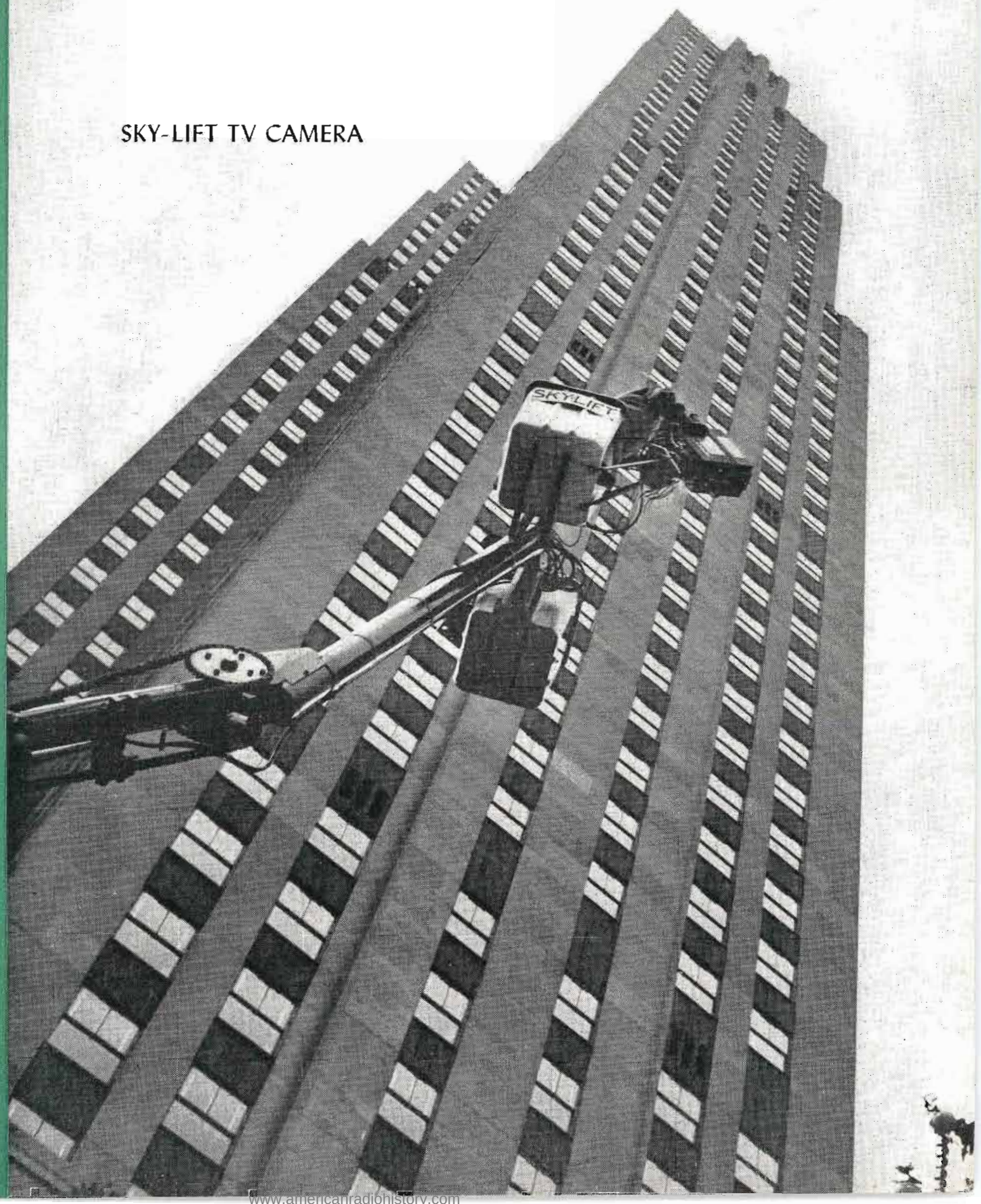
RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

SKY-LIFT TV CAMERA



RCA

JANUARY

1953

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RCA

RADIO CORPORATION of AMERICA

Radio Age

RESEARCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

VOLUME 12 NUMBER 1

JANUARY 1953

COVER

From his 40-foot perch on NBC's "Sky-Lift", a cameraman turns his television lens on activities around the base of the RCA Building in Radio City, New York. One of these camera units will be used by NBC in televising the Presidential Inaugural on January 20.

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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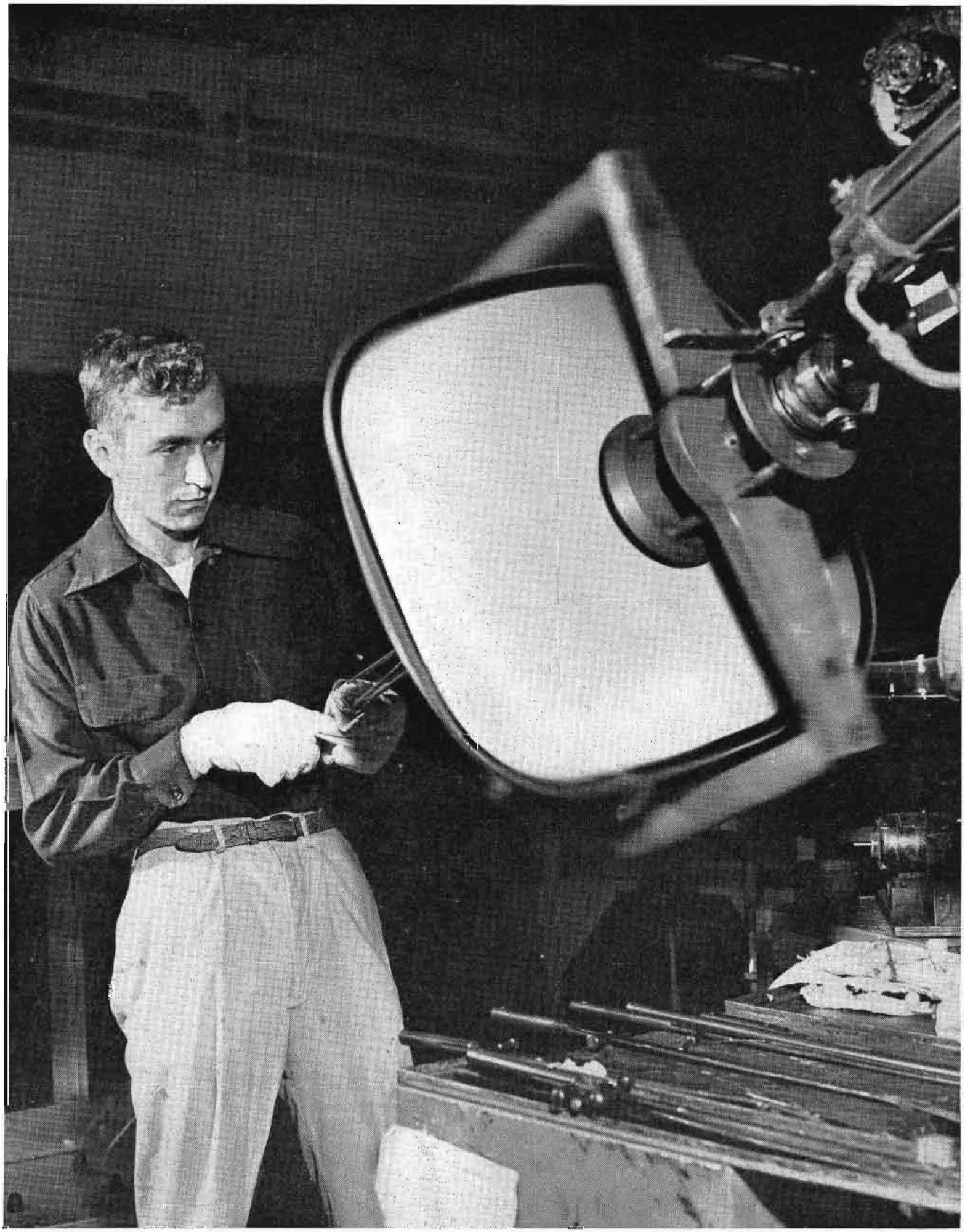
RADIO CORPORATION OF AMERICA

