thin discs can be placed in ordinary bookshelves, 150 to the foot. The "45" allows the listener complete freedom in choice and order of playing the shorter works which comprise 90 percent of all recorded music.

Does RCA Victor also manufacture long-play records?

Yes; RCA Victor records and issues 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. All new classical and popular albums are now being released on 33 $\frac{1}{3}$ -rpm. Because of a special process used in their manufacture, these records are considered the finest of their type obtainable.

What has the public reaction been to the new record speeds?

Both of the two new speeds, 45-rpm and 33 $\frac{1}{3}$ -rpm, have been so well accepted that they are now outselling the old 78-rpm system. 45-rpm, however, has a much greater potential for becoming the most widely accepted system because it provides for single records as well as albums. Both the coin-machine industry and radio stations are converting their equipment to 45-rpm.

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 is on 45-rpm records. "Red Seal" and appropriate popular albums also are available on 33 $\frac{1}{3}$ -rpm and, in some instances on 78-rpm. Popular and children's selections, for the most part, are available on 78-rpm and, in some cases, on 33 $\frac{1}{3}$ -rpm. The vast majority of RCA Victor's catalog of records have been converted to 45 and 33 $\frac{1}{3}$ -rpm. By the end of 1952, it is expected that RCA Victor will have a catalog of approximately 8,000 selections in this category.

In 1951, RCA Victor Record sales continued the upward swing begun in 1950, substantiating the Company's long-standing position in this important entertainment field, and adding lustre to its artistic leadership.

Along with the higher fidelity and truer reproduction of the new type records (45 and 33 $\frac{1}{3}$ -rpm) has come a rejuvenated public interest in classical music. RCA Victor capitalized on the demand with "A Treasury of Immortal Performances" drawn from the Company's priceless collection of old record masters, many of them by the great Caruso.

Left: This fan-shaped antenna is one of several types developed for the reception of television programs transmitted on ultra-high frequencies.



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 of custom-made record, including radio transcriptions, spot commercials, sales training, educational and slide-film recordings, and brand label phonograph records. RCA Victor Custom Record offices are located in New York, Chicago and Hollywood.

What is RCA's role in the radio program field?

RCA Victor, through its Recorded Program Services, is one of the leading producers and distributors of transcribed programs for radio broadcasting. Hundreds of radio stations in and outside of the United States are subscribers to *Thesaurus* and users of RCA Syndicated programs.

RCA's *Thesaurus* library service embodies complete, balanced radio programming of every musical category for station broadcast and local or regional sponsorship. This comprehensive service consists of a basic music library of approximately 5000 selections; a monthly release of new selections; a weekly script service; individual shows plus special holiday features;



Antenna on roof of station wagon is used to make field tests of the RCA-NBC experimental UHF television station near Bridgeport, Conn.

production aids such as voice tracks, theme and mood music, sound effects, time and weather jingles, etc.; sales aids that include sponsor-selling brochures, audience-building promotion kits and audition discs; loose-leaf catalogs, card index files and transcription storage cabinets.

What kinds of electron 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 Harrison, New Jersey; Indianapolis, Indiana, and Cincinnati, Ohio.

Does RCA manufacture microwave radio relay equipment?

Yes; RCA microwave radio equipment provides one of the most economical and effective means of point-to-point communications over long distances. It is designed for fixed installation and can be used, for example, by state police and foresters to link transmitting stations into a state-wide network.

Many types of information can be transmitted simultaneously over the microwave system. These include multiple voice channels, teletype, telegraph, telemetering, facsimile and other signaling information.

Many functions, such as remote control, heretofore provided only by wire lines, now are provided by microwave. RCA microwave equipment on the Pennsylvania and New Jersey Turnpikes, for instance, handles all communications including policing, administration, teletype and maintenance.

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 in 1951 when the Louis-Savold fight was televised for theatre audiences in nine cities.

At the close of 1951, more than fifty theatres were operating or installing RCA theatre television equipment. A great future for the telecasting of important events direct to motion-picture audiences is envisaged as a result of these pioneering installations.

Does RCA supply equipment for AM and FM broadcasting stations?

RCA manufactures a complete line of AM and FM broadcasting equipment, including transmitters, antennas, test equipment, microphones, monitoring units, loudspeakers, studio turntables, disc and tape recorders and many other types of broadcasting studio apparatus.

What progress has been made by RCA in Ultra-High Frequency?

In the important field of Ultra-High Frequency (UHF) television, hailed as the means of supplementing present VHF (very-high frequency) and thus bringing about a truly nationwide television service, RCA Victor is ready with a complete line of high quality, field-tested electronic products to be available when UHF service begins in any given locality. These include easily installed selectors and interchangeable tuners for present-channel VHF receivers, new UHF-VHF receivers, home antennas, tubes and complete equipment for transmitting stations. After twenty years of research, RCA was the first to transmit UHF television programs on a regular schedule, the experimental station near Bridgeport, Conn., being used as a proving ground for the TV set industry.

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.

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 provides equipment for recording sound magnetically on film and also for recording television programs on film from the face of kinescope tubes for re-broadcasting. RCA also makes many other commercial theatre products, including drive-in theatre equipment.



Technician of the RCA Service Company installs an antenna for the owner of an RCA television receiver.

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 5,000 RCA systems are in use now, including many units in new Veterans' 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.

Where can RCA Room Air Conditioners be purchased?

RCA Victor's new line of room air conditioners for the home and office is available from authorized dealers. Made in three sizes, they are of the window type, compact and expertly engineered for quality construction and smooth operation. They give peak performance in capacity to ventilate, circulate, dehumidify and filter out dust, dirt, and pollen. RCA Service Company contracts are available for installation and maintenance.

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.

Three-way portable radio sets near the end of a production line at RCA's Canonsburg, Pa., plant.



Bank employee uses RCA's Industrial TV system to compare signatures on checks, other documents.



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 for commercial airlines and private planes. RCA manufactures a line of aircraft transmitters and receivers, as well as supplementary equipment. 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 through overcast, making use of prevailing winds.

RCA also produces large quantities of loran units, equipment 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.

Does RCA Victor manufacture equipment for our Armed Forces?

RCA Victor is engaged in the design, development and manufacture of many electronic products for all branches of the Armed Forces, for use on land, the seas and in the air. While the exact nature of many of these products cannot be disclosed for reasons of national security, it can be said they include especially designed navigation and communication equipment, walkie-talkies, mobile television transmitters, radar

and complex electronic control devices for gun fire and guided missiles.

An example of these control devices is a new analogue computer, an ingenious electronic calculator used by the United States Navy for testing and studying guided missiles. This device solves in a matter of minutes mathematical problems which by manual methods require hours and often weeks and months to solve.

