APRIL 1954

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

A Year of Progress!

The steady progress that has characterized the history of the Radio Corporation of America continued in 1953 as the volume of business increased for the seventh successive year, reaching an all-time high of $853,054,000.

Progress in development of color television, approval by the Federal Communications Commission of signal standards on which the RCA compatible color television system is designed to operate, set the stage for 1954 as the "Introductory Year" of color television.

Significant advances on several fronts were made by RCA in 1953:

1. Magnetic tape recording of television programs in both color and black-and-white, ushering in a new era of "electronic photography."

2. A new method, which, for the first time in history makes it possible to convert atomic energy directly into small but usable quantities of electrical energy with sufficiently high current multiplication to operate electronic apparatus. Based on this method, an experimental RCA Atomic Battery powered by a minute quantity of a long-life radioactive isotope was demonstrated.

3. Continued development and application of transistors revealed that electronics of solids holds tremendous possibilities for new advances in radio and television sets as well as in other electronic equipment.

Foreseeing new opportunities in all phases of its activities, RCA has intensified research, strengthened and expanded its organization, increased manufacturing capacity and diversified its products. Our objective is to maintain the leadership of RCA in radio, television and electronics, to serve America and its people through production of the finest instruments and by rendering the most efficient and economical services. Our watchword is *quality* and our aim is to maintain the symbol "RCA" as a hallmark of dependability, superior performance and progress.

David Sarnoff
Chairman of the Board

Frank M. Folsom
President

Results at a Glance

from RCA 1953 Annual Report

	1953	1952
Products and Services Sold	$853,054,000	$693,941,000
Per cent increase over previous year	22.9%	15.9%
Profit before Federal Taxes on Income	72,437,000	67,362,000
Per cent to products and services sold	8.5%	9.7%
Per common share	4.94	4.62
Total Federal Taxes on Income	37,415,000	35,037,000
Per cent to profit before Federal taxes on income	51.7%	52.0%
Per common share	2.67	2.52
Net Profit	35,022,000	32,325,000
Per cent to products and services sold	4.1%	4.7%
Per common share	2.27	2.10
Preferred Dividends Declared for Year	3,153,000	3,153,000
Per share	3.50	3.50
Common Dividends Declared for Year	16,810,000	13,858,000
Per share	1.20	1.00
Total Dividends Declared for Year	19,963,000	17,011,000
Reinvested Earnings at December 31	164,068,000	153,299,000
Stockholders' Equity at Year End	215,719,000	202,287,000
Working Capital at Year End	228,941,000	205,288,000
Ratio of current assets to current liabilities	2.9 to 1	3.0 to 1
Additions to Plant and Equipment	33,644,000	26,561,000
Depreciation of Plant and Equipment	13,999,000	11,128,000
Net Plant and Equipment at Year End	134,182,000	115,444,000
Number of Employees at Close of Year	65,000	64,000

A copy of RCA Annual Report for 1953 will be sent upon request. Write Radio Corporation of America, 30 Rockefeller Plaza, N. Y. 20.

BOARD OF DIRECTORS

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Radio Corporation of America

World leader in radio—first in television

VOLUME 13 NUMBER 2

Radio Age

ARCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

APRIL 1954

COVER

The first commercial RCA color television sets undergo their final test at the RCA plant in Bloomington, Indiana.

CONTENTS

NOTICE

When requesting a change in mailing address please include the code letters and numbers which appear with the stencilled address on the envelope.

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RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.

DAVID SARNOFF, *Chairman of the Board*
JOHN Q. CANNON, *Secretary*
FRANK M. FOLSOM, *President*
ERNEST B. GORIN, *Treasurer*

RCA Begins Production of Color TV Sets; Gives Manufacturing "Know-how" to Industry

Plans Announced to Bring Color TV into American Homes; Deliveries of 15-Inch Color Receivers Started from Bloomington, Ind., Plant

Production of the Radio Corporation of America's first commercial color television sets began on March 25 in the Bloomington, Ind., plant of the RCA Victor Home Instrument Division as the initial step in a comprehensive program to bring color television into American homes.

The following day, RCA revealed its color plans to seventy competing manufacturers, furnishing detailed engineering and manufacturing information on RCA's first commercial model — the CT-100. At the same time, a full report was made on RCA's manufacturing plans and on the National Broadcasting Company's plans for colorcasting.

As a prelude to the meeting of television manufacturers, RCA invited press representatives to Bloomington on March 25 for an inspection of its color television production line, which is more than two city blocks in length and geared to an output of 2,000 color sets a month.

RCA announced that it planned:

1. To manufacture during 1954 — regarded as the "introductory year" for color television — about five thousand 15-inch color receivers and about five thousand 19-inch color receivers. These quantities can be increased to meet the public demand as it develops.

2. To begin shipment of color sets the following week. Initial deliveries are going to RCA distributors in areas where network color signals can now be received. Already, color reception is possible in 35 large cities from the Atlantic to the Pacific Coast. It is estimated that by the end of 1954, one hundred twenty-five TV stations will be equipped for color broadcasts, providing coverage for 75 per cent of American homes.

3. To expand color programming over the NBC network. By the end of this year, NBC will be colorcasting two programs a week from New York and a third from Burbank, Calif. In addition, NBC will present a series of specially produced ninety-minute shows, "Spectaculars in Color," the most elaborate in the history of broadcasting, beginning in October, 1954.

◄ Largest set ever built for television — created for the NBC broadcost of "King Richard II."

J. B. Elliott, Executive Vice-President in charge of Consumer Products, discussing the outlook for the color television market, said:

"Basically, as was the case of black-and-white TV, we are interested in seeing color television grow, steadily and securely, into a national service. This will take a lot of doing. Such an undertaking is too big for any one firm. It must be an industry-wide project, backed to the limit by each of the separate, competitive companies.

"We believe that the prospects for color television today are just as bright as black-and-white's were seven years ago. To show the extent of RCA's confidence, I quote the figures we prepared — figures on the sales prospects of color receivers during the next five years.

"During this year and next we believe the demand for color sets will exceed the supply. According to our estimates, the industry should be able to sell 70,000 units in 1954, and 350,000 in 1955.

"During 1956 we believe unit sales will reach 1,780,000; during 1957, 3,000,000; and during 1958, about 5,000,000. These annual sales add up to the very satisfactory total of 10,200,000 color sets in use five years from now.

"We believe that the RCA initial model CT-100 (with a suggested list price of $1,000) will help make television history. And we believe the market for color is as great as the market for black-and-white television was seven years ago."

Information to Competitors

E. C. Anderson, Vice-President of the RCA Commercial Department, made these comments on the plant visit by RCA's set licensees:

"This visit is another expression of RCA's long-standing policy to introduce color television at the earliest possible time. We have devoted substantial cash and considerable manpower to this important task. We believe that the process of continuing research and development by RCA and by other companies in this vital new field of color will be commercially rewarding to the industry within the next few years.

RCA tricolor tubes are installed in the first commercial production sets at Bloamington, Ind., RCA plant.

"Color receivers are now ready to enter the market. With them comes the need for new studios, new transmitting equipment, and for new factories to build these things. In short, a great new industry is being born.

"We have made available to our competitors and licensees the benefits of our pioneering and costly efforts in color as well as in black-and-white television. Since 1946, we have kept our licensees abreast of our progress in the development of compatible color television through demonstrations, technical bulletins and other informational services.

"We are fulfilling the promise we made in 1950 to make available to licensees complete manufacturing information on our first commercial color television receiver. This information includes an engineering description, manufacturing drawings, bill of materials, and sources of supply as well as an inspection tour of our color production set-up at our Bloomington factory."

D. Y. Smith, Manager of Marketing, RCA Tube Division, told the licensees of RCA production plans for tubes, special components and testing equipment. He stated that six brand new receiving tubes specifically for color television circuits, as well as electronic components for color television are now available, and that the Tube Division will begin shipments soon of three new items of equipment for the servicing of color receivers.

T. A. Smith, Vice-President in charge of RCA Engineering Products Division, told of progress in the equipping of stations to carry color network programs. Early in March, he said, RCA started shipment of additional color cameras to both NBC and the Columbia Broadcasting System, providing more facilities for producing color programs. In addition, live color cameras will be shipped to several independent stations during April.

Announcement of the NBC programming plans was made to the licensees by Barry Wood, Executive Producer and Color Coordinator for NBC.

The Production Line

The production line shown to the press and the licensees turns out the RCA Model CT-100, an open-face, console-type receiver which has a mahogany cabinet and a 15-inch RCA tricolor picture tube. Production of

a second model, with 19-inch tube, will start sometime later this year.

The tour, from receiving platforms to loading docks, included an inspection of all-channel UHF (ultra high frequency) and VHF (very high frequency) color tuner assemblies. It moved along a base assembly line where scores of women installed sub-assemblies, aligned circuits and soldered connections and parts in the receiver's base chassis.

It then moved downstairs where men handled the work of installing picture tubes, tuners, base assemblies and other components in the cabinets. It passed from assembly into the test area, where engineers and plant technicians brought the color screen to life with vivid bar patterns and, even more spectacularly, with a bright picture that provided a critical check on color test controls.

The visitors next inspected the crating operation where an overhead conveyor deposited cardboard box containers onto the moving line — and each container packaged a factory tested color set. As a final step, the visitors followed the crates into a storage warehouse where they were tagged for delivery in early April — with American homes as their destination.

RCA reached the "milestone" of commercial production less than a hundred days after the Federal Communications Commission approved standards for compatible color television. This nearly halved the Corporation's original estimate of six months.

During February RCA passed the 2,000-a-month rate in the production of tricolor picture tubes. This rate was achieved three months ahead of schedule.

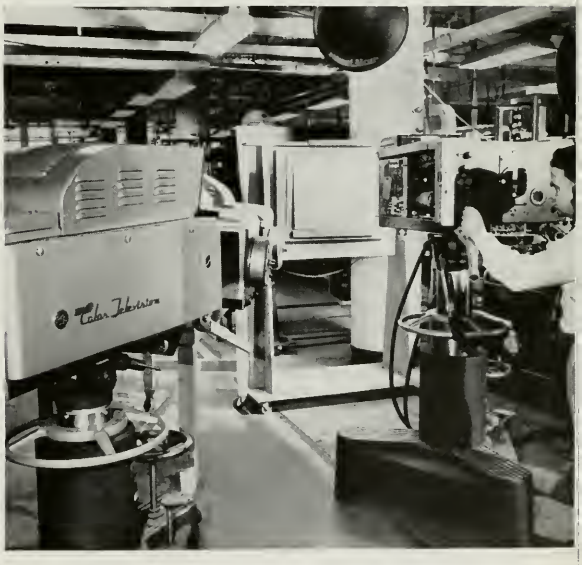
The newsmen were welcomed by T. A. Weeks, manager of the RCA Bloomington plant, who described production requirements for a color set, as compared with black-and-white. He pointed out that RCA's most popular 21-inch black-and-white set now in production, uses a total of 437 parts, including 19 tubes and approximately 63 feet of wire. The CT-100 color receiver has a total of 1,012 parts including 35 receiving tubes and the 15-inch color tube, along with approximately 150 feet of wire.

The Bloomington plant, with 1,850 employees, is one of the most modern in the nation. Installed there, at a cost of more than $500,000, is a newly developed test unit to permit factory tuning of color television sets to insure faithful color reception. The equipment is, in effect, a small-size television station which can transmit color test patterns over a closed-circuit in the plant.

The factory is a two-story stone structure located on an 81-acre tract. It has 430,000 square feet of space, of which 30,000 are now being utilized for the assembly of color television receivers.

Welding a 19-inch tricolor tube at the Lancaster, Pa., RCA plant, where tube is in pilot production.

RCA color TV cameras undergo final testing at end of commercial production line in Camden, N. J.