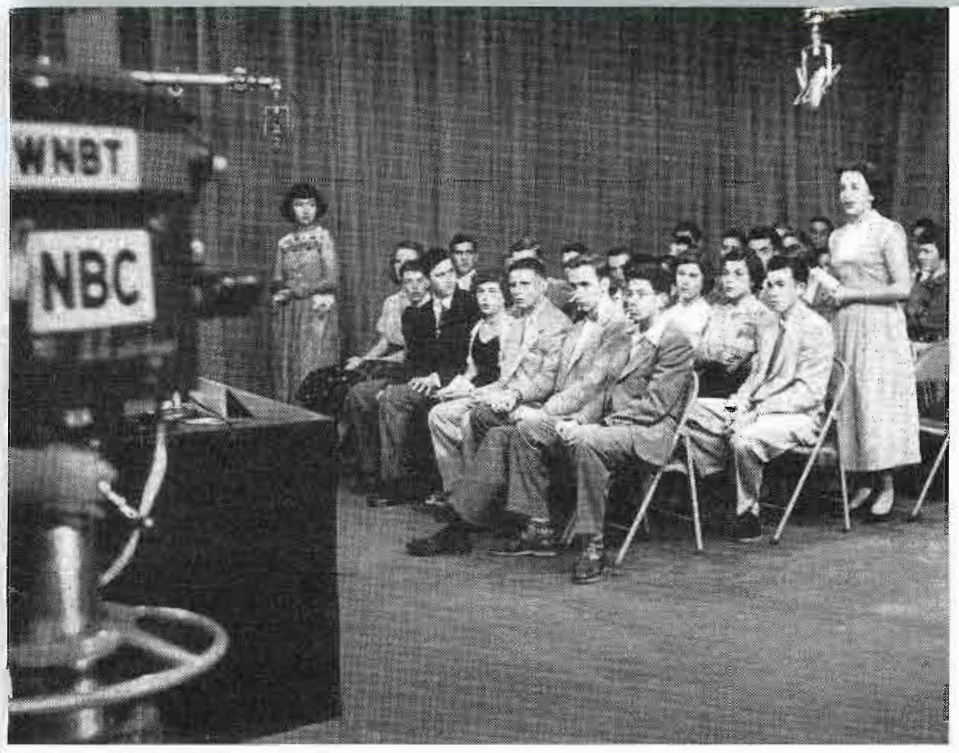
RCA Building, New York 20, N. Y.

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

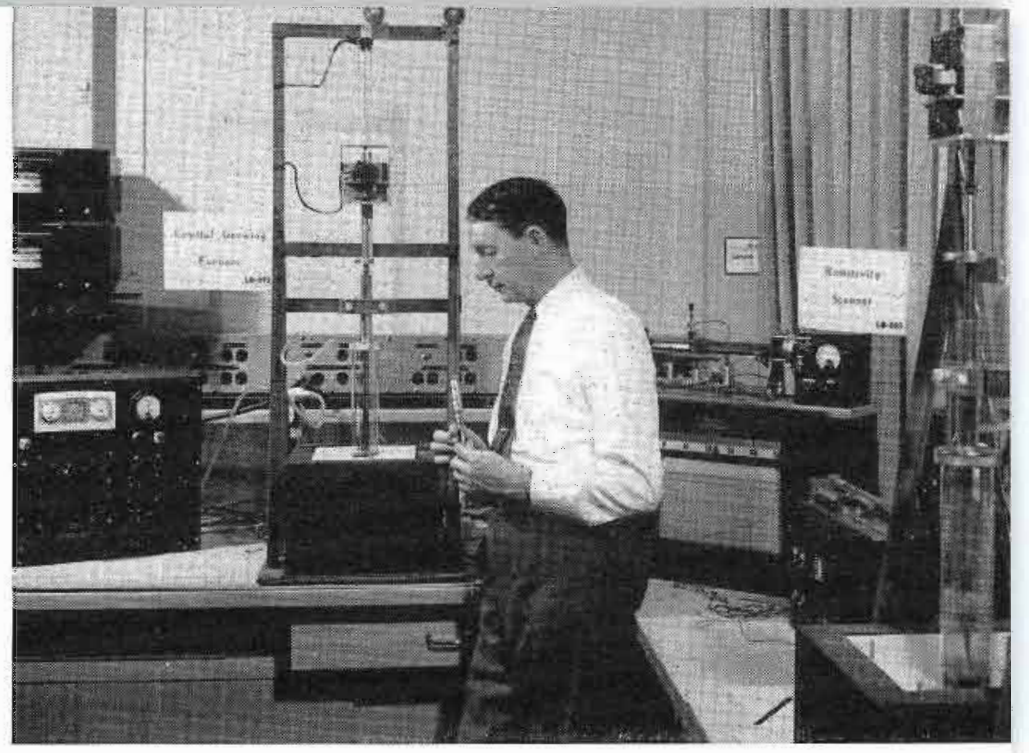
Services of RCA are:
RCA Victor Division • RCA Service Company, Inc. • RCA International Division
National Broadcasting Company, Inc. • Radiomarine Corporation of America
RCA Communications, Inc. • RCA Laboratories Division • RCA Institutes, Inc.
RCA Estate Appliance Corp. • RCA Victor Distributing Corp.



In making a picture tube for a television receiver, the kinescope is whirled rapidly while a graphite coating is applied to the inside of the glass neck and metal cone at the RCA plant, Lancaster, Penn.



"The uses of television in education are manifold."



"Engineers are developing transistors for mass production."

Sarnoff Says Transistor Will Have Profound Influence on Future of Electronics

Chairman of RCA, in Year-End Statement, Sees New Opportunities for Continued Expansion of Television and All Phases of Electronics Based on Tiny Device the Size of a Kernel of Corn

BRIG. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, in reviewing radio-television developments of 1952 and looking ahead to new advances, on December 29, pointed to the transistor as the latest marvel of science destined to exert a profound influence on the future of electronics and communications. Further development of the transistor, he said, will greatly broaden the base of the electronics art, enabling it to expand into many new fields of science, commerce and industry.

Major advances of the year included continued expansion and improvement of television; further refinement of the RCA compatible color television system; increased sales of improved radio sets, "Victrola" phonographs and records; and expanded application of electronics for military, industrial and communications purposes.