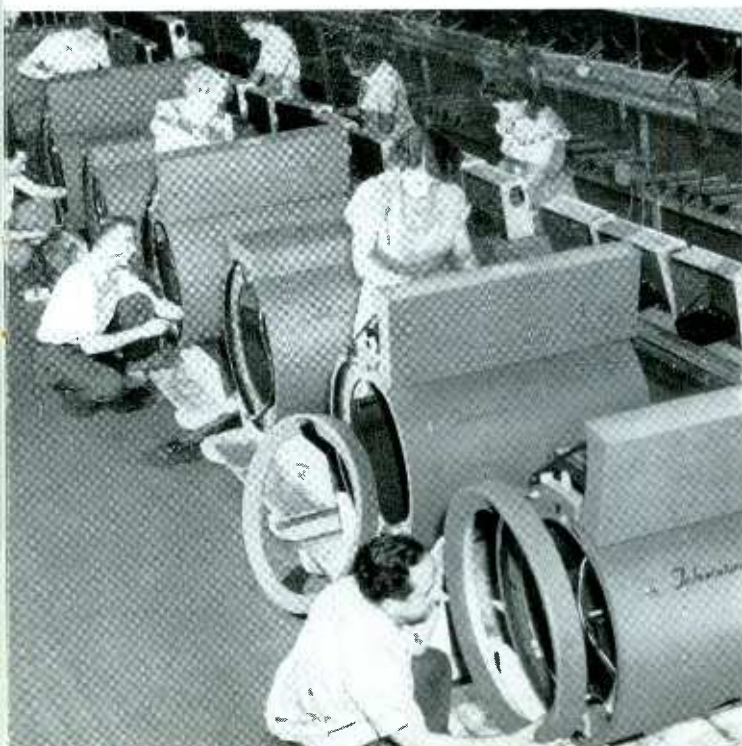
What is the new RCA Antenaplex equipment?

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. The RCA Community Antenaplex system provides television programs to audiences previously shielded from TV reception by mountains or other barriers to direct reception.

Who uses RCA two-way radio communication equipment?

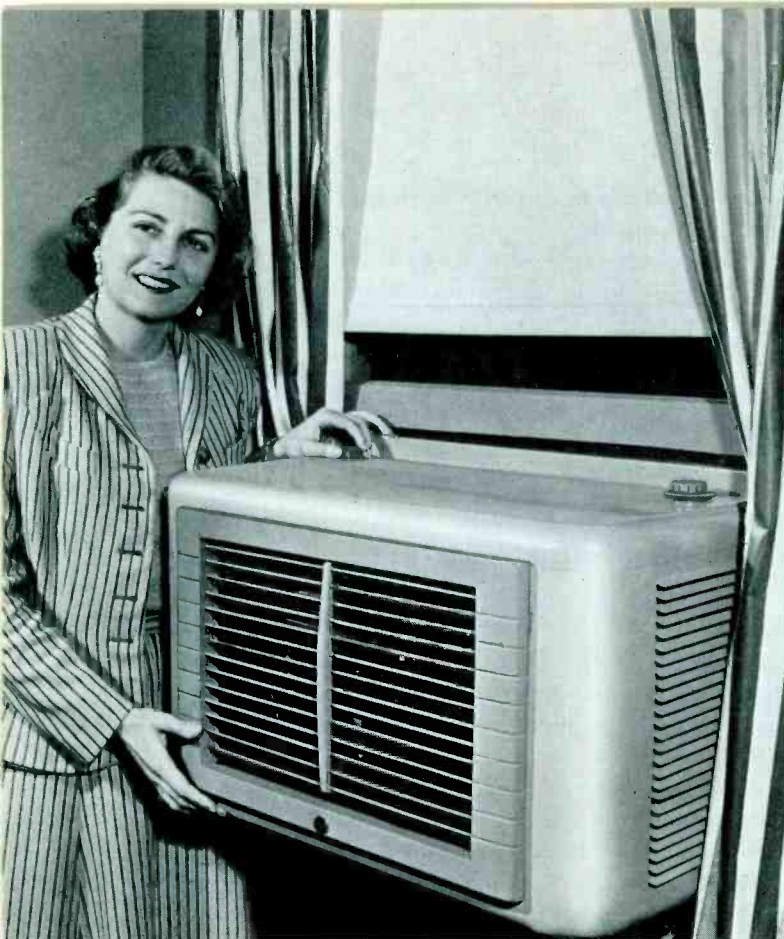
RCA two-way radio communication systems are employed by police, forestry and fire departments,

Assembling large screen television projection units for installation in motion picture theatres.



Automatic 45-rpm phonograph attachments pass final tests at the Indianapolis plant of RCA Victor.





One of the new window-type air-conditioning units which RCA Victor introduced early this year.

public utilities, oil, construction and transportation companies. They also are used widely by industrial and taxicab fleets. These RCA systems are used to great advantage in conjunction with civil defense electronic warning and communication systems.

What products and services 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, radio and television receivers, phonographs, record libraries, and transcription players. The Education Division of the RCA Victor Public Relations Department provides an advisory service to educational institutions in the selection and use of RCA Audio-Visual aids.

To what extent does RCA support "Small Businesses" through purchases of materials and parts?

RCA Victor's active suppliers number 5,000 located in 42 states. These vendors range from small

manufacturers to America's largest corporations. Four-fifths of RCA's suppliers have fewer than 500 employees. About half of them have fewer than 100.

In terms of dollars, about half of RCA Victor's 1951 purchases were placed with these small concerns. The Company continues to work hand-in-hand with this vital segment of American industry, and well recognizes the important role small business should and must play in defense as well as in commercial production.

What is the RCA Service Company, Inc.?

The RCA Service Company, Inc., is a nationwide organization of technical specialists devoted to the 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.

The Consumer Product Service Division first began to take shape in 1939 when a pilot shop and service branch was set up in New York City to make test installations, and to train additional technicians for distributors and dealers.

With the phenomenal expansion of post-war television, Radio Corporation of America quickly realized that the future of the new medium was dependent upon continued good reception. The job of assuring every RCA Victor television owner the best possible performance was delegated to the RCA Service Company, which created service and maintenance contracts that provided quality service on a fixed annual cost or demand basis.

The RCA Service Company is engaged in a continuous effort to improve service standards. Technical bulletins and manuals are available to all television technicians, and lecture clinics have been conducted for more than 53,000 technicians, dealers and other servicing agencies.

What is The RCA Victor Factory Service Contract?