Challenges and Opportunities of Today

Sarnoff, Accepting Humanitarian Award, Says Men Must Learn to Live in Unity or Perish—He Urges Greater Understanding Among All Peoples

URGING greater understanding among the peoples of the world to meet the challenges and opportunities of this age, Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, told a Philadelphia audience on March 3 that either all men will learn to live and work together in unity, or all men will perish together.

General Sarnoff was the guest of honor and principal speaker at a dinner at which he was presented the 1954 Humanitarian Award of the Golden Slipper Square Club.

"The activities of the Golden Slipper Square Club are to be commended precisely because they express the living spirit of American democracy, in terms of freedom, good citizenship, neighborliness, tolerance and fair play," he said. "You help teach your growing community—not by words but by example—that it is blessed for brethren to dwell together in peace and unity.

"It behooves us to learn that lesson quickly because the pace of modern life is so swift. In recent years we have acquired immense new knowledge and developed new means that can destroy civilization. Unless we learn to harness those new powers for useful and beneficient purposes, we shall find ourselves the victims of our own progress, trapped by our own genius.

"That is the great challenge to man if he is to survive—not merely in the physical but in the spiritual sense. Otherwise, like the patient in the popular story, we may die of improvements. Either all men will learn to live and work together in unity, or all men will perish together as the sun sets over the hills of Time."

Science and Religion

Declaring that there is no contradiction between science and religion, General Sarnoff continued: "Since the dawn of civilization these have been partners in humanity's continued efforts to learn the truth about itself and the universe, and to convert that truth into human values. Science and invention, far from denying the divine mystery of life, have made us more aware of it.

"The communion of sun, moon and stars, the winds and the rains, reveals the wonders of Nature working together in unity and harmony. The invisible electrons and atoms alike are parts of a harmonious pattern. But humanity, too, is a vast universe of forces which call for unity. These mortal forces—social, political, economic—must be brought into a pattern of harmony if we are to live in peace and prosper, if we are to come closer to the divine in man.

Brig. General David Sarnoff

"Our new knowledge of Nature and the modern discoveries of science require, more than ever before, that man advance spiritually as fast as he strides forward technologically. Only by such dual progress can we hope to meet the needs of a rapidly changing world. To achieve a harmonious blending of material and spiritual powers, man will do well to ponder the teachings of religion, not only the lessons of science."

Taking the electron—the tiniest thing in the universe—to illustrate how unity leads to achievement in the field of science, General Sarnoff pointed out that the electron accomplishes little by itself, but multiplied and working in harmony with other electrons, it has created the Electronic Age. He added: "An atom, by itself, is meaningless. But when its nuclear energy is released in unison with countless other atoms, there is a chain reaction that can influence the course of the world for peace or war.

"Within the past decade we have all entered the Electronic and Atomic Age—as apprentices. We are

(Continued on page 32)

Guided Missiles

Rocket propels a pilotless bomber on its takeoff

By P. B. Reed

Vice President in Charge of Government Service, RCA Service Company, Inc.

A B-61 pilotless bomber, sleek and deadly in its scarlet paint, roars into the air from a Florida beach, propelled by a flaming rocket. . . . It soars out over the Atlantic, flashing over remote islands in the Bahama group and disappearing to the southeast.

On the remote isles near which it passes, electronic eyes follow its swift flight, checking any deviation from the scheduled path, computing altitude and speed. . . . Back at the launching site, electronic ears and brains receive constant impulses from the missile itself, recording engine performance, response to controls and a multitude of vital details that tell the story of success or failure. . . .

Far to the southeast, at an unspecified point along the 1,000-mile course, the missile reaches the end of its path and plunges into the waters of the Atlantic. The missile has completed its mission; but it has left behind a mass of test data in the form of electronic information printed on tape, undeveloped film, graphs and charts — all still to be analyzed and combined into a set of comprehensive records essential to the missile manufacturer in developing future models.

The Radio Corporation of America, through the RCA Service Company, has taken over the vital function of operating and maintaining the hundreds of electronic and optical instruments used to track the missiles in their flight, collecting and reducing to usable form the test data for the manufacturer and the United States Air Force, and helping to develop new tracking equipment and techniques as swifter and longer-range missiles are tested.

The operation is based on the Air Force Missile Test Center, stretching along the Atlantic coast of Florida from Cape Canaveral to Patrick Air Force Base, near Cocoa. The center occupies a strip of once nearly deserted land between the Atlantic Ocean and the Indian River. Established in 1951 by the Air Force, the station is the answer to the growing need of the United States and its allies for a suitable location to test guided missiles, drones and pilotless bombers. To seaward, the flight range can be opened when necessary as far as Puerto Rico, providing a practical length of over 1,000 miles.

In May, 1952, the Air Force suggested that certain parts of the missile test program could be taken over by an industrial concern, with a substantial saving to the Federal government. Among the dozen companies which competed for the contract, it was apparent that Pan American World Airways, with its extensive experience in the Caribbean area, and the Radio Corporation of America, with its wide knowledge and long experience in electronics, were ideally suited for the task.

Since October, 1953, Pan American and RCA, as a sub-contractor, have taken over, bit by bit, the functions of the Air Force personnel who had been developing and operating the range during the previous three years. The executive and organizational talents of R. S. Mitchell, Division Manager of PAA's Guided Missile Range Operation, and A. L. Conrad, RCA's Guided Missile Range Operation Manager, have been largely responsible for a smooth transition from government to civilian operation of the Missile Test Center.

The jobs which are now falling to the lot of RCA engineers and technicians on the range provide a glimpse into the awesome complexities of guided missile operation. The missiles themselves are among the most complex mechanisms devised for flight, and the successful completion of a single test involves a series of separate but closely co-ordinated tracking and recording facilities without which the tests would be valueless.

Preparing for the Test

When a contractor sends a missile to the center, it is taken to one of the hangars at Patrick Air Force Base to be meticulously checked by Air Force personnel and representatives of the manufacturer. At the same time, personnel of RCA's Guided Missile Range Operation at the center itself and at the down range tracking stations in the Bahama Islands are occupied in testing and calibrating the electronic and optical instruments that will receive and record data from and about the missile during its flight.

Several distinct groups of scientists and engineers will perform key roles in the test that is to come:

The Systems Analysis and Performance group will analyze and evaluate the effectiveness of the range instrumentation services.

Among the scientists on this task is a slender, intense German expert, Dr. A. E. Hoffman-Heyden, a specialist in microwaves, whose main function is to check the accuracy of the radar tracking apparatus which supply data to range instruments and to the Range Safety personnel who must make certain that the range is clear for a test and must destroy the missile if it strays from its course.

The Precision Instruments Shop, under R. G. Meier, prepares the expensive and precise cameras and theodolites which will record the action of the missile at the critical moment of launching.

The Radar Shop, headed by Judson Eidson, tunes and calibrates the tracking radar sets which follow the flight of the missile as it hurtles out over the Bahamas.

The Test Instrument Shop, directed by Willard Van Heiningen, calibrates and repairs the meters and other test instruments used throughout the project, and operates what amounts to a "baby" Bureau of Standards to keep existing and newly developed tracking equipment up to its task.

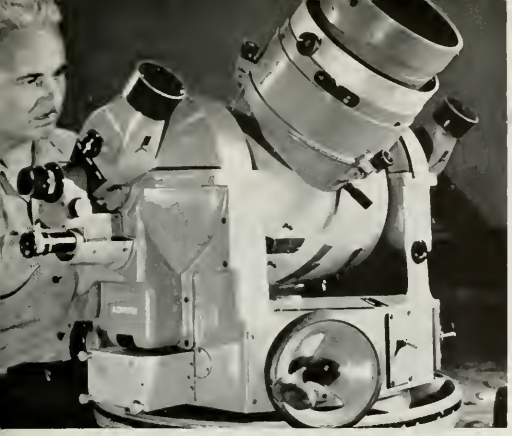
Four Aspects of Test Work

When the missile is launched, the RCA staff will be responsible for four critical aspects of the test — electronic and optical tracking of the missile in its flight, watching over the recording apparatus which receives information from the missiles, communicating observations from the island outposts back to the launching site, and co-ordinating the mass of data into a comprehensive performance record as rapidly as possible.

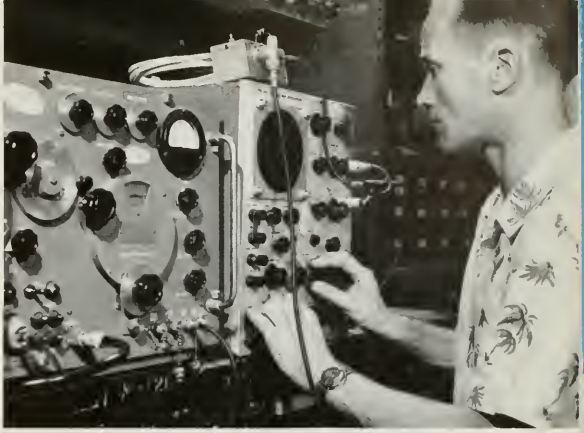
For hours, the pre-flight and ground checks continue. The missile is taken on a portable launcher to the launching site at Cape Canaveral and lined up on a heading that will carry it over the least inhabited areas of the Bahamas. Meanwhile, reconnaissance bombers, transports and crash boats of the Air Force have been warning ships and small boats away from the range. Only after all patrol craft have declared their areas clear will the Range Safety Officer give the final count-down to the second of launching.

Safety precautions are carried to the ultimate, both for the personnel in charge of the tests and for all people and places the length of the range. Should a missile prove defective or appear to be straying from its course without the possibility of being guided back, the Range Safety Officer destroys it with an electronic signal that detonates a destructive charge in the missile. If the tracking radar should lose contact with the missile entirely, a self-destructor circuit automatically goes into operation.

Air Force map shows guided missile range



R. G. Meier checks camera that will record takeoff



Dr. A. E. Hoffman-Heyden adjusts tracking apparatus

As the final minutes pass, sirens are sounded at the launching site and all personnel except cameramen and key technicians take shelter inside the three-foot walls of the control building at the launching pad or within the huge Central Control Building.

A voice counts the seconds over loudspeakers in the buildings — "X minus five - four - three - two - one —" and zero is lost in the roar of the flames that jet from the booster rocket as the firing button is pressed and the glittering missile shoots into the air. The telemeter equipment aboard the missile already has started to send in its information, and batteries of motion picture and still cameras have made their record of the launching. The radar tracking which will be continuous from the site has begun, and the Air Force F-80's and F-86's which follow the flight have slid alongside the missile as its booster rocket drops to the ground.

Once the flight has ended, two more RCA groups play their special roles. The Photographic Laboratory, directed by M. T. Owensby, gathers in, develops, processes and prints the thousands of feet of film that have been exposed, while the Data Reduction Branch reduces to usable graphs and charts the tape records of the flight that have been recorded electronically from the missile. These records, classified, organized and reduced to usable form, will give the manufacturer the information he needs to determine whether his missile is doing the job for which it was built. Once the records are completed, the job is done — until the next flight.

Thus RCA, together with Pan American World Airways, is taking on another vital task in the interest of national security. Out of the experience of the Guided Missile Center may come not only the most effective weapons that modern science can build, but wider knowledge leading to the development of electronic surveying and computing techniques of inestimable value in the future to a society at peace.

RCA Begins Deliveries Of Powerful TV Transmitter

A 50-kilowatt television transmitter, the most powerful yet produced by the Radio Corporation of America, was shipped from the RCA Engineering Products Division plant in Camden, N. J., in mid-February to Stations WMIN-TV and WTCN-TV, which will share its use on Channel 11 in the Minneapolis-St. Paul area.

The new VHF (very high frequency) transmitter, used with a custom-built nine-section super-gain antenna already delivered by RCA, will place the stations among the most powerful television outlets in the country, boosting their effective radiated power to the 316-kilowatt maximum allowed by the Federal Communications Commission.