"In recent years a vast new field for exploration and development called 'electronics of solids,' has opened in the scientific world," said General Sarnoff. "So impressive are the developments, and so important the potentialities for the future, that scientists are acknowledging electronics of solids as one of the most dramatic steps in technical progress.

"From this extensive research has come the transistor. In its present form, it consists of a small particle of the metal germanium — no larger than a pinhead — imbedded in a plastic shell about the size of a kernel of corn.

"The transistor has no heated filament, requires no warm-up period and uses very little power. Further, it is rugged, shock resistant and unaffected by dampness. These qualities, together with its very small size, offer great opportunities for the miniaturization, simplification and refinement of all instruments to which it can be applied.

"Recognizing the great potentialities of transistors, RCA research men and engineers are developing them for mass-production and are studying the multiplicity of new applications they make possible in both military and commercial fields. Such applications appear endless. One example is the electronic computer which in some of its advanced forms now requires thousands of electron tubes. Eventual substitution of transistors will permit machines of greater versatility and utility, as well as reducing their size and the power consumed.

"As a progress report, RCA scientists in November, 1952, demonstrated some of their experimental transistor

achievements to date," said General Sarnoff. "They showed a new basic principle in the operation of a power amplifier using only four transistors and no other components. Such a device will have many applications wherever sound amplifying equipment is used, as in radio, television and public address systems.

"Among other developments which were shown were a tiny, all-transistor personal radio, a tubeless auto radio set, a television set using all transistors except one picture tube, novel musical instruments using transistors, and numerous other applications of these new devices throughout the field of radio, television and electronics."

Television

General Sarnoff observed that television greatly extended its service area and increased its stature as one of America's major industries in 1952. As evidence of the growth, he pointed out that television-equipped homes increased from 15 million in 1952 to nearly 21 million at the end of 1952 — a gain of 40 per cent. At mid-December, 117 TV stations were on the air and construction permits had been granted to 135 others. He said that 47 per cent of the families in the United States have television sets in the home and more than 65 per cent of the population is within range of one or more television stations.

General Sarnoff listed the two most significant steps in television progress during the past year as the licensing of new stations, permitted by the lifting of the TV station "freeze," and the opening of UHF (ultra-high frequencies) for television broadcasting.

"As a result," he said, "new markets will open as television broadcasting service spreads, and an indication of what may be expected is found in the plans of the RCA Service Company to open thirty-four additional service branches in 1953."

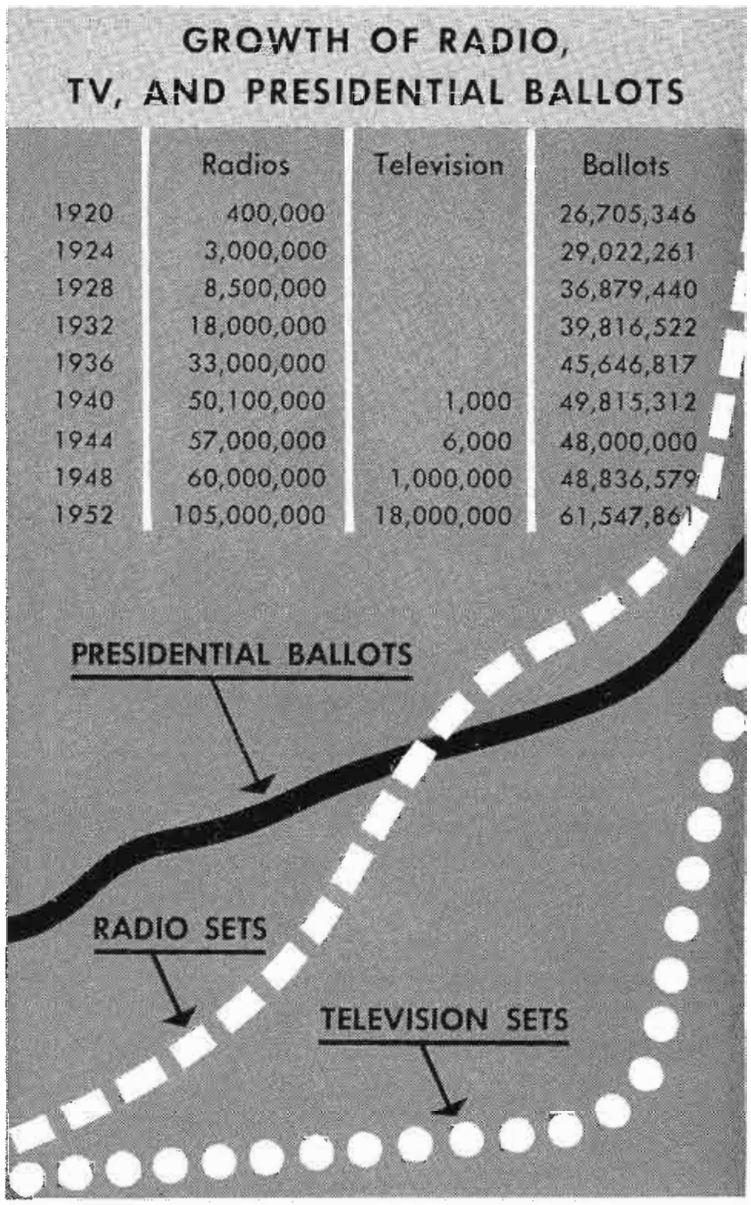
In the international field, he disclosed, RCA has supplied equipment for fifteen television stations in Canada, Brazil, Cuba, Hawaii, Dominican Republic, Mexico, Venezuela and Italy.

Color TV

"Further progress has been made during the year with the RCA compatible color television system and its tricolor tube," continued General Sarnoff. "During 1952 RCA and NBC engineers have been field testing color television standards evolved by the National Television System Committee, which is comprised of experienced engineers of the industry. When the field tests have been completed and the information evaluated and applied, the Federal Communications Commission will be petitioned to review the subject of color television and to set standards which will permit commercial broadcasting

GROWTH OF RADIO, TV, AND PRESIDENTIAL BALLOTS

	Radios	Television	Ballots
1920	400,000		26,705,346
1924	3,000,000		29,022,261
1928	8,500,000		36,879,440
1932	18,000,000		39,816,522
1936	33,000,000		45,646,817
1940	50,100,000	1,000	49,815,312
1944	57,000,000	6,000	48,000,000
1948	60,000,000	1,000,000	48,836,579
1952	105,000,000	18,000,000	61,547,861



of compatible color. The field tests have also produced further evidence of the practicability and desirability of a compatible system for service to the public, that is, a system which permits owners of existing television sets to receive color programs in black-and-white without any change whatever in their sets."

Television's Impact

General Sarnoff declared that television's great impact on American life was brought into sharp focus during the national political campaign, as TV played a vital role in presenting the candidates to the people and in getting out the vote. He said that historians as well as politicians will be busy for some time to come evaluating the full extent of the influence of television in politics, and evolving strategy for its most effective use in future campaigns.

"Millions of people," he continued, "including countless school children across the nation, will see General Dwight D. Eisenhower inaugurated as the thirty-fourth President of the United States.