The RCA Victor Factory Service Contract is available to RCA Victor television owners only. A variety of service and maintenance contracts are available to meet the customer's specific requirements, in addition to a full coverage plan giving complete parts and tube protection and unlimited service as needed for a year. Hundreds of thousands of satisfied RCA Victor television owners renew their Contracts year after year.

Can non-contract owners obtain TV and Radio Service?

Yes; conveniently located neighborhood branches in virtually all television markets make it easy for RCA Victor television owners to avail themselves of RCA's own service facilities. Thousands of factory trained technicians make RCA Factory Service available on a time and material basis. Ninety-five percent of the calls are handled right in the customer's home. When it becomes necessary to remove a chassis, modern, fully equipped service shops handle the work on a mass production basis, with personnel being always mindful that the customer wants quick and efficient results.

What is the Technical Products Service Division?

The Technical Products Service Division of the RCA Service Company was created more than a quarter century ago to install and service Sound Motion Picture Equipment. This Division is the nucleus around which the Service Company, as it is known today, has grown.

Today, the Technical Products Service Division provides installation, service, preventive maintenance, and parts and tube replacement plans to motion picture exhibitors, industrial and scientific electronics equipment users, and to the broadcast industry.

Since the beginning of "talkies", RCA Service Company has maintained pre-eminence in the field of motion picture equipment installation and service. Recently, theatre television has enjoyed phenomenal growth. Already the RCA Service Company has established itself in this new field of maintenance. Facilities of the industrial products service section are available to users of RCA Electron Microscopes, Beverage Inspection Machines, Metal Detectors, Sound Systems, Radio Frequency Generators, Industrial Television and Television Film Projectors. AM, FM, and television broadcasters regard the RCA Service Company Broadcast Engineering Section as foremost in the field.

More than 200 field engineers, attached to 11 strategically located District offices, form a nationwide network of equipment installation and service specialists.

What services are performed for the Government?

The Government Service Division of the RCA Service Company, Inc., has hundreds of field engineers with the Air Force, Navy and Army to assist and instruct U.S. and U.N. personnel at home and abroad in

the installation, operation, and maintenance of radio-electronic military equipments produced by RCA and others. These RCA field engineers accompany our Armed Forces to the battlefield, on the sea, in the air.

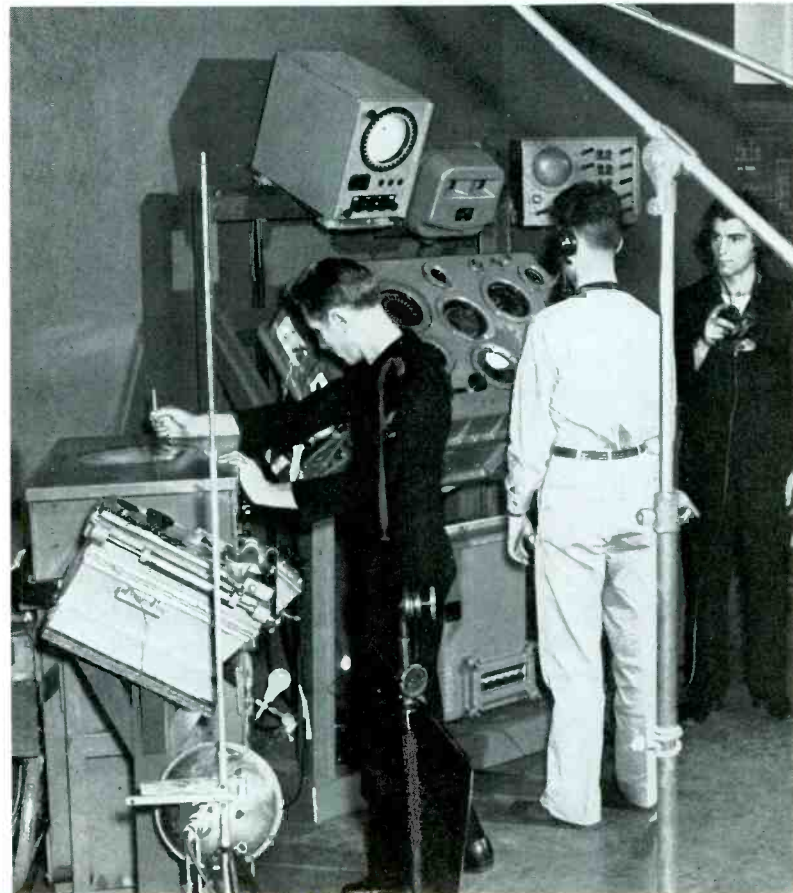
In addition to field engineering, the Government Service Division prepares and produces technical publications including training manuals, equipment instruction books, and installation plans. This technical writing service is made available to all private industries producing defense equipment, as well as to Government agencies.

Training schools are conducted by the Government Service Division to assist the Armed Forces in a training program for National Defense. Formal instruction in the classroom at factory or military base embraces basic, advanced, and practical courses.

What provisions are made for installation and servicing of air conditioners?