New amplifier and modulator circuit features assure maximum fidelity of both sound and picture transmission, RCA engineers said. The transmitter has been designed to operate at altitudes up to 7,500 feet and in temperatures up to 113 degrees.

Initial units of the 50-kilowatt transmitter have already been shipped to a number of other stations throughout the country.

Folsom Urges Equal Job Opportunity for All

SUCCESS of the non-discrimination policy followed by the Radio Corporation of America in its employment program was cited to a Subcommittee of the United States Senate on February 23 by Frank M. Folsom, President of RCA, in a statement advocating passage by Congress of legislation based on the principle of equal job opportunity for all, regardless of race, creed or color.

Testifying before the Subcommittee on Civil Rights of the Senate Committee on Labor and Public Welfare, Mr. Folsom said that such action by Congress would be "a giant step toward elimination of discriminatory practices and thus beneficial in helping to foster democratic principles not only in this country but throughout the world."

The Subcommittee, considering bills to prohibit discrimination in employment, invited Mr. Folsom to testify on the basis of RCA's experience in practicing a non-discriminatory policy since the founding of the corporation in 1919.

"Having always practiced non-discrimination in hiring and promoting personnel," Mr. Folsom said, "RCA has a substantial number of employees drawn from minority groups — particularly Negroes. These individuals have shown a high degree of skill and aptitude, they have been willingly accepted as co-workers by those with whom they work, and community reaction has been favorable wherever RCA plants are located."

Good Business as well as Principle

While RCA is in no way unique among managements in practicing non-discrimination in employment, Mr. Folsom added, "we are proud to be among those who have practiced it from the start." He continued:

"We fully believe that non-discrimination in employment is not only a matter of principles; it is also a matter of good business. Our minority groups can contribute relatively as much in the way of technical skills as any other part of our population, as RCA experience is showing. These groups also form a considerable market for the output of American industry, and they can be counted upon to consume more of this output as their standards of living are raised."

Mr. Folsom told the Senators that implementation of any such policy must be tailored to the nature of the company that practices it, but he emphasized these basic considerations in RCA experience that would apply to any type of business: 1) solid support by top management for non-discrimination in employment; 2) knowledge of the levels of education and of attitudes among the working force, local minority groups and the community, and 3) firm application of the policy throughout the working force.

Frank M. Folsom

"These elements have been a basic part of the RCA experience," he said.

Prompted by the firm top management attitude favoring non-discrimination, "the various divisions and subsidiaries of RCA have established their own programs to make the most effective use of the skills and talents offered by our minority groups for the wide range of production and servicing operations in which RCA specializes," Mr. Folsom said.

Emphasizing that any member of a minority group has a right to work at any job he is capable of performing, Mr. Folsom continued:

"Aside from the moral and social considerations, we have acted too in the realization that job discrimination against any of our people on the basis of race or creed weakens us in the face of adversaries who would destroy our democratic system.

"From the standpoint of good business, it is worth re-emphasizing that the policy of hiring people for what they can do, rather than for who they may happen to be, is hardly sentimental indulgence. The products manufactured for competitive trade are as good as the manpower that makes them, and the consumer is not concerned about whether the hands that made an item are black or white, or whether the maker goes to one church or another.

RCA Atomic Battery

A MAJOR advance in the production of low-power electrical energy directly from atomic energy was unveiled by RCA on January 27, when Brig. General David Sarnoff, Chairman of the Board of RCA, displayed for the first time a tiny, experimental atomic battery capable of operating a transistor.

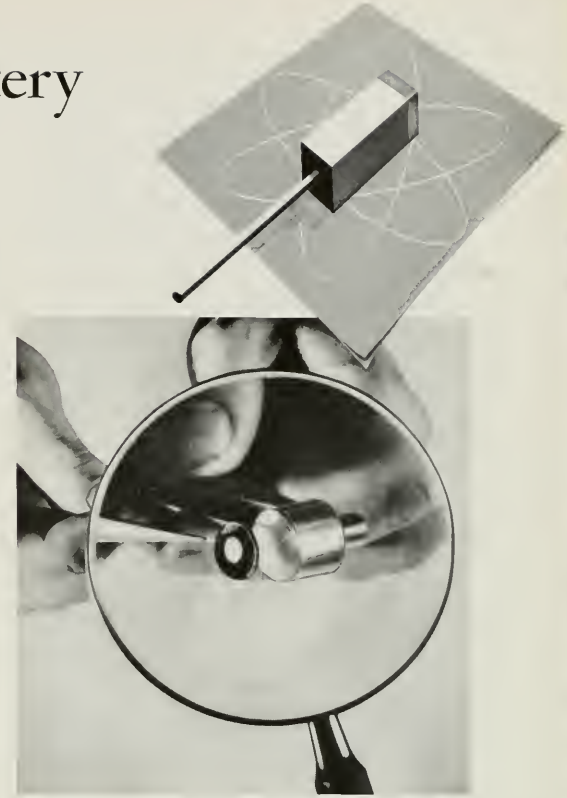
In the presence of science writers and newsmen assembled in his office at Radio City, New York, General Sarnoff demonstrated the ability of the device to produce usable electricity directly from a minute quantity of radioactive material — strontium-90 — obtained as a by-product of atomic reactor operation. The current was applied for the demonstration to an audio oscillator in which a steady, high-pitched tone was produced.

"This development, though still in the pioneer stage, may prove to be the beginning of a new and basic chapter in man's efforts to utilize some of the enormous untapped energies within the nucleus of the atom for peaceful purposes and for the enrichment of human life rather than its destruction," General Sarnoff said. "Although it is still too soon to know all the uses to which this direct conversion of nuclear energy might be put, the prospect of an entirely different kind of power source is a particularly exciting one for the electronics industry."

The performance of the experimental battery was hailed by the press and other media throughout the country as a major contribution to the peaceful application of atomic energy and a development of immense promise for the future. Admiral Lewis L. Strauss, Chairman of the Atomic Energy Commission, in a letter to General Sarnoff, emphasized the potential usefulness of the development in the communications field and concluded: "Your research department is due for congratulations."

Consists of Two Small Units

The demonstration battery, the product of a research program started in the RCA Laboratories Division immediately after World War II, consists of two extremely small units — the radioactive source and a thin wafer of semi-conducting crystal (germanium or silicon) into which an impurity has been alloyed to form a junction similar electrically to those used in a junction transistor. Current is produced when the units are brought together, permitting the electrons emitted from the source to bombard the semi-conductor. But where previous experimental methods had succeeded in converting to usable current only the single electron supplied by each bombarding electron, the new battery achieved the production of 200,000 useful electrons by each bombarding electron. This large multiplication was made possible by the employment of the semiconductor material.



Both elements of the battery — semi-conducting crystal, held in tweezer, and layer of radioactive material, on cylinder — are shown under magnifying glass.

"It is this extraordinary multiplication in the number of available electrons which promises to make the atomic battery a usable device of practical significance," General Sarnoff said.

"Progress in increasing the efficiency of the RCA Atomic Battery has been rapid during the past few months and is expected to continue," he added. "Results to date indicate the possibilities of producing thimble-size, atomic batteries. When these experimental batteries are developed to a commercial stage, they can supply power for radio receivers and other kinds of

electronic apparatus, without replenishment or attention for at least twenty years."

General Sarnoff foresaw application of commercial atomic batteries as reliable, long-life power sources for portable and pocket-size radio receivers, hearing aids and signal control. With the development of such batteries producing greater power than the present experimental models, further possibilities arise for their use in operating portable short-range transmitters for radio, telegraph and telephone communication and for radio beacons for air or sea navigation, he said.

"Of great importance is the fact that such atomic batteries will be highly compatible with future equipment using transistors," he added. "Both the battery and the transistor have the potential advantages of compactness, ruggedness and long life."

Direct Source of Energy

Further possible applications were foreseen by Dr. E. W. Engstrom, Executive Vice President in Charge, RCA Laboratories Division, who emphasized the basic importance of generating electrical power directly from atomic energy. Where previous proposals for power production have involved atomic fuel to produce heat for steam-powered turbines and generators, the atomic battery converts atomic energy directly into electrical energy without intermediate processes.

"If the promise of the atomic battery is ultimately fulfilled on a large scale," he said, "boilers, engines and electrical generators would increasingly become elements of the past. Instead of distributing power over long distances — a costly process — atomic generators could be installed at or near places where power is to be used. These future batteries would be designed as 'on-the-spot' energy sources for specific installations, whether a radio beacon or an individual home.

"Naturally, much fundamental work and applied research remains to be done and many years will elapse before such a goal is attained; nevertheless, this prospect offers a bright hope for mankind," he said.

The atomic battery demonstrated by General Sarnoff produces a tiny amount of electrical energy — one millionth of a watt — but this is sufficient to power a transistor audio circuit producing a tone audible twenty feet away, and it demonstrates the basic practicality of converting atomic energy directly into usable electric current by a simple method capable of broad development. Until recently, radioactive battery devices produced no more than one billionth of a watt of power under conditions suitable for transistor operation.

The demonstration device is a result of combining studies of the basic problems of radioactive generation of electricity conducted by RCA over the past few years with recent RCA developments in the fields of transistors, semi-conductors, and in the broad area of solid-state electronics. In RCA's experiments with atomic batteries, Dr. Engstrom said, both silicon and germanium crystals have been tried as "transformers" of the beta radiation to useful electricity, and materials other than strontium-90 have been and are under study as possible improved sources of radiation.

The research program in this field, headed by Dr. Irving Wolff and Dr. Ernest G. Linder, of the RCA Laboratories Division, has investigated a number of approaches, gaining an understanding of the problems to an extent that has been of great value in achieving the present atomic battery — developed by Paul Rappaport, physicist on the technical staff of the David Sarnoff Research Center of RCA at Princeton, N. J.

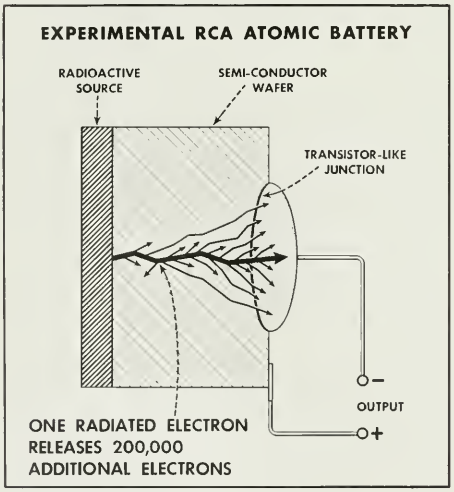


Diagram shows how the battery operates.

Vacuum-Type Generator Tried

Early research following the end of the war centered on development of a vacuum-type radioactive generator, and one of the first types built was a vacuum tube the size of a football in which a small amount of radioactive material built up huge voltages but could provide only a minute current. After further investigation, a radioactive voltage source was built which did not require a vacuum. But while this produced voltages at usable levels, each bombarding electron could produce no more than one electron for the output.

Brig. General David Sarnoff with demonstration battery.

Attention was then turned to the field of solid-state electronics—in which transistor development was taking place—and it was here that the path was found that led to the RCA atomic battery.

The strontium-90 used in the atomic battery is a highly active source of beta particles — high speed electrons — and is one of the long-lived beta-emitting substances. Its half-life is roughly twenty years, meaning that half of its radioactivity is dissipated every twenty years. It is one of the most abundant of the materials resulting from the fission of uranium in a nuclear reactor, and, like other radioactive materials being studied for possible use, can be expected to be available in increasing amounts at lower cost as more nuclear reactors are put into operation.

In the battery, a minute quantity of the strontium (1/300th of a cubic centimeter, or an amount that would fill a cube 1/16th of an inch on a side) is spread in a thin layer against the junction wafer. The layer of strontium bombards the semi-conducting crystal wafer with several billion electrons each second, and as the electrons penetrate the wafer they release many more electrons — an average of 200,000 for each bombarding electron.