"On the other side of the sea, the Coronation of Queen Elizabeth will add lustre to history. It promises pictures of splendor that will add to the dimensions of television in presenting history as it is made."

Calling attention to the fact that throughout 1952 the older arts, including radio, the press and motion pictures, felt the added touch of television, General Sarnoff added:

"Each medium has stimulated the other to further improvement and greater service. For example, the motion picture series, 'Victory at Sea,' produced for television by the National Broadcasting Company in cooperation with the United States Navy, has brought into the homes of the nation documentary proof of the defeats and the triumphs of World War II and the heroism of our fighting men at sea, on land and in the air.

"The live-talent telecasts of 'Opera in English,' originated and developed by the NBC, have provided a new dimension and significance to this field of entertainment and education. Among the 'Operas in English' have been, 'Amahl and The Night Visitors,' 'Billy Budd,' and 'Trouble in Tahiti;' others being scheduled for the near future include 'Der Rosenkavalier,' and 'Suor Angelica.' The public response to these live television programs and films has been gratifying and stimulating.

"As further evidence of the creative efforts of the NBC in program pioneering, Robert E. Sherwood, noted dramatist, has been engaged to write nine original plays for television, the first of which is scheduled to be broadcast in the spring.

"There is plenty of evidence at hand to show that television will by no means be limited to its present operations. The uses of TV in education are manifold. It may well be that the volume of business that can be developed in industrial television and electronics as well as television in education, will one day be larger than the volume of business now being done in the field of TV entertainment."

Radio

Sales of radio sets continue to increase, enhanced by technical refinements and attractive designs, General Sarnoff stated, with production by the industry of 9 million new sets during the year. At the beginning of 1952 there were 105 million radio sets in the United States, including 25 million radios in automobiles.

Portable sets, because of their efficiency and convenience, have gained in popularity and will continue to do so, he said, adding that clock radios and book-size receivers in light-weight plastic cases beautifully designed in a variety of colors have contributed to the novelty and usefulness of such instruments and have increased the public demand for them.

Phonographs — Records

The popularity of the "Victrola" phonograph and recorded music continued to grow, he said, and asserted:

"Today there are 26 million phonographs in the United States as compared with 8 million in 1946. New, simplified and improved record-changers, smaller nonbreakable records, new electronic techniques in recording, and attractively designed albums have all helped to increase the demand for phonographs and records.

"The '45' records and 33⅓-rpm Long Play records have spearheaded the advance. Among the new developments in 1952 was the RCA Victor 'EP' (Extended Play) '45' record which plays up to eight minutes on a side, or a total of 16 minutes for each seven-inch disk."

Industrial Electronics

There are many new developments in industrial radio and electronics which will further enlarge the commercial horizon, he said, declaring:

"For example, business machines, home appliances, highway communication systems, radar, electron microscopes, bottle inspection machines are some of the uses to which microwaves and electronic techniques have been applied. Industrial television will perform important services in manufacturing plants, in aviation, transportation and navigation, in business offices, department stores and wherever seeing, counting, sorting and controlling are essential."

Value of the American System

General Sarnoff said that the United States is fortunate in having a radio-television industry made up of so many competent organizations. The keen competition among them, he said, spurs continued effort on the part of all and stimulates scientific and economic advances matched by no other country.

"Here, private enterprise and freedom in research and invention, in engineering, production and service are the lifeblood of progress," he continued. "These competing organizations, through their individual efforts, give the United States preeminence in all phases of radio, television and electronics. For defense, this industry provides superior equipment developed and produced by American ingenuity and craftsmanship. The finest radio-television instruments and services in the world, and at the lowest cost, are made available to the American home. In achieving this, the industry provides employment for hundreds of thousands of people and contributes substantially to the high standards of living enjoyed in this great country.

(Continued on page 21)

Folsom Says 1953 Will Bring Marked Expansion in Television

President of RCA Foresees between 150 and 200 New TV Stations Going on Air in Next Year, Bringing About Five Million Additional Families Within TV Program Service Range

FRANK M. FOLSOM, President of the Radio Corporation of America, in a year-end statement released January 2, said that between 150 and 200 new television stations are expected to go on the air in 1953, bringing approximately five million additional families within TV program service range.

On the basis of this expectation, plus the replacement market, he said, it is believed that the industry will distribute approximately 6,250,000 new television sets in 1953.

Mr. Folsom said that the annual "going rate" of the radio-television industry is now estimated at $5 billion, and that analyses of market potentials indicated a continuing upward trend in 1953, with the industry rate approaching $6 billion during the latter part of the year.

"Equipped with the greatest production capacity in its history, the radio-television industry is successfully meeting the dual requirements of manufacturing for the national defense and the domestic market," he stated. "In RCA, this is largely due to the outstanding teamwork of employees and the splendid cooperation of suppliers.

"While defense production formed the bulk of the industry's output in 1952, television continued to be the major factor in the civilian field. The 6,000,000 television receivers produced during the year added more than $1 billion to the industry's gross income.

"America's overwhelming acceptance of television as one of our most powerful mediums of entertainment, culture, and news is shown by the fact that, in the last six years, the public's investment in TV receivers alone amounts to more than $9 billion. This represents an unparalleled achievement. It involved the manufacture and distribution of approximately 23,000,000 television sets, of which nearly 21,000,000 are in use today."

Mr. Folsom noted that along with television's growth, the public's interest in radio broadcasting "continues firm," with distribution of 9,000,000 radio sets achieved in 1952 and expectation of producing that many in 1953.

"As one of the principal manufacturers in the industry," he declared, "RCA Victor produced as many radio and television home instruments in 1952 as Government allocations of materials permitted. The greatest demand in the television field was for 21-inch receivers. The public's desire for larger screen sizes is growing, and this trend probably will result in substantial sales of 27-inch receivers by the end of 1953. In radio, the trend is to small sizes with high performance. Miniaturization of component parts and tubes is enabling us to meet this demand in radio.

"In the field of defense production, RCA made an outstanding record throughout the year."