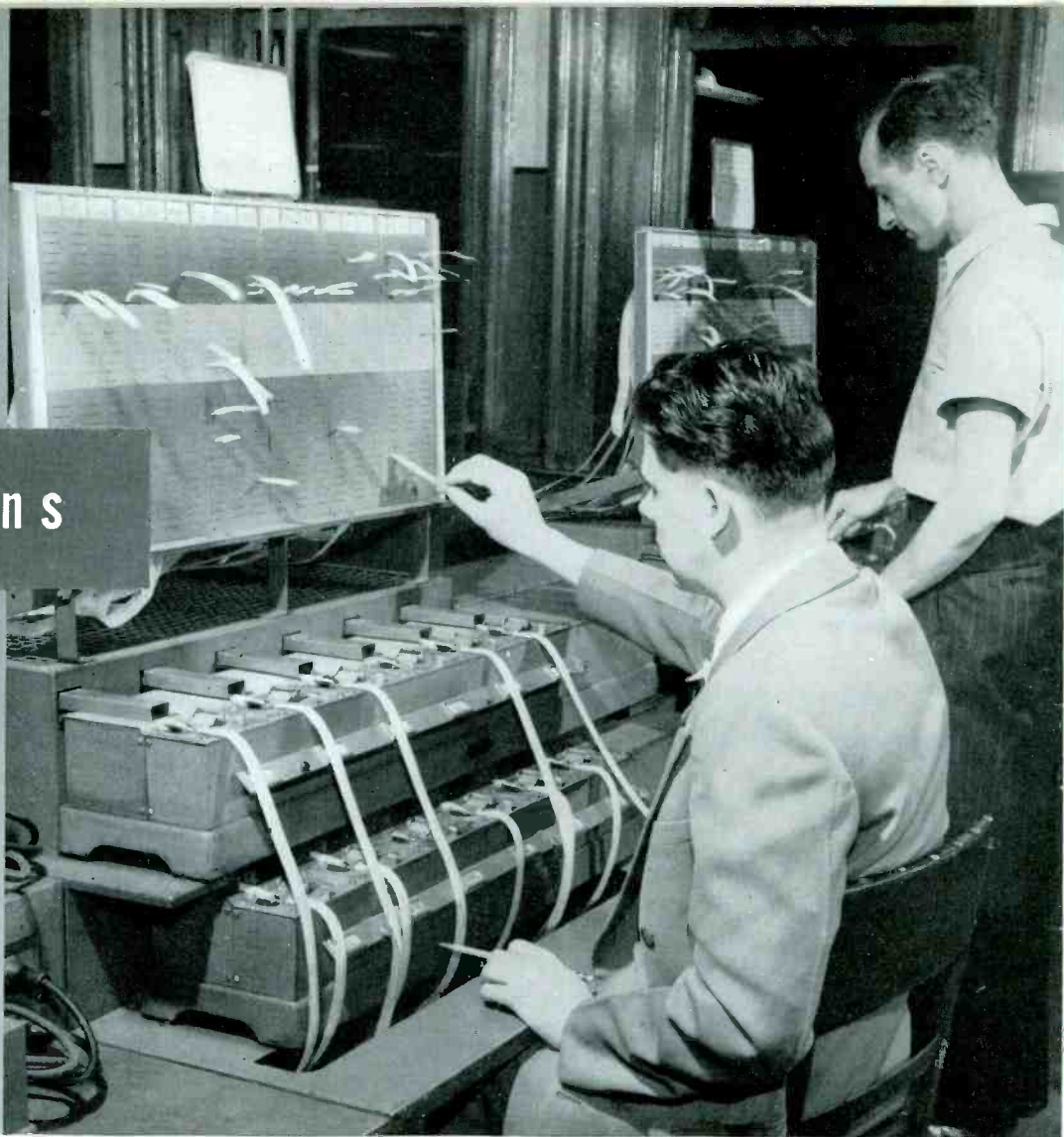
With the entry of RCA Victor into the room air conditioning field, the installation and service facilities of the RCA Service Company have been expanded to include these units. Installation and service contracts also are available for users of RCA 2-way mobile and microwave communications systems.

Training of Armed Forces personnel in the use of electronic equipment is one of the services performed for the Government by RCA Service Company.





communications



Radiograms are sent and received to and from overseas points by these automatic tape-machines at RCA Communications, Inc., in New York.

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.

The main trans-Pacific 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, Guam, Manila, Okinawa, 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 trunkline 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 communications 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
Australia, Melbourne
Bermuda, Hamilton
Brazil, Rio de Janeiro
Ceylon, Colombo — *Via London*
China, Shanghai
Czechoslovakia, Prague — *Via Paris*
Denmark, Copenhagen — *Via Stockholm*
Egypt, Cairo
Finland, Helsinki
Formosa, Taipéh
France, Paris
Germany, Frankfurt, Berlin
Great Britain, London
Greece, Athens
Hawaiian Islands, Honolulu
India, Bombay

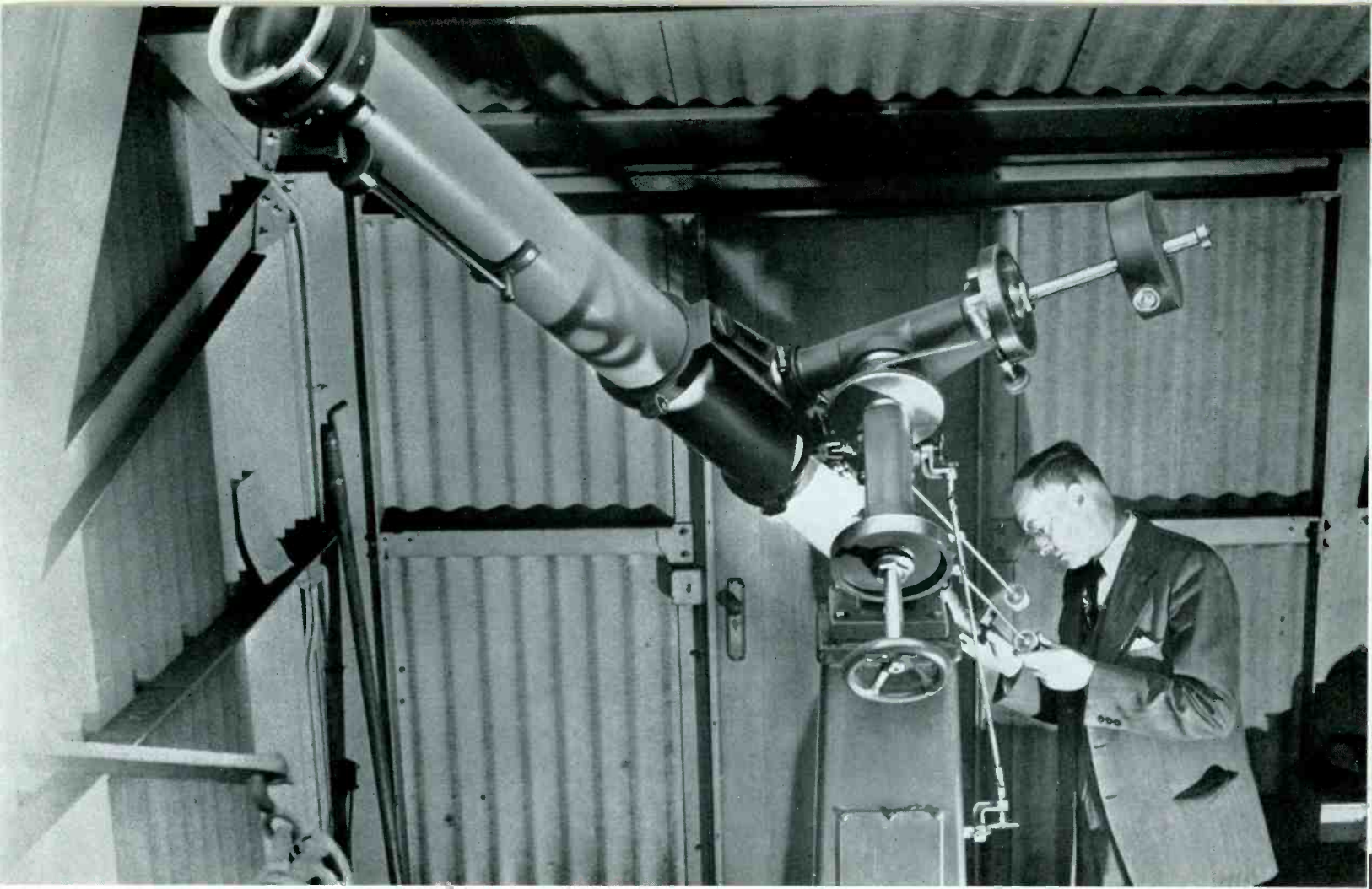
Italy, Rome
Japan, Tokyo
Korea, Seoul
Malta — *Via London (westbound only)*
New Zealand, Wellington
Norway, Oslo
Philippine Islands, Manila
Portugal, Lisbon
Straits Settlement, Singapore —
Via London (westbound only)
Sweden, Stockholm
Switzerland, Berne
Transjordan, Amman —
Via London (westbound only)
Union of South Africa, Capetown
Durban, *Via Capetown*
Johannesburg, *Via Capetown*
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, Great Britain, France, Luxembourg, Germany (Western Zone), Denmark, Belgium and Switzerland. 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 inaugu-