The released electrons flow across the wafer's junction, producing a voltage which can be applied to an electronic circuit and cause a current to flow. The electron action within the crystal wafer is known as the electron-voltaic effect, a phenomenon of solid-state physics which heretofore has not been put to any practical use.

While almost any radioactive material could be used to supply the energy of an atomic battery in theory, strontium-90 was selected for its high energy beta radiation, relatively long life, low shielding requirements and availability in experimental quantities from the Atomic Energy Commission. Since the strontium-90 obtainable at the present time is not completely free of other fission products which emit unwanted gamma radiation, the experimental battery has had to be shielded in a lead container which adds considerably to its size and weight. Use of purified strontium-90, which emits only beta particles, would greatly reduce the required shielding for the minute quantities required in an atomic battery.

One problem that remains to be overcome at the present stage of research is the determination of the effect of beta radiation on the crystal wafer. It is known that the crystal structure of many substances is gradually damaged by bombarding electrons, and investigations now are directed at minimizing these effects to make them negligible for the structures used in the atomic battery.

Turkish President Sees Color TV On Tour of NBC Headquarters

President Celal Bayar of Turkey included a tour of the National Broadcasting Company's Radio City headquarters and a first view of color television during his first visit to the United States in late January.

The President and Madame Bayar were greeted by Frank M. Folsom, President of RCA; Sylvester L. Weaver, Jr., President of NBC; Robert W. Sarnoff, Executive Vice-President of NBC; Thompson H. Mitchell, President of RCA Communications; Mead Brunet, Vice-President and Managing Director of the RCA International Division, and NBC officials.

The tour included a dress rehearsal of the first color telecast of "Zoo Parade," which featured the natural ability of animals to adapt themselves to their environment. President Bayar became so interested in the program that he remained 15 minutes beyond the scheduled time for this portion of the tour. Later he visited the set of a television drama in rehearsal and inspected control room facilities.

At the end of his NBC tour, President Bayar was escorted at his own request to the roof of the towering RCA Building for a view of New York City from above.

Electronic Sound Absorber

By Dr. Harry F. Olson

Director, Acoustical Research Laboratory
RCA Laboratories Division

ELECTRONIC science is going to work to cancel out some of the sound you are about to hear, with an aggressive device that reaches out to knock down the sound waves before they have a chance to land with their full impact on the ear.

This novel application of electronics is being developed at the David Sarnoff Research Center of RCA at Princeton, N. J., in an electronic sound absorber that will cope with the variety of deep noises associated with motors, the hum of conversation in a crowded hall, or even with heavy snoring. The first model has demonstrated in tests its ability to cut sounds in this category by as much as 10 to 25 decibels in the vicinity of the ear. In everyday terms, this is equivalent to reducing to at least one quarter the engine noise level in the average bus, or eliminating almost entirely the steady hum of your car as it is driven along at cruising speed.

Ultimately, electronic sound absorbers installed in seats aboard planes, buses and other vehicles that produce a deep and persistent noise may mean greater comfort for passengers. Others placed near noisy machines in factories and workshops can ease the task of the worker. Groups of such absorbers built into the corners of auditoriums, assembly rooms and dining halls can increase the pleasure of meal hours and large gatherings. You may even look forward to better sleeping with a sound absorber near your bed.

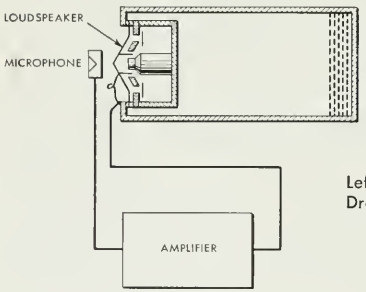
The electronic sound absorber works by turning sound waves back against themselves, and in the process it performs a job that conventional types of sound-proofing material cannot handle efficiently. All sounds consist of waves of air that are similar in behavior to the waves in water, and they cause the atmospheric pressure to rise and fall with a rhythm and intensity that depends on the nature of the disturbance from which they originate. The tone we hear depends on the frequency of the sound waves — the longer the waves, the deeper the tone.

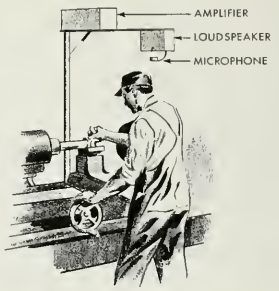
Present sound absorbing systems are based on the use of porous materials containing a maze of tiny passages in which the energy of sound waves is dissipated. But this type of sound-proofing works most effectively at the upper end of the sound scale. To dissipate the longer waves of sound in the lower frequencies, the thickness of the porous material must be increased. In the low frequency range of engine noise and other deep sounds, an absorbing system based on these materials becomes too bulky for most practical uses.

Absorber Creates Counter-Waves

The electronic sound absorber tackles the problem not by trying to catch the sound waves in a trap, but by creating counter-waves that reduce their force or cancel them entirely — somewhat in the fashion of waves on the surface of water being levelled by a similar disturbance travelling in the opposite direction.

The device consists of three units — a special elec-





Left, diagram of sound absorber. Drawings at right and above show possible installations.

tronic microphone, an amplifier, and a specially-designed small speaker. The microphone, reacting instantaneously to the changes in atmospheric pressure caused by the sound waves, translates these changes into electrical impulses that pass through the amplifier and emerge from the speaker, directly behind the microphone, as counter-waves of equal and opposite pressure. The effect, within a few feet of the speaker, is a substantial levelling of the changes in air pressure and hence a reduction or even elimination of the oncoming sound.

The principle on which the electronic sound absorber works was conceived some time ago, but the application became practical only in recent years with the development of the electronic microphone. Among the particular advantages of the microphone are its uniform sensitivity and response in the low-frequency range with the result that it will perform consistently over a range of more than three octaves.

The heart of the microphone is a tiny vacuum tube called a mechano-electronic transducer, which contains a rod connecting one element of the tube through a vacuum-tight shell directly to the diaphragm of the microphone.[1] The vibration of the diaphragm by the oncoming sound waves is thus transferred directly into a vibration of one of the elements in the tube, developing the current which is passed to the amplifier and the loudspeaker.

Dr. H. F. Olsan, left, and E. G. May, who assisted in the project, test first madel near a pump at the David Sarnoff Research Center of RCA in Princeton, N.J.

The design of the loudspeaker was guided by the fact that in this type of operation, the back of the loudspeaker mechanism has to be enclosed to ensure complete non-interference. To keep this enclosure small in the interest of portability and easy installation, the speaker was designed with a cone diameter of only 3½ inches.

Operates On Battery or House Current

The sound absorber can be built to operate either on battery power or on house current. The first developmental model, using a ten-tube transformerless, direct coupled amplifier, was built for battery power so that it could be tested in locations remote from power lines. A second model, on which work is now progressing, will use an amplifier of only four or five tubes, with a suitable transformer coupling the tube to the loudspeaker. Ultimately, a transistor amplifier can be developed, permitting a far more compact and economical unit.

The design of the absorber means that the microphone and speaker, forming a combined unit, can be installed at some distance from the amplifier and adjacent to the head of an airplane or automobile passenger or a machine operator. There are numerous possible jobs for a spot-type low-frequency noise reducer where the position of the person subject to such noise is fixed. In a bedroom, a sound absorber operating on house current could be installed near the head of a sleeper to cut down traffic noises and other low-frequency sounds.

Other possible applications can be found near the source of the noises rather than adjacent to the ear: examples are the location of one or more sound absorbers next to a noisy motor or at the outlet of an air-conditioning duct already lined with sound-proofing materials to intercept the higher frequency sounds.

The absorber also can be used in the same manner as conventional wall materials in a room to handle the low-frequency waves that now escape. Three of them placed at the intersection of two walls with a ceiling, for example, would catch oncoming low-frequency sounds before the waves could reach the surfaces to rebound as echoes.

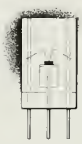
A substantial period of laboratory development lies ahead before the electronic sound absorber reaches the stage of commercial production. But in view of the absence today of efficient sound protection in the low-frequency range, the new device would seem to have plenty of work cut out for it in quieting much of the heavy noise that is an unwelcome part of our daily life.

[1] Editor's note: the mechano-electronic transducer and the microphone were developed originally by Dr. Olson.

Making Transistors

The transistor, a laboratory curiosity six years ago, is today a commercial product of considerable importance and incalculable promise for the future. Unlike the electron tube, which controls electrons in a vacuum, the transistor controls them in a solid—a crystal of purified germanium. Two types have been developed: the point-contact, with many applications in high-speed switching and control, and the junction, useful as a low and medium-frequency amplifier. These pictures, taken at the RCA Tube Division plant in Harrison, N. J., show a few of the close-tolerance processes in their manufacture.

Junction transistor



Point-contact transistor

Purifying and "Growing" Germanium

1 A germanium ingot is moved past heat induction coils, collecting impurities at trailing end.

2 A "seed" of purified germanium slowly draws molten germanium from electric furnace in form of single large crystal, essential for electron flow in transistors.

Assembling the Point-Contact Transistor

3 Pinhead bits of germanium crystal are soldered on tiny supports for assembly in transistors.

4 Under a microscope, technician joins crystal and support assembly to center lead of the transistor.

5 An eye-dropper is used to apply plastic coating that protects transistor from light and air.

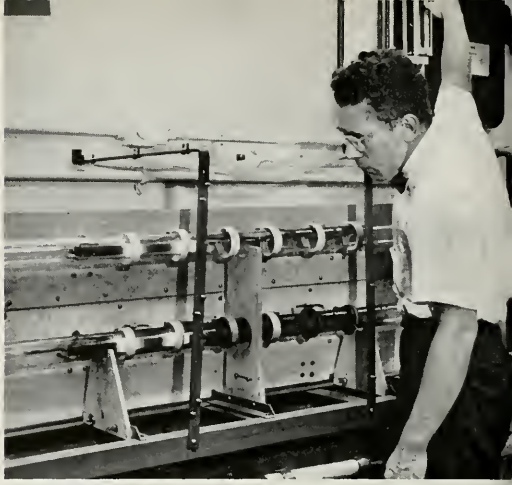
Assembling the Junction Transistor

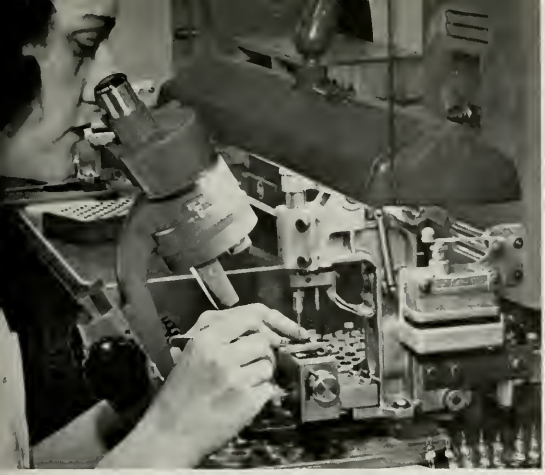
6 Tiny "sandwiches," formed by fixing slightly impure germanium pellets to crystal wafer, go into electric furnace for fusing.

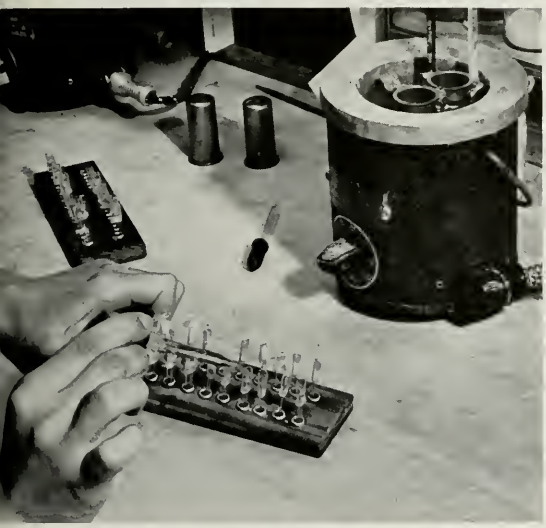
7 Resistance of "sandwiches" is tested on circuit formed by metal bar and spring arm above tweezers.