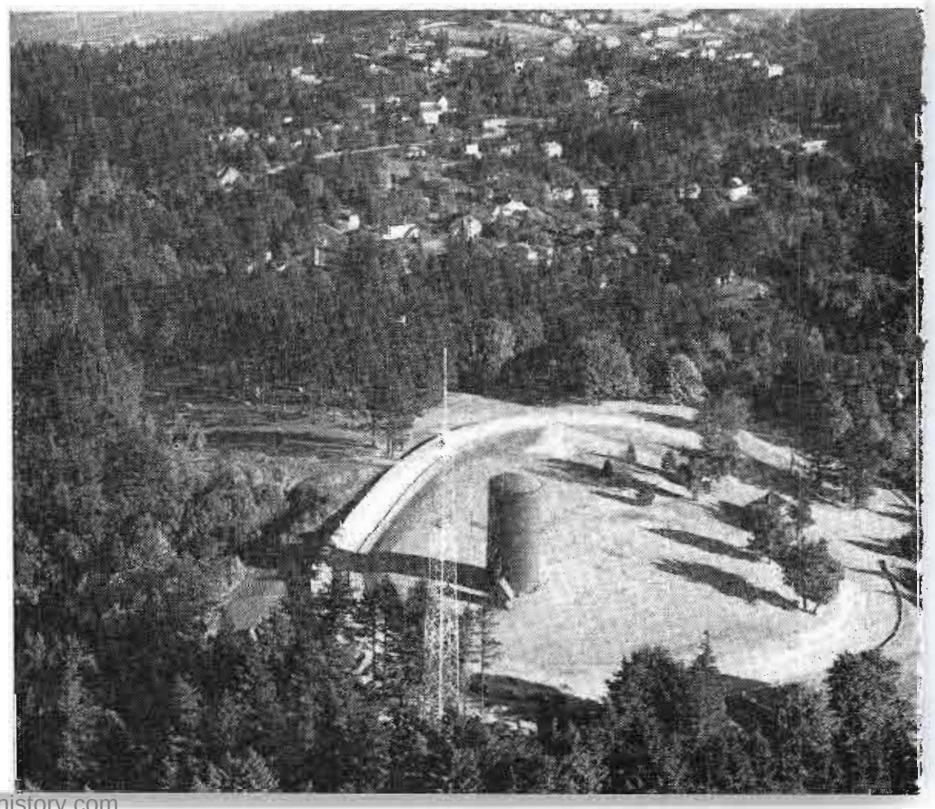
Attention Focuses on UHF

Throughout 1953, Mr. Folsom said, the expansion of television service will devote increased attention on UHF (ultra-high frequencies).

"While the number of VHF (very-high frequency) stations will continue to increase, many communities will be served by both VHF and UHF," he pointed out. "Still others will be served by UHF alone.

"The rapidly expanding UHF television market is a direct outgrowth of RCA's experimental 'proving ground' at Bridgeport, Conn., where the practical prob-

Antenna of first commercial UHF station in Portland, Ore.



lems of UHF were solved and virtually the entire industry tested its receiver designs. Largely as a result of these experiments, the 'freeze' on television broadcast station construction was broken in 1952, and the entire broadcasting industry hailed the highly successful inauguration of the first post-freeze VHF station in Denver, Colo., and the first commercial UHF station in Portland, Ore.

"The contributions of RCA and RCA Victor engineers in bringing television to these new markets included not only the design and construction of these transmitters, but advances in receiver design and the design and installation of new combination UHF-VHF antennas by the RCA Service Company.

"Both VHF and UHF provide excellent telecasting service, but, because of the added frequency range, new dual receiving equipment must incorporate the best possible technical design. This type of equipment includes combination VHF-UHF receivers, as well as conversion units for sets already in use. Our objective is to continue to provide excellent reception in the home at all stages of television's growth. In this connection, RCA has continued its engineering development of compatible color television as a future additional service to the public."

One of the most significant things about the electronics industry is its long-range capacity for expansion and diversification, Mr. Folsom said, adding:

"In this connection, it often has been predicted in the past that the non-entertainment applications of electronics would some day produce a greater volume of business than radio and television.

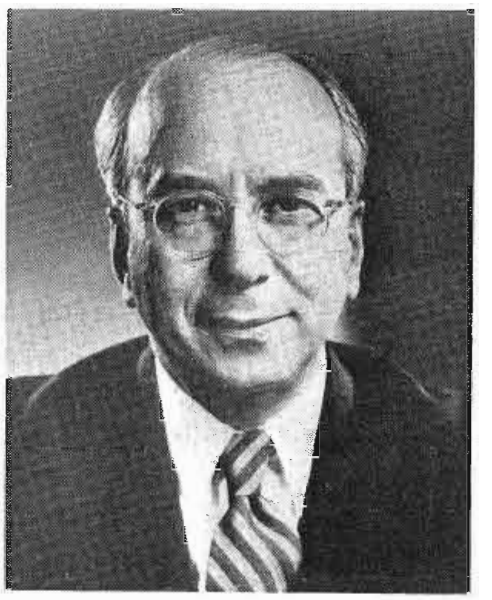
"While non-entertainment applications are still far short of forming the major output, the year 1952 brought a pronounced quickening of interest on the part of different elements of the industry in an ususually wide range of developments in electronics for business, industry, and health. High on the list of these potentially important developments were:

"1. *Electronic Business Systems.* Capable of tremendous savings in time, energy, and space, these systems can handle inventory, general accounting, and payroll functions completely and efficiently. They are expected to find broad applications not only in general business, but also in such specialized fields as Government, insurance, utility, mail order, and circulation of newspapers and magazines. The RCA Victor Division is presently constructing an electronic inventory control system under Government order for the U. S. Army Ordnance Corps.

"2. *Medical Instruments.* To the list of such

(Continued on page 20)

Strauss Elected Director of RCA and NBC



Lewis L. Strauss

Lewis L. Strauss has been elected a Director of the Radio Corporation of America and of the National Broadcasting Company.

Mr. Strauss, Consultant and Financial Adviser to the Messrs. Rockefeller, fills a vacancy on the RCA and NBC Boards left by the resignation of Niles Trammell, on December 8. He is a Director of a number of industrial enterprises and is President of the Board of The Institute for Advanced Study at Princeton. He is a Trustee of the Sloan-Kettering Institute and Memorial Hospital in New York.

Mr. Strauss was for many years a partner of Kuhn, Loeb & Company, before resigning all business connections to serve as a member of the Atomic Energy Commission. Commissioned Lieutenant Commander, U. S. Naval Reserve in 1926, he was advanced through the various ranks to Rear Admiral in 1945. He received the Distinguished Service Medal and the Legion of Merit for services in the United States Navy in World War II.

New RCA Victor TV Sets

RCA Victor has announced its 1953 line of 25 television models with newly styled cabinets and a chassis that is said to be the most powerful in the Division's history.

Outstanding in the line is the "Nassau", featuring for the first time by RCA, a 27-inch picture tube. Optional in all models is a 16-channel combination UHF-VHF rotary tuner designed for use in those areas where UHF stations are in operation.

Millions Will Watch Pageantry of Presidential Inaugural by Television

TELEVIEWERS tuned to NBC will, in effect, be riding at the head of the Presidential inaugural parade on Tuesday, Jan. 20, 1953, when the network's five-hour telecast and three-hour radio broadcast carry to the nation a comprehensive account of the change in the nation's administration.