Long-range forecasts of atmospheric disturbances that might affect transoceanic communications are carried out in this observatory at RCA Communications, Inc.

ated 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 channels leased to 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 Com-

munications, 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 originating 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 terminating in the principal cities of the 68 countries listed below:

- | | |
|--------------------|--------------------|
| Argentina | Ecuador |
| Australia | Egypt |
| Austria | Finland |
| Belgian Congo | France |
| Belgium | French West Africa |
| Bermuda | Germany |
| Brazil | Great Britain |
| Canada | Greece |
| Chile | Greenland |
| China | Guam |
| Colombia | Guatemala |
| Cuba | Haiti |
| Czechoslovakia | Hawaii |
| Dominican Republic | Hong Kong |

Terminal office of RCA Communications in San Francisco which connects the United States with the Far East and islands in the Pacific.



- | | |
|-----------------------|---------------------|
| Iceland | Okinawa |
| India | Pakistan |
| Indo-China | Panama |
| Indonesia | Philippines |
| Iran | Poland |
| Iraq | Portugal |
| Israel | Puerto Rico |
| Italy | Spain |
| Japan | Surinam |
| Korea | Sweden |
| Lebanon | Switzerland |
| Liberia | Syria |
| Macao | Tahiti |
| Martinique | Tangier |
| Mexico | Thailand |
| Netherlands | Turkey |
| Netherlands, Antilles | U. S. S. R. |
| New Caledonia | Union of So. Africa |
| New Zealand | Venezuela |
| Norway | Yugoslavia |

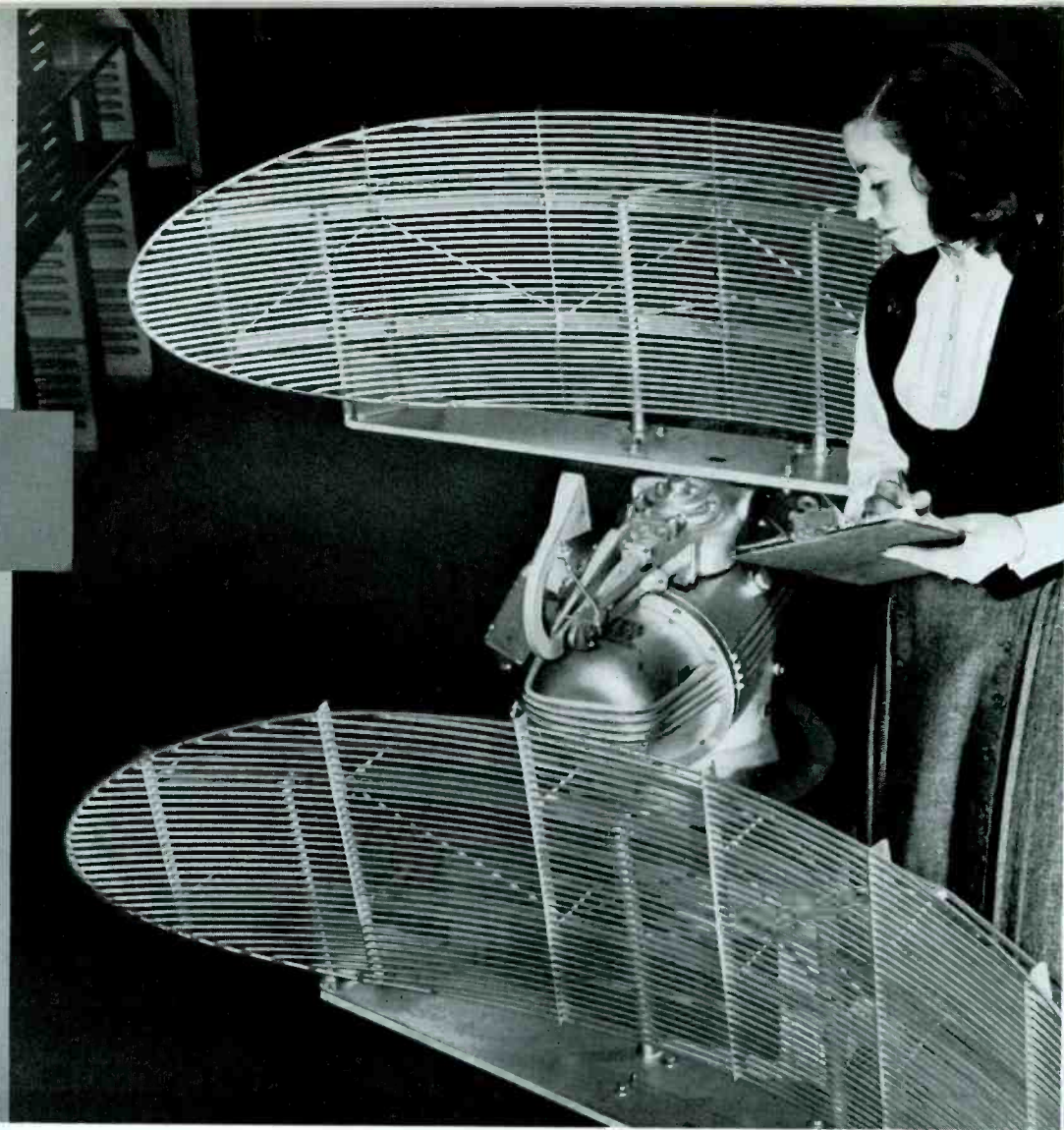
RCA also provides service of superior quality to countries other than those listed here, by carefully planning the routing of its worldwide traffic in a way that takes fullest advantage of the best available connecting facilities.

This stock of spare tubes insures continuous operation of RCA's 52 powerful overseas transmitters at Rocky Point, New York.





marine radio



Two radar antennas undergo final inspection at Radiomarine Corporation of America in New York.