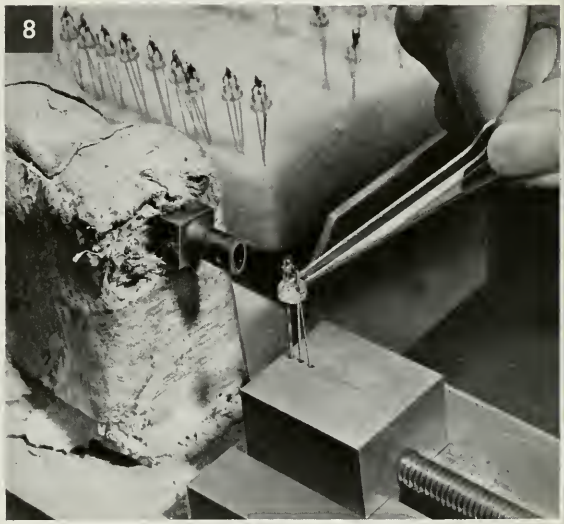
8 Jig holds transistor before nozzle of hydrogen furnace to solder wire contacts to pellets on crystal wafer.

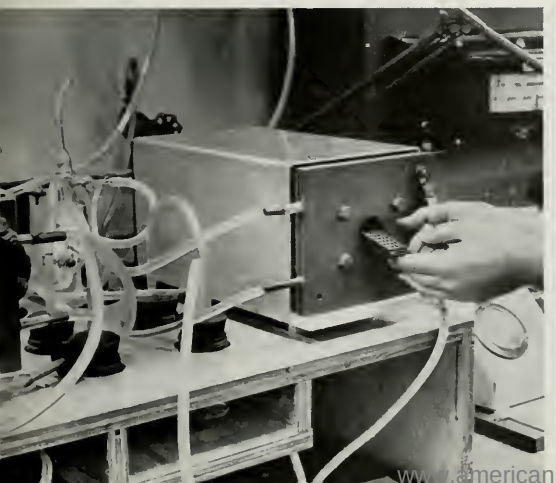
9 Trained inspector checks semi-finished transistors for flaws before final treatment and packaging.











New York Police Scan Suspects with TV

Industrial television took on a new role in law enforcement on February 8 when the New York Police Department flashed a staged version of the daily "line-up" of suspects from its headquarters in Manhattan to receivers at the Brooklyn police headquarters, seven miles away.

Using a small RCA industrial television camera and receivers joined by a microwave link, the demonstration was arranged by the police and the Radio Corporation of America as an initial glimpse for city officials and the press of a technique that can save the police of New York and other large cities thousands of man-hours each year and can increase public security by speeding up a number of law-enforcement procedures.

The "line-up," held daily at police headquarters in Manhattan, gives detectives from precincts throughout the city an opportunity to view all persons recently arrested for felonies or major misdemeanors. At present, this requires a number of detectives to travel each day from their precincts in all parts of the city to headquarters. Installation of a television system with receivers in the precinct stations, however, would make it unnecessary for the detectives to leave their posts and spend considerable time travelling to headquarters in order to look at the latest arrests.

The demonstration on February 8 drew praise for the system from Mayor Robert F. Wagner and Police Commissioner Francis W. H. Adams, both of whom visited the line-up room in Manhattan to watch the test. Supervising the operation were Assistant Chief Inspector Francis A. Burns, commanding officer of the police department's Communications and Records Division, and Barton Kreuzer, industrial marketing manager of RCA. A throng of reporters, newsreel cameramen and television news photographers were on hand, and detectives played the part of suspects in a highly realistic special "line-up" staged for the occasion.

Elements of System

The equipment used for the test included a standard RCA television camera, built around the cigar-size Vidicon camera pickup tube, and a number of modified RCA table model TV receivers. The signals from the camera in the line-up room were sent out from a dish-shaped microwave transmitter mounted on the headquarters building to a microwave relay booster on top of the Empire State Building. Here they were amplified and re-transmitted to a receiving microwave antenna on the Brooklyn police headquarters building.

Besides the advantages of such a system in eliminating the need for personal attendance by detectives at the line-up, industrial television can be used for transmitting photographs to precinct stations and would enable the Commissioner and other officials to address the entire police force simultaneously when necessary.

The New York demonstration represented the first use of RCA industrial television to send police information through the air to distant points, but it was not the first use of such equipment in police work. Eight RCA industrial TV camera chains have been in use for nearly a year in the Houston, Tex., city jail to monitor prisoner activities within the building, and Los Angeles police used the equipment to trap thieves suspected of stealing television tubes from an RCA warehouse.

Looking at police "line-up" on television screen, left to right, are Barton Kreuzer, industrial marketing manager of RCA, New York's Mayor Robert F. Wagner and Police Commissioner Francis W. H. Adams.

Television in Japan

TENSE faces, straining over shoulders to catch the image on the screen, the crack of a baseball bat, "oh's" and "ah's" from a partisan throng: this has become a familiar scene in Tokyo's main boulevards since the arrival of television. Through cherry tree groves, over rice paddies, and around majestic Mt. Fuji, the invisible beams from RCA-equipped stations reach a growing and eager audience of Japanese viewers.

Only a little over a year old, television in Japan is rapidly maturing, both technically and artistically. In a constant effort to merge the advances of the West with Japan's own great cultural past, TV is playing an increasingly significant role. Meeting enthusiastic responses from all segments of Japanese society, television is making rapid strides in providing the medium for education and entertainment.

Crowds that formerly gathered around public newspaper bulletin boards and radios for the latest political and sports news, now cluster in even greater numbers around stores displaying television sets. Ardent sports enthusiasts, the Japanese jam thoroughfares to watch telecasts of baseball, sumo (Japanese wrestling), hockey, soccer and other sports.

Theater performances of all types, as well as old movies, are also televised. In the late afternoon, children's programs, as yet without interplanetary complications, hold the small fry enthralled. In the evening, the TV viewer can see his favorite Kabuki (Japanese classical play) performance on sets in store windows, restaurants, or in his own home.

Newscasts regularly punctuate the full day's TV fare, often bringing the excitement of a debate in the Diet or the Prime Minister's news conference before the eyes of the voting public. Musical programs are particular favorites and run the gamut from the traditional Japanese music to modern jazz. Like their American counterparts, the television networks in Japan also present amateur hours, quiz programs, variety shows, and round table discussions, though the latter are marked by a gentleness and reasonableness, sometimes lacking on similar programs in the Western world.

Difference in Program Standards

Actually, it is impossible to compare Japanese programming to American, as their standards are often quite opposite from ours. For instance, where Americans consider the lavishness of a production a criterion of artistry, the Japanese consider studied simplicity the pinnacle of artistic perfection. By American standards some Japanese productions seem flimsy, while by theirs, some American productions are in bad taste.

Through educational films and programs, television in Japan is aiding in the fight against communism and is helping to spread democratic ideas. Television is also stressing the growing role of women in Japanese society, and programs, both informative and entertaining, are being produced especially for women.

Television facilities of the National Broadcasting Company — with its key station WNBT in New York

An NTV camera focuses on a children's drama

A cooking lesson for viewers of NHK

and 168 affiliated stations — have afforded prime training grounds for Japanese engineers, technicians and studio personnel desirous of employing in their country's budding TV broadcasting industry the latest and best proven techniques.

Through arrangements made by the RCA International Division and NBC, many of the future leaders of Japanese television have journeyed across the Pacific to avail themselves of this training and to familiarize themselves with "know-how" that can be readily applied upon their return to Tokyo. And, in turn, NBC has benefitted by contact with the inquiring minds of the alert and interested visitors.

At present, many of the approximately 8,000 existing receivers are in public places such as store windows, restaurants, depots, and hotels so that large segments of the metropolitan population are reached. In small-sized communities, plans are progressing to install TV receivers in schools or theaters, thus greatly increasing the potential audience of a single set. The number of sets is still small, but because prices have been steadily dropping and because Japan looks forward to mass production in the near future, the Japanese expect that by 1958 hundreds of thousands and maybe up to a million sets will be in use. The Japanese TV receiver industry is making constant progress toward low cost production.

Licenses from RCA

The Radio Corporation of America has licensed, under RCA patents, members of the industry on a non-exclusive basis. The use of RCA inventions will help Japanese manufacturers to advance more rapidly toward their goal of making better and less expensive television receivers. RCA is currently setting up an Industry Service Laboratory in Tokyo to assist the set manufacturers in solving their technical problems.

The 17-inch receiver is the most prevalent size of the TV sets in use. The remainder are 21-, 19-, 14-, 10- and 7-inch models. Easy time payment plans have been devised to facilitate the buying of receivers. About twenty-five per cent of sales are parts sales for home assembly of television sets — a tribute to the high technical skill and resourcefulness of the Japanese people.

Three broadcasting organizations have been licensed by the government to operate television stations. In each case, RCA transmitters, as well as other television equipment, have been chosen. RCA flew the first transmitter over to Japan to equip the television station of the Broadcasting Corporation of Japan (known as NHK). NHK, which began regular telecasts in February, 1953, is a public corporation, similar in organization to the BBC in London, and operates two radio networks consisting of 83 stations, blanketing the nation and contributing to the high standards of an informed public.

NHK now operates three television stations, one in Tokyo, one in Osaka and another in Nagoya. It is planning a network of TV stations which will cover the whole of Japan and will include the building and operation of 32 stations in the next five years. In the next fiscal year alone, the company intends to add four more stations. NHK, which is headed by Mr. Tetsuro Furukaki, hopes to reach a potential of sixty-two per cent of Japanese homes by 1958.

Besides transmitters, RCA supplied NHK with two custom-built antennas. The first is a single section super-gain to be used for emergency operation. The second is a six-section super-turnstile used as the main antenna. Both operate in our FM bands.

By Japanese law, NHK is entitled to collect fees from all owners of radio and television sets in order to finance programming; therefore, its stations operate without commercials or sponsors.