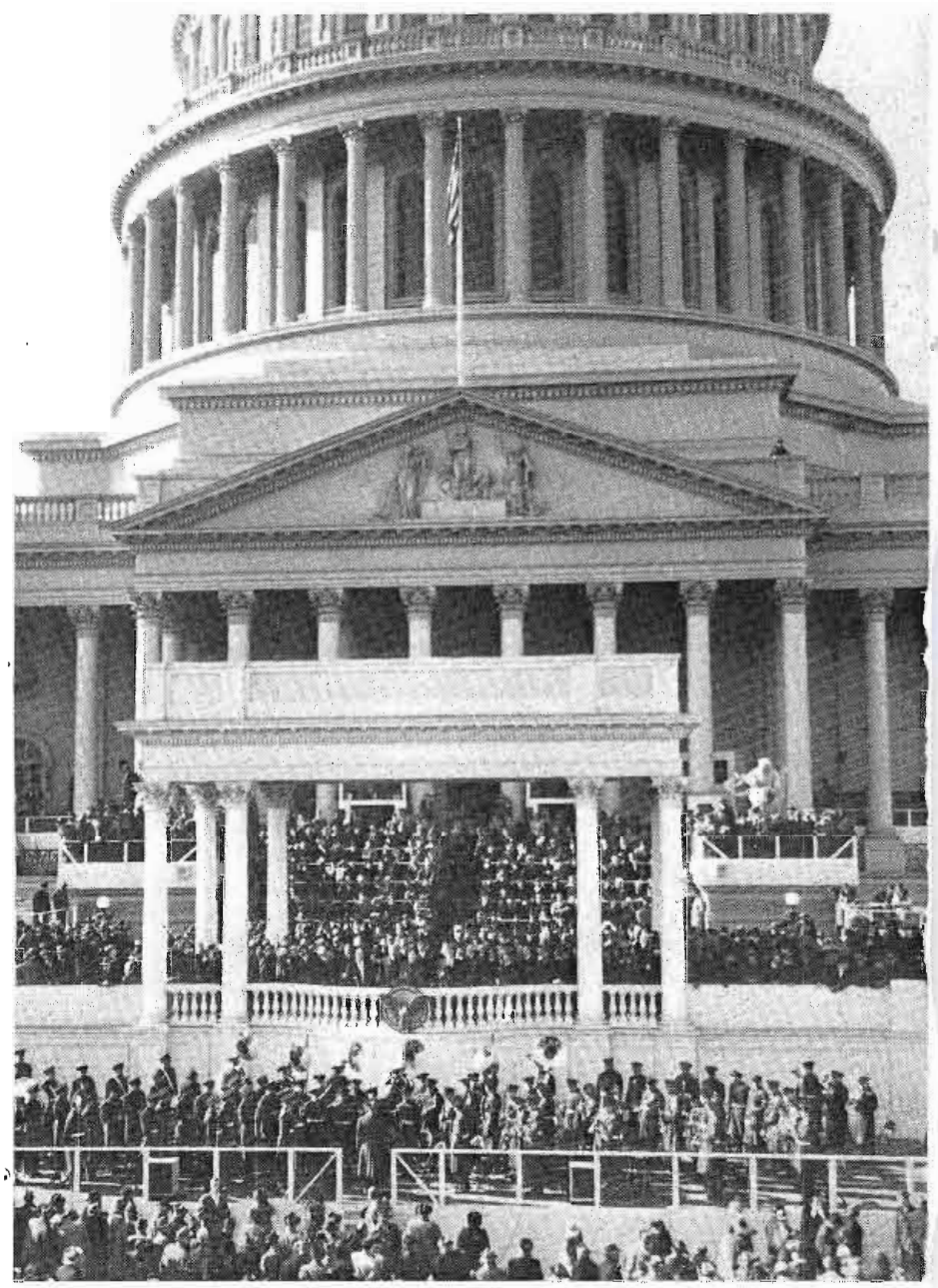
Four of the five TV hours, as well as the radio broadcast of the historic event, will be sponsored by General Motors. The swearing-in ceremonies which will take place at noon at the East Portico of the Capitol, and the inaugural speech of President Eisenhower will be broadcast and telecast by NBC as an unsponsored public service.

Beginning shortly before noon, NBC will escort the inaugural parade from the White House to the Capitol. Other NBC cameras will scan the parade from a vantage point opposite the presidential reviewing stand in front of the Executive Mansion. This service will continue until 2:30 for radio, and approximately 4:00 for television.

For the first Republican inauguration in 20 years, NBC will call in key personnel and latest model equipment from broadcast centers across the country. Fifteen fixed and mobile electronic cameras and 50 microphones will assist 25 reporters and commentators to capture the whole story of inaugural day. A news and engineering staff of 250 will work behind the scenes. Special mobile TV units equipped with studio-type cameras and with NBC's new hand-sized TV camera, back-pack radio transmitters, a telescopic skylift to elevate cameras and commentators above the heads of the crowd, these and many other devices will be pressed into service on "Inauguration Day." Half a dozen film-camera crews, a complete film laboratory staff and rapid on-the-spot developers will supplement NBC's live coverage of the parade.

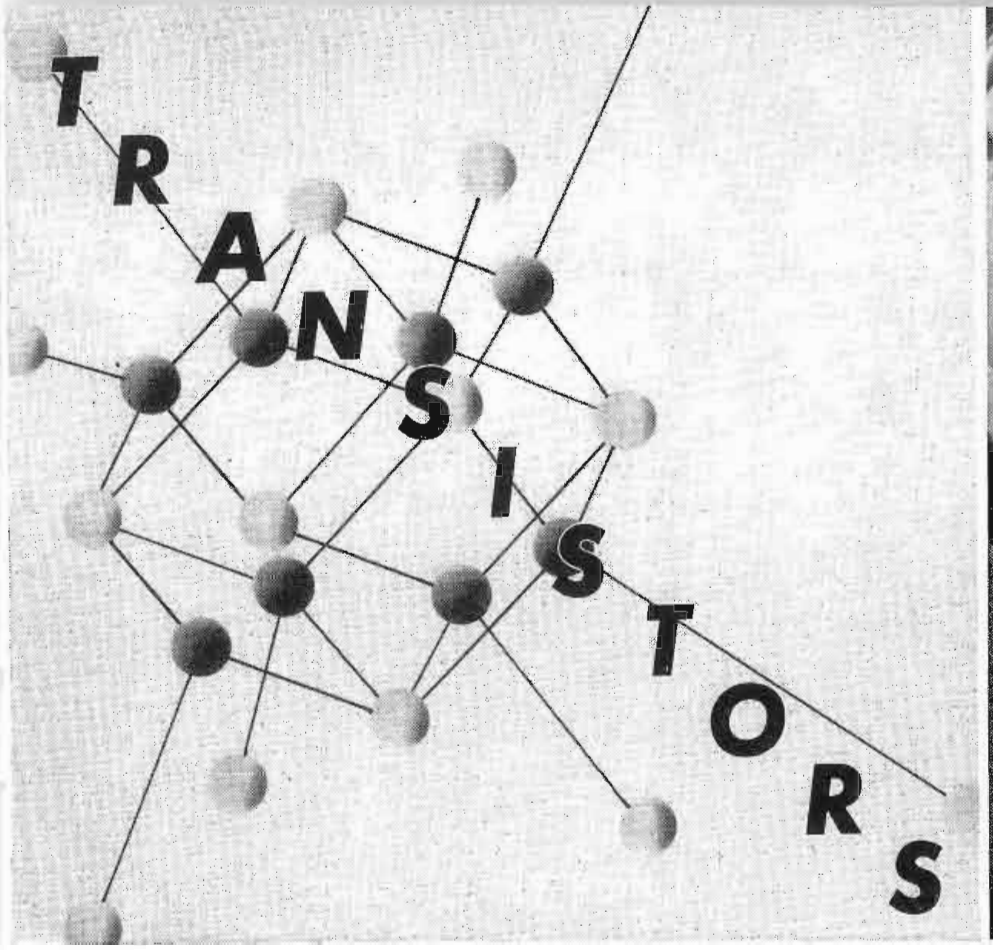
William R. McAndrew, NBC manager of news and special events, will be overall producer of NBC's television coverage of inauguration day. Joseph O. Myers is radio producer. Charles C. Barry, vice-president in charge of programming, and Davidson Taylor, network director of public affairs, will supervise activities.