T. P. WYNKOOP
President,
Radiomarine Corporation of America

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 communications 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.

Does Radiomarine operate branch offices outside of New York?

Radiomarine has more than 30 service depots and offices located in principal seaports of the United

States. Many of these service port offices 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 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 passen-

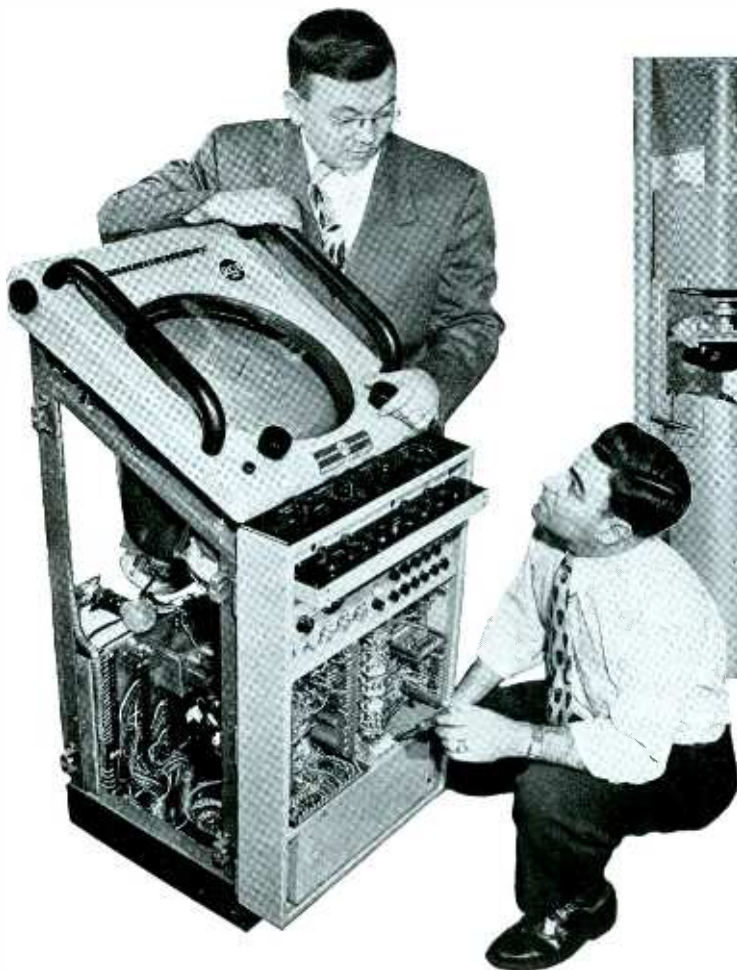
gers and personnel, enables them to have flowers, candy, fruit or magazine subscriptions delivered to any address in the continental United States. The charge for the service is the value of the gift selected plus a flat rate for the radiogram, which includes a personal greeting to accompany the delivered 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 (above left) and radiotelephone (right) are typical of the RCA apparatus installed aboard the SS "Independence". Other RCA equipment on this modern liner includes radar, loran and complete radiotelegraph facilities.

Engineers test operation of a Radiomarine 3.2 centimeter radar with 16-inch viewing scope.



technical training



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



Students receiving instruction at RCA Institutes.

What is RCA Institutes, Inc.?

RCA Institutes, Inc., comprises a Technical Institute, which offers an Advanced Technology Course at collegiate level, and a Vocational School which offers courses in Radio and Television Broadcasting, Radio and Television Servicing, Advanced Television Servicing, Radiotelegraph Operating, and International Morse Code Instruction.

The Advanced Technology Course provides the day student, in 27 months, with a thorough knowledge of radio technology, supplemented by detailed treatment of its principal commercial applications. This course is approved by the Engineers' Council for Professional Development which is an accrediting body

representing the combined engineering societies of the United States.

The Broadcasting Course trains the day student, in 18 months, for the operation and maintenance of radio and TV broadcast and commercial transmitters and station operation, and for the maintenance of receivers.

The Servicing Course, in 9 months, trains the day student for the maintenance and installation of radio and television receivers.

The Advanced Television Servicing Course is concerned with the location and correction of faults in latest types of TV receivers and is based on the students' prior knowledge of television receiver circuits. This course is 3 months in the day school.

The Operating Course trains students in 9 months for duty as radiotelegraph operators on shipboard or at land stations. There is increasing employment in this field in view of the current expansion of our merchant marine. The International Morse Code is part of this course and is also offered separately to operators who wish to renew their practice.

All courses include detailed laboratory training.

What instruction does RCA Institutes offer in television?

All courses, except the Operating Course, include instruction in TV. The design, maintenance and operation of the complete TV system are covered in the Advanced Technology Course. The maintenance and operation of the complete TV system are covered in the Broadcasting Course. The installation and maintenance of TV receivers are covered in the Servicing Course.

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 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. Courses 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.

Does RCA Institutes maintain a Placement Service?

Yes; to assist students in obtaining satisfactory positions, RCA Institutes maintains a placement service. A recent survey shows that of a total of 794 graduates during the past year, 772 or 98.5 per cent were employed. These graduates became associated with development laboratories of leading electronic companies and broadcasting stations in 43 different states.

Through the years, RCA Institutes has kept abreast of the major changes in radio and television, and has sought to maintain a high level of instruction. Today, the school not only ranks as one of the leading technical institutions of the nation, but is also recognized as a valuable source of qualified men.



Circuits and assembly of a radio receiver are explained to students at RCA Institutes.



Broadcasting techniques and control room operations are included in courses at RCA Institutes.



foreign trade



Senoritas in Madrid display the RCA Skyliner portable radio.

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 in the RCA Building, 30 Rockefeller Plaza, New York.