Commercial Network Planned

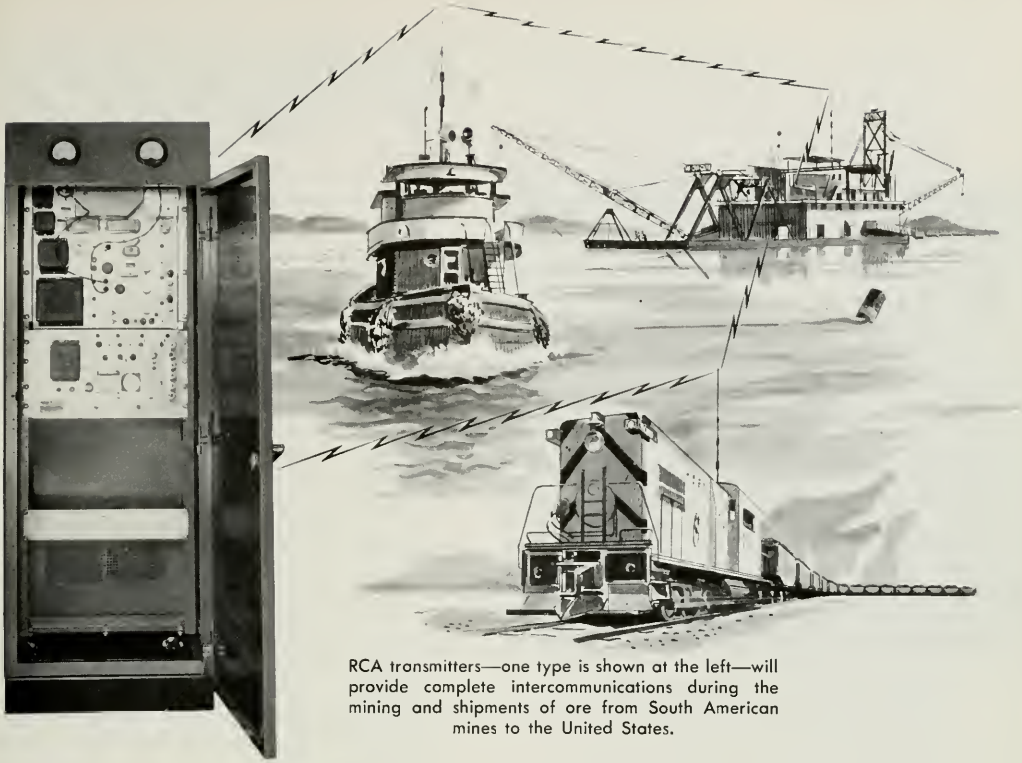
The Nippon Television Network Corporation, a privately owned company, began regular telecasts in August, 1953. Leading newspapers and industrial corporations are stockholders in the organization, of which Mr. Matsutaro Shoriki is president. The company's future plans call for an all-Japan commercial TV network based on a principal station in Tokyo and including a chain of relay stations within range of one another on mountain tops throughout the islands. The station is completely self-contained with its own power plant, air conditioned studios, film rooms, technical section, theater property and other departments.

Cosmetic manufacturers, pharmaceutical houses, food and beverage dispensers and radio and television manufacturers are among the sponsors and advertisers on the commercial station.

Radio Tokyo is another privately-owned company that has a television license. This company, directed by Mr. Tadashi Adachi, is the largest of the privately-owned radio stations and has an RCA television transmitter on order. Expecting to go on the air this year, Radio Tokyo now has under construction a building especially designed for television broadcasting.

RCA supplied 12 section super-turnstile antennas to both the Nippon Television Network Corporation and Radio Tokyo. All of the antennas were especially built to specifications called for by the Japanese climate and will withstand the perennial typhoons and a wind speed of 150 miles per hour. In addition to the 10-kilowatt transmitters and custom-built antennas, RCA has sold a number of cameras, studio equipment, mobile units

(Continued on page 32)



RCA transmitters—one type is shown at the left—will provide complete intercommunications during the mining and shipments of ore from South American mines to the United States.

Radio Helps to Move a Mountain

By E. A. Laport
Chief Engineer,
RCA International Division

MODERN radio is in the thick of one of the greatest mining operations in history as American enterprise prepares to tote a mountain 2,000 miles to help satisfy the nation's enormous appetite for steel. Playing an important role in the project is the Radio Corporation of America whose communications systems and equipment link the various segments of the operations.

After a journey by rail and sea, the first shipload of high-grade iron ore from the fabulous Cerro Bolivar, a mountain of iron in the heart of Venezuela, was delivered in January to the sprawling new Fairless Works of United States Steel at Morrisville, Pa. More will follow to other U. S. Steel plants. In the deposit are an estimated 400,000,000 tons, representing perhaps the greatest single accessible high-grade ore deposit discovered since the opening of the rapidly depleting Mesabi Range in Minnesota. Exploitation of the supply is being undertaken by the Orinoco Mining Company, a subsidiary of the Steel Corporation.

Transforming an isolated prominence on the Venezuelan landscape into the starting point of a 2000-mile supply line which leads to mills in the United States has required the skillful application of the most modern engineering and industrial techniques. Included in the plans has been a communications system capable of networking the scattered points of operation both during construction and after the start of operations.

In a region virtually devoid of communications facilities at the start, RCA radio has provided the vast project with a high frequency and microwave network. These facilities keep field units in touch with construc-

tion headquarters; provide radio telephone and teletype communications between the project and executive offices in Caracas, 270 miles away; permit conversation over a 206-mile triangle linking the mine and railhead at Cerro Bolivar with head offices at Ciudad Bolivar and the newly constructed port of Puerto Ordaz at the mouth of the Caroni River, and help to control traffic on the 90-mile single-track railroad from the mine to the port through remote operation of signals and switches.

Rail Traffic Control

Like the Cerro Bolivar project itself, the remote control system which handles two-way traffic on the single line railroad is itself a revolutionary development. The use of a microwave channel in conjunction with a railroad signal system was first tested in 1946 by RCA, Union Switch & Signal (a division of Westinghouse Air-brake Co.), Western Union and the Pennsylvania Railroad over a 900 mile circuit linking Washington, Philadelphia, New York and Pittsburgh. On the Venezuela project, the system developed through these tests has been put to regular use for the first time.

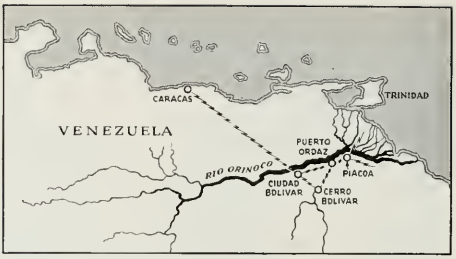
The system utilizes RCA facilities installed to handle telephone and teletype communications as well as the radio waves controlling signals and switches at the four sidings along the railroad. Radio towers capable of carrying the microwave channel and transmitting and receiving VHF-FM have been located at both Cerro Bolivar and Puerto Ordaz, and each of the locations is equipped with two transmitters, two receivers, two transmitting aerials and two receiving aerials.

The two sidings nearest the port are governed by waves transmitted from the Puerto Ordaz tower, while the two nearest the mine are controlled by waves sent over the microwave channel from the port to Cerro Bolivar tower. The transmitting and receiving facilities, together with centralized traffic control and coded carrier systems developed by United Switch & Signal, enable a single operator at the port to regulate all rail traffic in both directions simultaneously.

Components of System

To weave the communications network serving the far-flung operation, RCA has provided some 50 transmitters and receivers for installation at fixed points, on dredges, tugs and other vessels, in construction crew barracks and project offices, aboard trains, and with surveying parties. The entire collection breaks down into these separate systems:

(1) A triangular radio-telephone circuit comprising a duplex (two-way) microwave system connecting with regular telephone switchboards at the mine, the port and Ciudad Bolivar. Included in the system is an automatic repeater station located on a rise at Piacoa, at the head of the Orinoco delta, for communication between Puerto Ordaz and dredges which keep clear a 176-mile deep-water channel for ore vessels from the port out to the open sea off the coast of Trinidad.



Radio networks link all principal points involved in the Venezuela operations of the Orinoco Mining Company.

(2) A high-frequency radio system connecting the project offices at Ciudad Bolivar with the executive offices of the Orinoco Mining Company in Caracas, 270 miles to the northwest. This system provides a duplex telephone channel and a teletype circuit working on frequency-shift keying. The high frequency transmitter at the Caracas end could not be located within the city proper and was placed instead at Petare, about 10 miles east. A VHF link from the Caracas office to the transmitter provides full remote control of the transmitter and handles the outgoing traffic.

(3) Mobile facilities to provide communication between construction camps, vehicles, surveying parties and other units likely to be on the move, and to permit communication between front and rear of trains or between train and dispatcher.

From the start, RCA facilities have been used to ensure rapid progress. The principal paths for the radio circuits were surveyed in 1950, when certain temporary channels were installed for the beginning of operations by the Orinoco Mining Company. The relatively long distances to be covered over barren territory required special care in site selection and the use of special antenna to avoid the need for repeater stations at intermediate points.

The system was engineered and installed by the RCA International Division with an auxiliary field staff from the RCA Service Company. The engineering project in New York was directed by D. H. Pain with field engineering originally under the direction of G. G. Gerlach, later under L. A. Shotliff. Supervising all of the radio installations for the Orinoco Mining Company was Henry Carroll, communications superintendent. Paul F. Godley is consulting engineer.

Syndicated Film Opens New Field in TV

By Carl M. Stanton
Vice President in charge of Film Division, National Broadcasting Company

MILLIONS of American television viewers served by scores of independent broadcasting stations are gaining benefits in the form of high quality program fare through the phenomenal growth of a fairly new adjunct to the television industry — the syndication of films repeating highly successful network programs or made especially for sale to local stations and sponsors.

Film syndication is the business of the NBC Film Division, which completed on March 3 its first full year as one of NBC's three major operating divisions. The record for the first year is a measure of the rapid, though carefully controlled, rise of syndication as a vital element in programming throughout the country.

In recent months, such nationally known program series as "Victory at Sea," "Badge 714" (formerly "Dragnet") and "The Visitor" (formerly "The Doctor") — carried originally on the National Broadcasting Company network — have been ringing up new audience totals as syndicated film features in markets ranging in size from Panama City, Fla., to New York City. Together with other programs filmed specifically for syndication, such as "Hopalong Cassidy," "Inner Sanctum" and "Dangerous Assignment," these features have attracted a constantly growing number of local advertisers and broadcasters as a simple, inexpensive and high quality approach to building and holding local audiences.

On March 3, 1953, when the Film Division was set up as a self-contained operation, only two programs were being syndicated, while the Division's film exchanges in New York and Hollywood were servicing 76 stations with these programs, network film shows and film recordings of "live" television programs.

One year later, the Division's inventory included fourteen properties, including one package of 26 feature films not previously shown on television, while the exchanges were servicing 256 stations with 2,000 prints a week. In addition, the Division's film library in New York, containing the largest collection of stock footage photographed especially for television, had multiplied its activities in servicing stations, agencies and producers throughout the country from the more than 20,000,000 feet of completely cross-indexed film in its vaults. This total, incidentally, has been increasing by a quarter of a million feet each month.

The author, right, inspects a film camera with Robert B. Sarnoff, Executive Vice-President of NBC, center, and Himan Brown, head of Galahad Productions.

The Film Division in recent months has been emphasizing the value of re-running good TV film series as a means of showing locally — and at local cost — programs of the highest quality. The campaign was based from the start on the claim that such programs reach a larger audience than did the original showing. Research data that has just become available has more than substantiated the claim: the rating figures show that these syndicated programs not only reach a larger audience than the original program, but that the program continues to grow in popularity and can boost a station's rating for a given time period anywhere from 10 to 25 per cent.

The first year has given the Film Division solid confidence in the future as competition grows through the increase of film programs on the market. In spite of the astonishing record of growth in 1953, 1954 bears the earmarks of an even more important year for the syndicated film business as new stations come on the air looking to syndicators for much of their local programming, as local advertisers continue their trend toward syndicated films as an inexpensive, popular vehicle, and as national sponsors make ever greater use of these films to supplement their basic network television coverage.

What I Found Out About Television

Rosita Sarnoff, who will be 11 years old in June, is the daughter of Robert W. Sarnoff, Executive Vice-President of the National Broadcasting Company, and the grand-daughter of Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America. The following article appeared in the Winter, 1954, issue of "The Venturer," a publication of Miss Hewitt's Classes, New York, where she is in Grade VI.

By Rosita Sarnoff

ONE night, a few weeks ago, I was watching television when I began to wonder about it. I found there were a lot of questions to which I didn't know the answers. How old is television? How did it start? How big is it and how many people can see it? I decided to find out the answers to my questions. By asking and reading I learned some interesting things.

I am so used to watching television that I didn't realize that the broadcasting we have today is younger than I am. It is hardly more than five years old, although it took a long time to develop. This is how it started.

As early as 1925, nearly 30 years ago, scientists were testing television in the laboratory. In 1931 a television station was put on top of the Empire State Building for experimenting.

During those years many men worked hard to develop this invention. One of the most important of these men was Dr. Zworykin, who invented a tube called the iconoscope. This is known as the "eye" of the television camera. He also developed the kinescope, which is the "screen" of the television receiver. It is these two inventions which make it possible to see what is happening many miles away without leaving your living room.