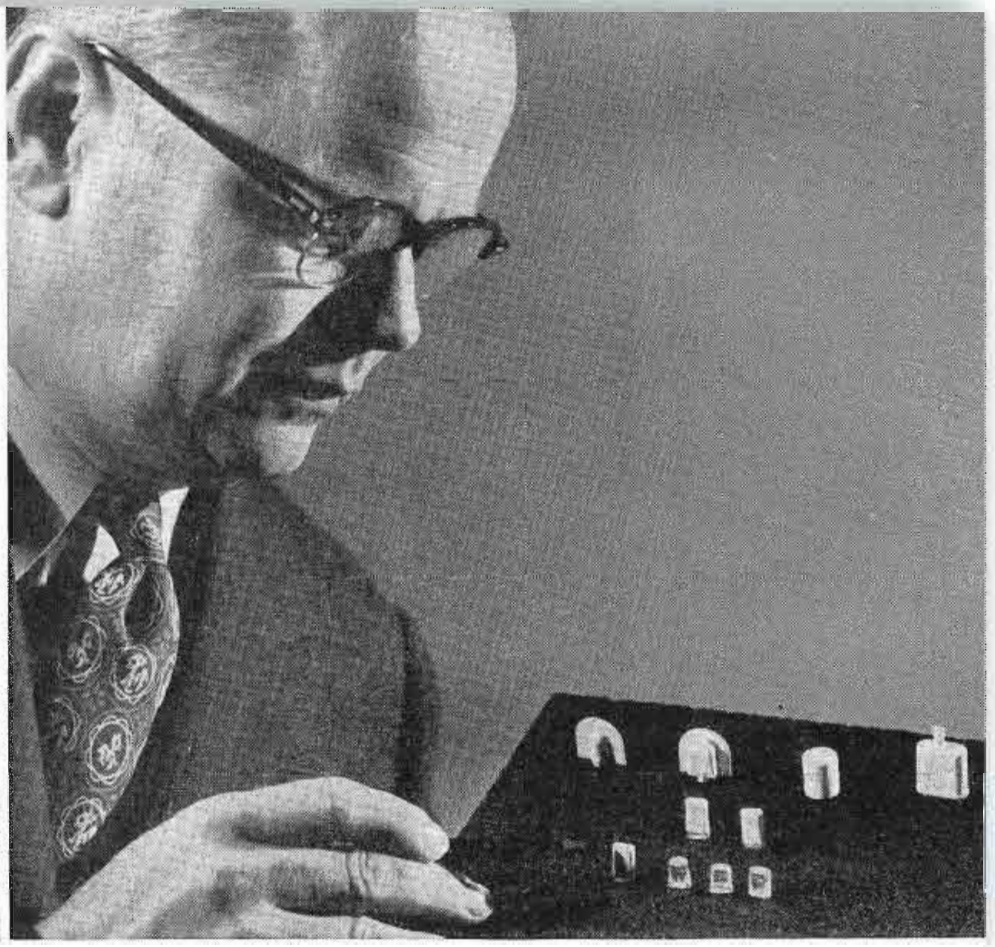
NBC will coordinate its inauguration coverage from network studios in the Wardman Park Hotel in Washington. There will be six different camera and microphone emplacements along Pennsylvania Avenue between the White House and the Capitol, route of the inaugural parade.



Scenes such as this one at the East Portico of the Nation's Capitol, will be viewed on Inaugural Day, January 20, by millions of TV set owners from coast to coast. NBC will broadcast the ceremonies by radio and television.

NBC technicians have been perfecting plans for "Inauguration Day" since the morning after the election. Every idea which might possibly contribute to a public service program of national interest has been developed and integrated into plans for the multi-hour telecast and broadcast. NBC officials have been conferring continually with the Inaugural Committee to insure the most complete coverage of the ceremonies.





Dr. E. W. Engstrom points to one of the ten types of experimental transistors developed at the David Sarnoff Research Center of RCA.

FIRST demonstrations showing the scientific progress made towards harnessing the tiny transistor, which performs many of the functions of electron tubes, in a wide range of applications useful to radio, television, and industry, were held during the week of November 17 at the David Sarnoff Research Center of RCA, Princeton, N. J.

Transistors made from specks of germanium crystal were shown operating an experimental portable television receiver, radio sets, loudspeaker systems, miniature transmitters, parts of electronic computers, and other experimental devices, many of which are believed to be the first of their kind. Each development was in the form of a laboratory model which, it was emphasized, is still in the preliminary and experimental stage.

Appraising the present status of transistor development, Dr. E. W. Engstrom, Vice President in Charge of RCA Laboratories Division, said:

"These demonstrations highlight the fact that transistors are today no longer entirely a research concern. They are, in the fields of radio and television, an immediate problem for advanced development by industry engineers who can learn how to put them to work in evolving more versatile, smaller, sturdier, and eventually lower cost equipment for industry and the public."

"We can report that transistors, after a brief four years in the laboratory, can be made to do many of the electronic jobs that tubes could do only after the first twenty years of their existence," Dr. Engstrom continued. "Because transistors, many of which are no larger than a pea, have certain properties that differ from tubes, we find there are some tasks they perform more effectively than tubes. Also of course, there are now, and always will be, applications where only tubes will perform.

"We haven't yet worked out mass production techniques for transistors," he continued. "Although germanium itself is available, it requires careful processing to get it in the form that gives transistors their remarkable characteristics. Thus, the cost of even those few types of transistors that are available in limited quantities is still high.

"Even so, a demonstration such as this would have been impossible a year ago, even a few months ago," he continued. "We are just at the outset of trying a variety of transistor types in operating circuits. As other new types of transistors come from the laboratory, providing greater power, operating at higher frequencies, and functioning with greater reliability, we will try them out as we have experimented with the types you see here."

Dr. Engstrom said that RCA does not expect the transistor to supplant the electron tube "any more than radio replaced the phonograph." In fact, the market for electron tubes may even increase under the full impact of commercial transistors. "This is because the transistor will allow the development of electronic devices now undreamed of," he said. "Many of these devices will still require the work of electron tubes and in quantities that will continue to tax the manufacturing capacity of the electron tube industry. Thus, as transistors begin to replace certain tubes in present electronic equipment, the displaced tubes will find new jobs in new devices made

possible by the development of the transistor."

Dr. Engstrom said that the experimental equipment demonstrated represented exploratory employment of transistors in many phases of electronics and that the items were laboratory models in a research stage. Neither the transistors nor their applications are yet in commercial form, he pointed out.

Among the experimental equipment shown was a portable, battery-operated television receiver, tubeless except for the picture tube. In its initial form, it is a one-channel set with a five-inch screen. In another approach, transistors were introduced in part of the circuits of a standard television receiver. Transistors were also employed in circuits of industrial television equipment and the "Walkie-Lookie" portable TV camera equipment to point up savings in weight, size, and power consumption.