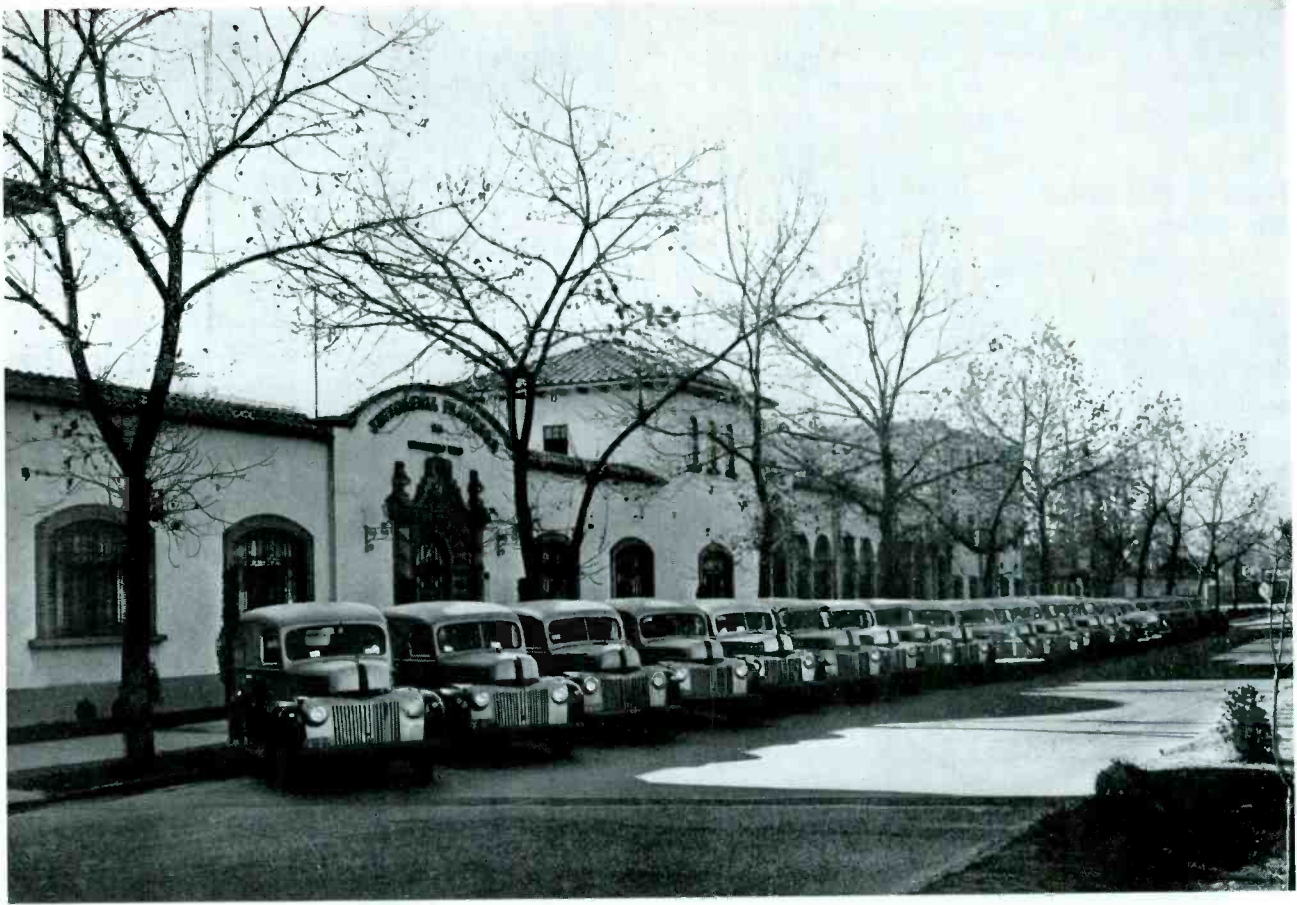
What are RCA's associated companies in other countries?

The associated companies for which RCA International Division provides management counsel are:

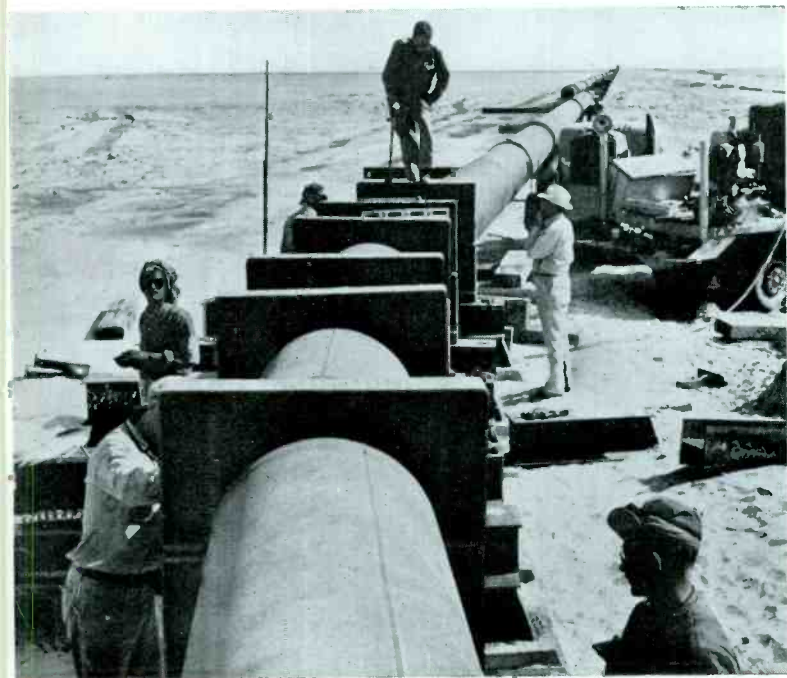
RCA Victor Argentina, S.A., in Buenos Aires; RCA Photophone of Australia, Proprietary Ltd., in Sydney; RCA Victor Radio, S.A., in Rio de Janeiro, Brazil; RCA Victor Company, Ltd., in Montreal, Canada; Corporacion de Radio de Chile, S.A., in Santiago; RCA Victor Company of China, in Hong Kong; RCA Photophone, Ltd., in London, England; Photophone Equipments, Ltd., in Bombay, India; Radio e Televisione Italiana, S. p. A., in Rome, Italy; RCA Victor Mexicana, S.A. de C.V., in Mexico, D.F.

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

Television is growing in importance abroad. TV



Delivery trucks of a Mexico City dry-cleaning firm are equipped with RCA mobile radio units.



Daily transportation of 300,000 barrels of oil over Tapline's 1719 kilometer pipeline in Trans-Arabia, is aided by RCA communication system.

sets are assembled in RCA factories in Argentina, Canada, Brazil, Mexico. Companies in Argentina, Canada and Chile manufacture and distribute records, radio receivers — including automobile radios in Canada — some broadcast transmitters and special communications apparatus. Plastic products are made in the Argentine factory.

The Brazilian company's factory in São Paulo produces phonograph records and radio receivers. A complete building in Rio de Janeiro houses activities there: offices, recording studios and 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. 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. RCA's newest company, Radio e Televisione Italiana, S. p. A., was organized in 1951.

Does RCA export products from this country?