On April 30th, 1939, President Roosevelt was televised at the New York World's Fair. This event has been called the "birth of the television industry." After this, it began to develop with telecasts of football games, hockey, basketball, and the circus from Madison Square Garden. In 1940 the Republican Convention was televised in Philadelphia and was seen in New York.

On May 2, 1941, the Government gave permission for TV programs to be sold to advertisers. But World War II stopped the development of television broadcasting. During the war, it was used by the Army and the Navy to control planes and bombs, and played an important part in helping to win the war.

Rosita Sarnoff

After the war television grew rapidly. The kind we have today really began about five years ago when many stations were built. Lots of sets were sold to people who wanted to see all the new programs.

In 1951 television reached across the country for the first time, and people watching sets in New York, as well as other cities could see the signing of the Japanese Peace Treaty in San Francisco.

In 1948 there were very few television stations and not many receivers; programs were being telecast only a few hours a day. Today, five years later, there are more than 300 television stations throughout the United States. There are now more than 25,000,000 sets, and there are programs all morning, afternoon, evening and late at night. Television can now be seen almost everywhere in the United States by most of the people.

You can now sit at home and see many important and exciting events as they actually happen. You can also see drama, mystery, science, fiction, books, and many other types of entertainment and information.

Very soon much of what we now view on television in black and white we shall be able to see in beautiful color. A little later we shall be able to sit at home and see programs originating not only in the United States but throughout the rest of the world.

This is what I found out when I started asking some questions about television.

On the "Home" set. In left foreground is Arlene Francis, editor-in-chief for the show.

Versatile Stage Supports New NBC Show

A MECHANICAL wonderland — the most completely workable permanent set in television — has been devised for "Home," NBC-TV's new weekday morning woman's service program, which made its debut from 11 a.m. to 12 noon on March 1.

Editorially, the program is a television service magazine, with experts in a variety of fields expanding the horizon of service information to an extent never before approached. Among the features appearing regularly are fashion, beauty, cooking, family problems, child care and training, leisure time activities, shopping news and notes, interiors and gardens, architecture and home economics.

The revolutionary set demonstrates products, processes and home procedures in the clearest and most extensive manner ever accomplished on television. The novel equipment has been completely integrated with the editorial and commercial needs of any television show.

Located at the NBC West 67th Street studios in New York, the set, conceived by Sol Cornberg of NBC-TV's plant operations, cost approximately $200,000. Its value lies in the fact that whatever the creative production staff of "Home" wishes to do, the means for an efficient, visually exciting presentation are there and available to them.

The many devices are not simply curiosities or gimmicks, but ingenious instruments designed to do specific jobs with a maximum effect. The set, circular in design, is divided into ten working areas. The whole is enclosed by a translucent plastic skin — a color value wall — which can be lighted from above, below, front or back.

In the center are two concentric turntables. The inner table elevates up to four feet and can also be lowered flush with the outer table. It can hold a pair of sofas, before and after upholstering, for example, or four models of television sets, or even a small car.

Can Hold a Large Car

When the two turntables are interlocked and flush, they can hold a large car. And since the whole turntable can be revolved, the camera can remain stationary while showing all sides of any object, or focus in turn on each of the objects.

The working areas follow each other around the outer circumference of the set. Each is self-contained, although not physically divided from its neighbor. There is an atmosphere of space, and each area can be seen from many angles.

The first, the "tumbler," handles heavy objects automatically and without effort. Anything weighing up to 300 pounds and measuring less than six feet in its longest dimension can be accommodated by the device.

Artist's sketch shows aerial camera, left.

For instance, it can revolve and invert a refrigerator so that the viewer can see the back, side and under surfaces.

The "cookery," a counter engineered for maximum visibility, gives the television audience a clear view of the food in preparation, without the cook's back monopolizing the scene. The cooking, baking, refrigerating and sink facilities are arranged in an unconventional manner, permitting the camera to show distinctly from all angles the smallest object or action.

Editor's Area For Interviews

The "editor's area" is used for interviews. It has monitors to bring in features done "on location"; a screen for showing films; a "flashcast" strip for headlines, recipes, mailing addresses and other data.

The apparatus for demonstrating "how-to-do-its" is in the "workbench" area. In addition, this is a live laboratory for testing various products before the television audience.

The "weather area" is next. Labelled the "elementery," this will produce the elements "live" — rain, fog, snow, and hail — to show how products and materials respond to weather. It can be used for fashion shows, demonstrating most effectively clothes designed for resort wear, rain, or winter.

The next three areas, arranged for room set-ups, fashion shows, and commercials, can be used separately or together. The center area elevates, tilts, and can be photographed from underneath. The entire walking surface is translucent and can be lighted from below.

The last area is occupied by the garden or "growery." This is an earth pit, where anything from seeds to trees can be planted and viewers can watch their growth over the weeks. Demonstrations can be given on how to prune bushes and transplant house plants, among other practical gardening procedures. Not wishing to thrash out the issue of whose soil raises the best fruits, vegetables, flowers and shrubs, the producer wrote a letter to the 48 governors, inviting each to send "Home" a package of soil from his state. The soil has been thoroughly mixed in the "growery." The theory is that not only will local pride be salved in every part of the country but the plants will thrive on the mixture better than they would in soil from any single state.

New Aerial Camera Used

Three conventional cameras will be in operation on the set. In addition, the studio is equipped with a new aerial camera, mounted with its own lights on a telescoping arm attached to the ceiling. More flexible than any previous television camera, it can go from an overall aerial view to a close-up. The arm extends to 30 feet, reaching as far as the wall. It can go straight down, straight out, or at any angle in between, and swings in a complete circle. The entire mechanism is remotely controlled from the wall.

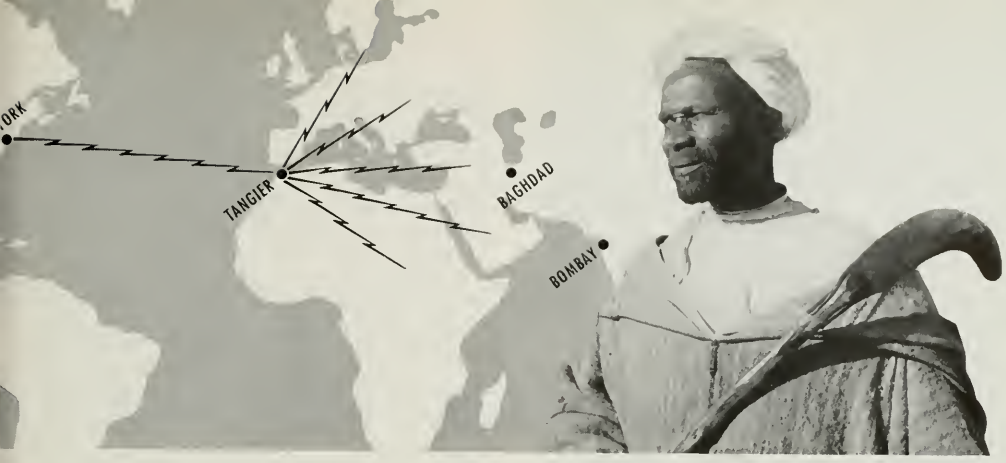
The "Home" set is absolutely practical. Its facilities mean that much can be done "live" and imaginatively which previously required the use of expensive film, edited in order to reproduce similar effects. The new studio set will also make it possible not only to inform but to stimulate the housewife to adopt procedures and buy products demonstrated on the program, thus implementing to the fullest the editorial and commercial plans of the program.

Foundation Honors NBC

THE Distinguished Service Scroll of Freedoms Foundation, the highest honor conferred by the organization, was awarded on February 22 to the National Broadcasting Company for having won "at least four" of the Foundation's annual awards selections in the past five years.

The 1953 award — the fourth which qualified NBC for the scroll — was conferred on the network for its non-discriminatory "integration without identification" policy, cited by Freedoms Foundation as a "high level policy of NBC in all of its operations — the official mandate that neither color nor religion may constitute a barrier to the full utilization of any human skill."

In addition to the special award to the network, six NBC television programs and two NBC radio programs won Honor Medal Awards.



Tangier: Crossroads of Radio

By Eugene D. Becken

Assistant Vice President and Plant Operations Engineer, RCA Communications, Inc.

A TWENTIETH century electronic marvel is planted today on land where subjects of His Majesty, the Sultan of Morocco, have lived and hunted since the beginning of history.

Into this ancient domain in Northwest Africa has come one of the great communications centers of the world — the Tangier radio relay station of RCA Communications, Inc., linking the United States directly to twenty major countries, and channeling messages destined for nineteen additional nations.

Here, partly on its own land and partly on leased public domain known as the Forest of Charf el Aquab, RCA Communications has erected buildings and antennas and has installed transmitters, receivers and diesel power generating units to handle messages in all the important tongues of humanity. Lying to the south of the highly disturbed zones rimming the arctic regions, the Tangier station has become the key relay in RCA's world-wide communications system.

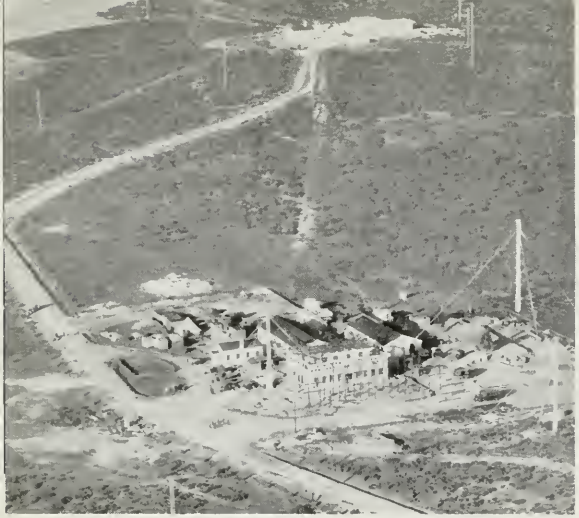
The station lies sixteen miles to the south of the city of Tangier, a center of 175,000 population near the Straits of Gibraltar. The Riff and Atlas mountains ring the region about 40 to 300 miles to the east and south. Modern Tangier is an international zone whose control is in Moroccan, French, Spanish, British, American, Italian, Belgian, Dutch and Portuguese hands. Its inhabitants represent a sampling of many continents with a wide range of ancient and modern culture and customs. It is a land of free exchange of the world's currencies, no income tax, wonderful climate, and political intrigue.

This was the stage on which RCA Communications decided in 1946 to erect its great radio relay station. There were a number of reasons for building such a station and for placing it in Tangier. At the end of World War II, in the period of initial reconstruction, international communication requirements grew steadily, calling for greater volume and reliability of radio circuits. The need for greater volume was met by introduction of the five-unit tape relay system, using teleprinters — but this innovation further sharpened the need for more reliable circuits.

Reasons For Tangier Site

Wartime experience had improved knowledge of the behavior of radio waves. It had been determined, for example, that the electrical disturbances frequently interfering with the radio paths between New York and points in Europe and the Near and Middle East could be largely avoided by moving the paths farther to the south. However, it was known too that the nearer these paths approached to the equatorial zone, the greater the radio noise encountered. Tangier was selected as a satisfactory technical compromise.

Another reason for the selection of Tangier was the need for a relay center where weak radio signals could be restored to their original shape, amplified and transmitted onward with a tremendous increase in power. This was especially vital on extremely long circuits, such as those from New York to Bombay and New York to Baghdad.



Aerial view of the Tangier station.

Radio waves travelling with the speed of light become weaker with every passing mile, and on very long circuits they diminish to a magnitude about equal to or even less than the magnitude of the local radio noise at the receiving station. The solution is either an extensive increase in transmitter power at the point of origin, or the installation of a radio relay at some midpoint in the circuit. The Tangier station performs this relay function.