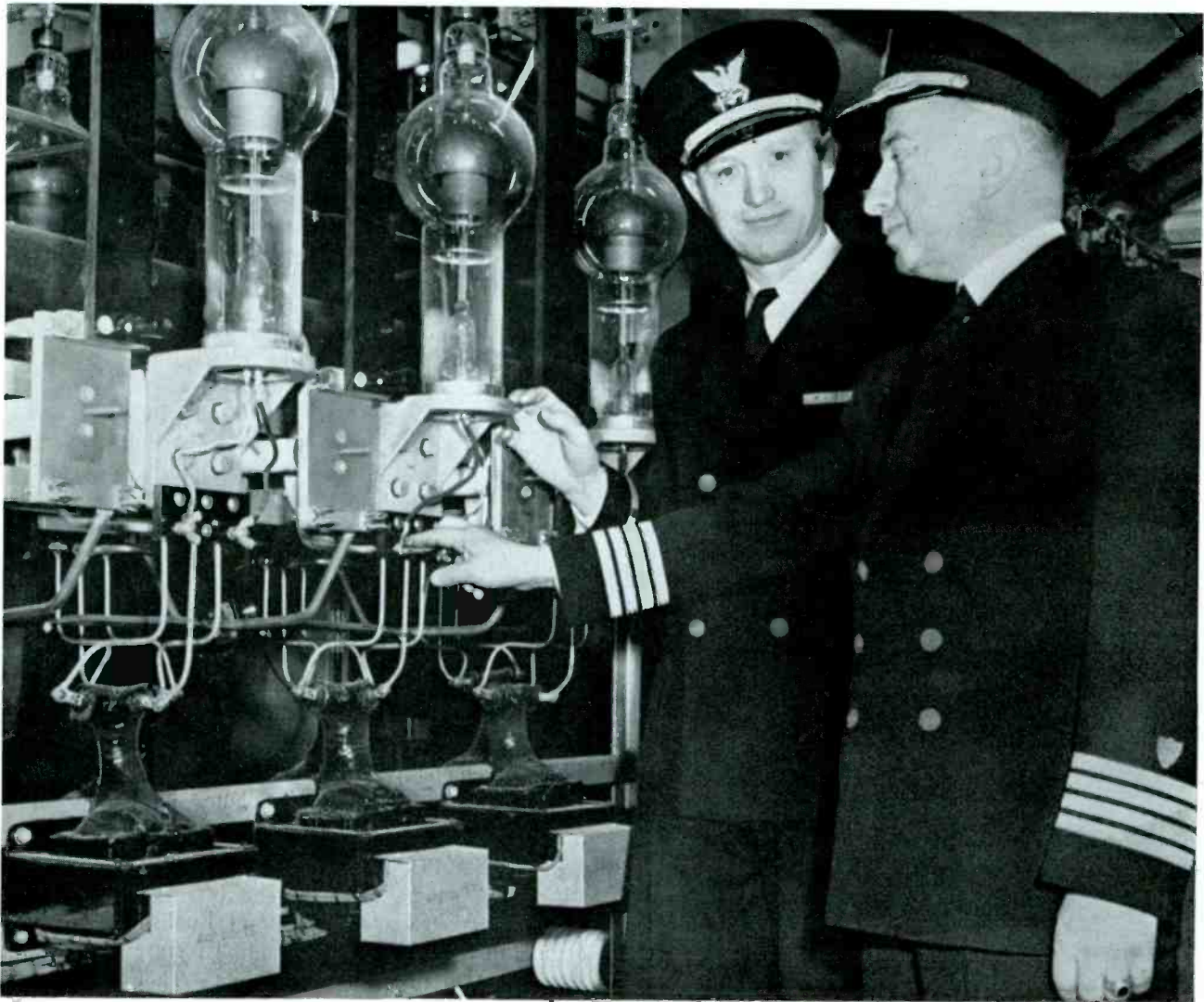
Yes; RCA International sells abroad all products manufactured by RCA, wherever export, import and exchange regulations allow. The products sold range from miniature tubes supplied to distributors and manufacturers, to complete communications networks supplied to governments, and marine radio installations 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?

Nine RCA-equipped television stations are on the air or scheduled to go into operation outside of the U.S.A. These are: one station each in São Paulo and Belo Horizonte, Brazil; two stations in Mexico City, one in Matamoros; one in Ciudad Trujillo, Dominican Republic; three stations in Havana, Cuba.

Officers of USS *Courier* inspect some of the electronic equipment which supplies power for the 150 kw transmitter designed and built by RCA for the Voice of America's floating broadcaster.



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 shortwave 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 radiotelegraph 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, in 1931, perfected the velocity microphone, which became the standard of broadcasting stations; in 1934 it introduced the unidirectional microphone, used widely in film and phonograph recording as well as in 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.

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.



Compact, light-weight "walkie-talkie", developed for the Signal Corps, is one of RCA's contributions to the Nation's defense.

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 200,000 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 dehydration 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."

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. Seely, 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 application 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 sniperscope, 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 "talkback" 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 "Ultra-fax", the new system is a development of RCA Laboratories and the Eastman Kodak Company.

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 rpm 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 Graphechon, 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 Typhoon", 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.

During National Convention of I.R.E. on March 21, 1951, RCA scientists announced development of a new gas-discharge tube — the Plasmatron — which provides a new means of high-speed power control and of radio circuit operation.

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 Radio 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)



Brig. General David Sarnoff introduced television to the public at the New York World's Fair in April 1939.

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 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*)

Coxial 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 TV studio. (*February 20*)

RCA-NBC made successful tests with first projection-type color 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



NBC television cameras scanned ceremonies at opening of New York's World's Fair on April 30, 1939.

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 TV 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, via coaxial cable. (*June 19*)

Post-war television receivers introduced by RCA Victor. (*September 17*)

Color television pictures on 15- or 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 at "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 prizefight 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-Wagernian 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, near 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 FCC at Washington, D. C.; one tube used a single electron gun; the other, three 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



Five-kilowatt power tube developed by RCA for transmission of both television sight and sound.

functions with its own battery-power supply. *(March 22)*

RCA revealed results of tests in Bridgeport, Connecticut, which showed that by directing the radiated energy from the antenna of a UHF television station slightly downward toward a desired city, the signal strength of the station could be very considerably increased in that city while the interference which the signals might create at distant cities was correspondingly reduced. *(May 8)*

A 21-inch direct-view tricolor picture tube, making possible larger color pictures for the home, shown by RCA. *(July 9)*

RCA-NBC conducted color television field tests simultaneously on VHF and UHF, using, for the first time, standards chosen by the National Television System Committee. *(September 7)*

Transmission of compatible color television programs was field-tested over coaxial line and radio-relay facilities between New York and Washington, D. C. *(September 20)*

In connection with other color television field tests, RCA exhibited a color projector which provided color pictures on a 9 x 12-foot theatre screen, at the Colonial Theatre, New York. *(October 16)*

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