The station comprises two separate clusters of buildings and antennas — one for receiving and the other for transmitting. The message handling or traffic function is combined with the receiving center, while the 400-kilowatt diesel electric power generating equipment for the entire station is included in the transmitting center.

There are 22 rhombic antennas — forming the pattern of a rhombus or a diamond when viewed from above — and 30 diversity receivers at the receiving site. The antennas operate in groups of two or three, spaced at least 1,000 feet apart. Erected on steel masts 80 to 150 feet high, the rhombic antennas act somewhat like a hearing trumpet to concentrate the received energy. The radio receiver automatically picks out the strongest signal from any of the three in a group, making for considerable improvement in reception.

Signals Are Put on Tape

The incoming signal goes by cable to the nearby traffic center, where it is converted automatically into perforations in a continuous paper tape. While the message is being converted into perforations on the tape, the automatic device also types the information on the tape, permitting an operator to read the letters, figures or symbols being sent.

Although tape appears at Tangier with dozens of different languages, the operator does not need to know — and in fact seldom does know — the contents of the message being relayed. It is important only that he quickly scrutinize the tape for any technical flaws.

The process of converting the message to perforated tape creates a duplicate of the original message, to be sent out completely refreshed on the second leg of its journey. The destination is determined from the preamble of the message, and the tape goes on to a so-called transmitter-distributor, which translates the perforations back into electrical signals that are sent by cable to the transmitting site.

At the transmitting site, the signal is amplified and sent out from rhombic transmitting antennas which concentrate the radio energy in a narrow beam like that of a searchlight. Tangier is equipped with 26 such antennas and 25 radio transmitters ranging in power from one to 15 kilowatts of output.

Another function for which Tangier is equipped is automatic electronic relaying, a method employed for messages over leased channels between New York and an overseas point. This technique eliminates the per-

(Continued on page 32)

Thompson H. Mitchell, President of RCA Communications, Inc., explains a transistor to Eagle Scout Stanley Becker in this photo sent from New York to Tangier and back again by radio.

They Keep the Standards High

NBC Unit Reviews All Broadcast Material

Problems of taste are day-to-day business for the National Broadcasting Company. In quantities of program and commercial material prepared each day for broadcast there are occasional offensive items that call for immediate treatment by a corps of specialists in the art of reviewing broadcast material for family consumption in the home. For example:

The flag is an inspiring symbol to all Americans, but isn't it out of place as a cake decoration in a television commercial for a brand of flour?

A broadcast performer may play George Washington or an equally respected historical figure without giving offense, but can a comedian do likewise for the sake of a laugh without risking charges of having thrown aside good taste?

The Bible is a source of spiritual strength to millions, but is it the sort of item that should be offered as a premium to any radio listener who sends in a monetary consideration and the box-top from a sponsor's product?

Add to these fairly obvious questions a wide range of situations involving offenses to moral or political views, to racial dignity and to religious sensibilities and the result is a general idea of the responsibility that rests upon the broadcaster. The answer is, of course, a reasonable, self-imposed censorship with the sole aim of protecting a family audience—and sponsors and broadcasters as well—from the flagrant but unintentional lapses in taste that inevitably occur in the great volume of program and advertising material that makes up the day's broadcast fare.

Code Established in 1934

The Radio Corporation of American, announcing the creation of NBC in 1926, emphasized the responsibility of the broadcasting service for producing high quality programs in the public interest and by 1934 NBC had equipped itself with a detailed code governing program and advertising content, along with the machinery for ensuring its firm application. The NBC code antedated by more than eighteen years, and set the pattern for, an industry-wide code established by the National Association of Radio and Television Broadcasters.

Applying the code effectively means a considerable task of reviewing all films and scripts for radio or television broadcast—both programs and commercials. NBC has placed the job in the hands of a small but enthusiastic group known as the Continuity Acceptance staff, headed in New York by Stockton Helffrich, an NBC Twenty-Year Club Member. Fourteen comprise the staff operating at NBC headquarters in New York; proportionate groups are maintained in Washington, Chicago, Hollywood, Cleveland, and San Francisco.

The job is perhaps the closest approach in broadcasting to a tightrope-walking act. The reviewers are responsible for weeding out any clearly offensive oral or visual material that may terrify, anger or disgust a considerable segment of the audience, but at the same time they must avoid hampering the creative talents necessary to high quality programming.

Mr. Helffrich defines the function this way:

"Essentially we're a common-sense department, devoted not to telling producers what they can't do, but to helping them to say what they want to say in a manner acceptable to the widest possible majority."

This gives only a faint idea of the dimensions of the task. A more graphic measurement lies in the files of the Continuity Acceptance staff—a collection of dreadful examples that have been stopped in their tracks, and of indignant letters proving the point made by a prominent columnist that "there is hardly a radio or television program that doesn't offend *somebody*."

Occasional complaints may refer to the dramatic quality of a program or the performance of an artist—aspects with which Continuity Acceptance is not primarily concerned—and a number represent isolated points of view that in all justice cannot be allowed to influence programming for the great majority. In the

Sarnoff Accepts Award

(Continued from page 6)

far from being journeymen workers in that complex area. Indeed, with every new advance we are more acutely conscious of how much remains to be explored and analyzed.

Constructive Purpose Needed

"Unhappily, too much of our new knowledge has been applied to the instruments of destruction. But, like the fire of Prometheus, it can serve man as well as consume him in its flames. No time must be lost in applying our new knowledge to constructive purposes. The electron and the atom can be made wonder-working allies, rather than death-dealing enemies, of man. They hold incalculable treasures of peace and civilization which we shall squander unless we succeed, in due time, to make them instruments of God rather than the Devil.

"Man cannot hope to control the behavior of the electron and the atom until he learns to control himself in a world where one man's madness can make millions mourn. There might be an atom bomb on this platform, but it would remain harmless unless man in his confusion and desperation pulled the trigger that released its frightful energy. If the civilization we cherish is to survive, the hand that controls the atom must be guided by understanding and good will—not by hate, but by love of mankind."

In conclusion, General Sarnoff declared:

"Today we stand on the threshhold of a new era, bright with promise. If man turns his thoughts and energies toward the potentialities of science for peace instead of war, modern inventions can help make life on this earth so fruitful and satisfying for all people that there would be little cause for envy and conflict.

"What we need most is the faith and the spiritual guidance that will lead us to use our amazing new knowledge for the benefit of all humanity, and not for its destruction. Especially in troubled times of decision like the present, we dare not forget the goals set for us by the noblest prophets and poets, philosophers and spiritual leaders, through the ages. Those goals have never changed. The hope of everlasting peace and a world that is free has its source in the mind, the heart and the soul of man. These are the divine gifts with which man, alone among the teeming creatures of the world has been endowed, and they will enable him to meet, 'Today's Great Challenge and Golden Opportunity.'"

Tangier Relay

(Continued from page 28)

forated tape line, passing the incoming message directly to the transmitting circuit in electrical form for radio transmission. Any message sent over such a leased circuit by a client in New York is sent automatically through Tangier to its destination. Pictures and radio programs are relayed through the station in this fashion, as well as radio messages.

The people who operate this complicated electronic plant are British, Spanish, Moroccan, Italian, French, Dutch, Danish, Portuguese, and Cuban nationals, making up a staff of 225 employees. A number are highly-trained electronic specialists who, despite their widely-varied backgrounds, are joined together in a mutual effort to provide the finest communication service possible. English is the common denominator for carrying on the station's affairs.

RCA Communications, Inc. had and continues to receive the able and helpful assistance and guidance of the United States Department of State, both in Washington and Tangier, and the International Administration of Tangier in constructing and operating this plant with its many complex problems.

Television in Japan

(Continued from page 20)

for remote coverage, microwave relay links, and other associated equipment to the Japanese broadcasting companies. The Okura Trading Company, Ltd., of Tokyo, RCA International engineering products distributor, has been rendering valuable service to RCA customers in Japan by helping them to select proper equipment and plan the set-up of the stations.

The Nippon Telephone and Telegraph Corporation has constructed a two-way microwave relay link between Tokyo, Nagoya, and Osaka. It will provide facilities to both the public and private broadcasting companies. The Nippon Telephone and Telegraph Corporation plans to service other areas of Japan as television is established in those places.

Although Japan was the leader in the Far East in television broadcasting, Thailand and the Philippines have since purchased RCA TV transmitters. All three countries will operate on United States FCC standards of 525 lines, 60 fields.

RCA was the first company to supply television equipment also in Brazil, Canada, Cuba, the Dominican Republic, Mexico, and Venezuela.

ENGINEERS:

DOES YOUR PRESENT JOB GIVE YOU ALL THESE RCA CAREER ADVANTAGES?

CHECK SHEET

Yes	No	
☐	☐	PROFESSIONAL RECOGNITION AND PRESTIGE?
☐	☐	ADVANCEMENT IN STATUS?
☐	☐	SECURITY AND STABILITY?
☐	☐	CHALLENGE AND OPPORTUNITY?
☐	☐	HIGH SALARY SCALE AND OPPORTUNITIES FOR PROMOTION?
☐	☐	EXCELLENT SUBURBAN HOUSING AT REASONABLE COST?
☐	☐	FACILITIES FOR PROFESSIONAL ADVANCEMENT?
☐	☐	UNEXCELLED TECHNICAL AND LABORATORY FACILITIES?
☐	☐	ASSOCIATION WITH TOP SCIENTISTS?
☐	☐	TUITION REFUND PLAN FOR ADVANCED STUDY?
☐	☐	MILITARY OR COMMERCIAL OPPORTUNITY?
☐	☐	MODERATE COST OF LIVING?
☐	☐	MODERN RETIREMENT PLAN?
☐	☐	COMPANY-PAID LIFE INSURANCE?
☐	☐	COMPANY-PAID LIBERAL HOSPITAL, SURGICAL AND DISABILITY PLAN (FAMILY BENEFITS)?
☐	☐	LIBERAL VACATION PLAN?
☐	☐	LIBERAL HOLIDAY SCHEDULE?
☐	☐	PROFESSIONAL STATUS AND UTILIZATION OF YOUR EDUCATION AND EXPERIENCE?

POSITIONS NOW OPEN FOR SENIOR DEVELOPMENT AND DESIGN ENGINEERS:

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RCA

RADIO CORPORATION of AMERICA

Compatible color television reaches every TV home

The rainbow you can see in black and white!

RCA brings you compatible color TV. Lets you see color programs in black and white on the set you now own!

"When a modern and practical color television system for the home is here, RCA will have it . . ."

Echoing down through the years, these words—spoken in 1946 by David Sarnoff, Chairman of the Board of RCA—have a ring of triumph today.

The day on which the FCC approved standards for the commercial broadcasting of *compatible color television*—December 17, 1953—will be remembered in the annals of communications along with the historic date of April 30, 1939, when RCA-NBC introduced *black-and-white television* as a service to the public.

At that time sight was added to sound. Now color has been added to sight.

Behind this great development are many long years of scientific research, hard work and financial risk. RCA scientists were engaged in research basically related to *color* television as far back as the 1920's . . . even before *black-and-white* television service was introduced.

Since then RCA has spent over $25,000,000 to add the reality of color to black-and-white TV, including development of the tri-color tube.

The fruit of this great investment is the RCA all-electronic compatible color television system, *a system that provides for the telecasting of high-quality color pictures that can be received in full color on color receivers; and in black and white on the set you now own.*

RCA and NBC will invest an additional $15,000,000 during color television's "Introductory Year"—1954—to establish this new service on a solid foundation.

RCA color television sets are beginning to come off the production lines in small quantities. Although it will probably be another year before mass production is reached, the promise of compatible color television is being fulfilled.

RCA pioneered and developed compotible color television

RCA® *Radio Corporation of America*

World leader in radio—first in television