In the radio field, all-transistor AM, FM, and automobile radio receivers were demonstrated. These exploratory applications already point the way to new compactness and much lower battery drain than receivers require today. The automobile radio operating with transistors directly off the 6-volt battery of a car eliminates the relatively costly high-voltage power supply common to present-day automobile sets and enables more than a ten-fold reduction in battery drain.

Also demonstrated was a small portable 45-rpm phonograph with a self-contained transistor amplifier and battery supply. Another transistor amplifier circuit was displayed in a portable public address system with self-contained battery supply.

A transformerless transistor power amplifier, an entirely new kind of circuit that may have considerable significance in the design of radio and television receivers, was displayed and operated. The experimental power amplifier circuit consists of nothing but four transistors mounted in a small tube socket. For many audio applications it appears that such a device, which harnesses a unique transistor characteristic known as complementary symmetry, can do the job that now requires two or more tubes, an output transformer, a phase inverter, and other components to amplify audio signals into a loudspeaker.

Battery Operates Transmitter for 3,000 Hours

Tiny radio transmitters employing transistors as oscillators were demonstrated to suggest possible applications in other fields. One was a 2-cubic-inch unit which will operate off its button-sized battery for 3,000 hours in "transmitting" the output of a phonograph pickup to a nearby radio receiver. Another was a cigar-sized microphone-transmitter using one transistor which points the way to a simple public address system, using any radio receiver as the amplifier.

Two transistorized sections of modern electronic computers, a counter and an adder, were operated to show how transistors can do at least as good a job as tubes in such circuits and at the same time offer great advantages in size, reliability and power consumption.

Two examples of how transistors might be practical in musical devices were also displayed. One was an eight-note transistor "piano" the oscillations from which were picked up and "played" by a standard radio receiver. The other was an electronic ukulele, working on the same principles as an electric guitar, except that the compactness and low-power requirements of transistors enable the amplifier and loudspeaker to be self-contained within the instrument itself.

Ten Transistor Types Used

Dr. Engstrom explained that the equipment made use of ten types of RCA developmental and experimental transistors, three of the point-contact variety and seven of the junction transistor family. The three point-contact types and one of the junction types will be offered on a limited sampling basis for engineering advanced development to industry representatives attending the week's conferences. The other six junction types are still under research and are classed as experimental, he said.

The three kinds of developmental point-contact transistors used in the RCA demonstrations are a general purpose switching type, a high-frequency amplifier and a very-high-frequency oscillator. The one developmental junction transistor is a general purpose amplifier of p-n-p (positive-negative-positive) construction.

Dr. Engstrom explained that junction transistors are classed p-n-p or n-p-n depending on their design. He said that an n-p-n transistor provides, as does an electron tube, negative charges in a circuit, while the p-n-p has the effect of providing positive charges, thus giving circuit potentialities unobtainable with tubes, an example of which is the transformerless transistor power amplifier described earlier.

The six RCA experimental junction types are an extension of both p-n-p and n-p-n design into greater power-handling capabilities, higher frequency response and other desirable characteristics. The "power" transistors in this group are somewhat larger than earlier types since they are constructed to dissipate the heat that transistors may generate when operated at higher power.

Dr. Engstrom emphasized that transistors are not interchangeable with present tubes in the sense that a tube from an existing instrument can be pulled out and a transistor substituted. New circuitry must be developed, he explained, in order to take full advantage of the special characteristics of transistors and, to fully realize space- and weight-saving possibilities which they open up, new components will also have to be designed.

Portable public address system. This experimental amplifier delivers 1.4 watts to a 12-inch speaker and operates off a 22½-volt battery supply with an estimated life of 25-50 hours. The amplifier uses six developmental and experimental junction transistors. Smaller dimensions than those of the amplifier demonstrated (18 x 13½ x 9½ inches) are feasible, if a smaller speaker and/or battery supply are used.

Personal radio transistorized except for one tube. To solve initial circuit problems in small, portable radio receivers, this personal radio was built in a standard personal receiver case retaining the first tube (converter) but using junction transistors in all other circuits. The experimental set maintains the performance of a standard all-tube receiver. Use of transistors enabled a three-fold reduction in the size, weight and cost of the batteries without reducing the standard 100-hour operating life.

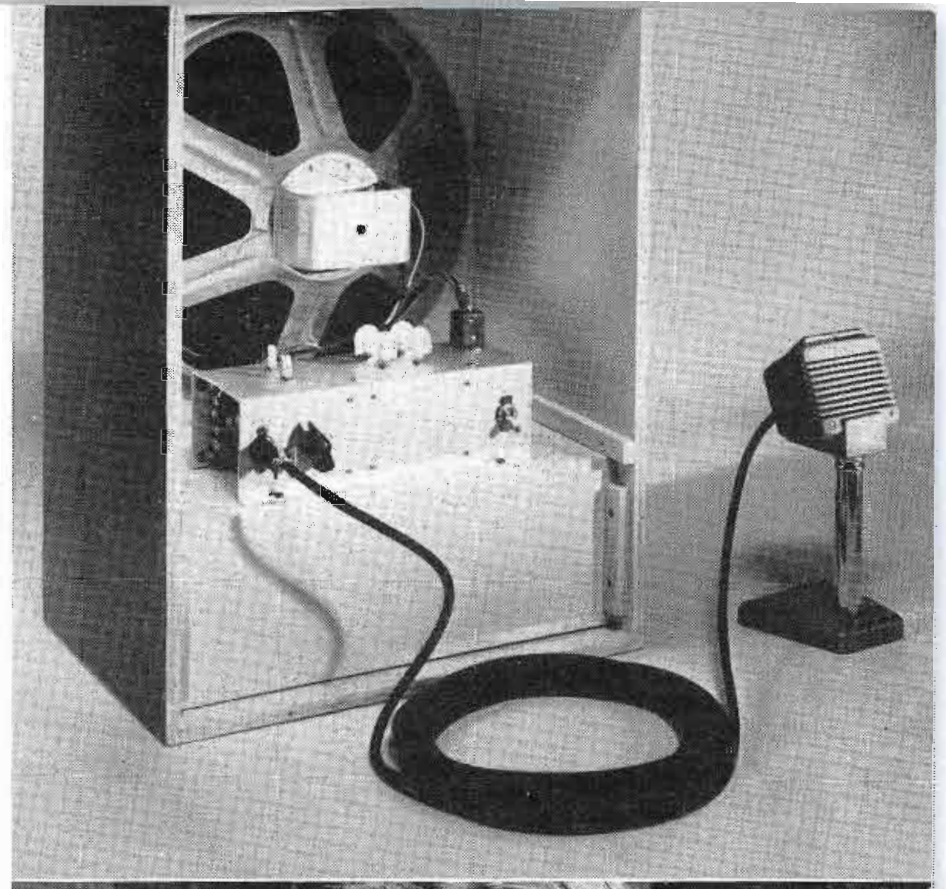
All-transistor personal radio. Employs nine developmental and experimental junction transistors. It has not yet been engineered for smallest possible size. In this AM-band transistor receiver, it is possible to get standard 100-hour battery life with five small batteries each about the size of a checker piece. All-transistor operation allows an even greater reduction in the size and weight of the power supply than enabled in the one-tube set above.

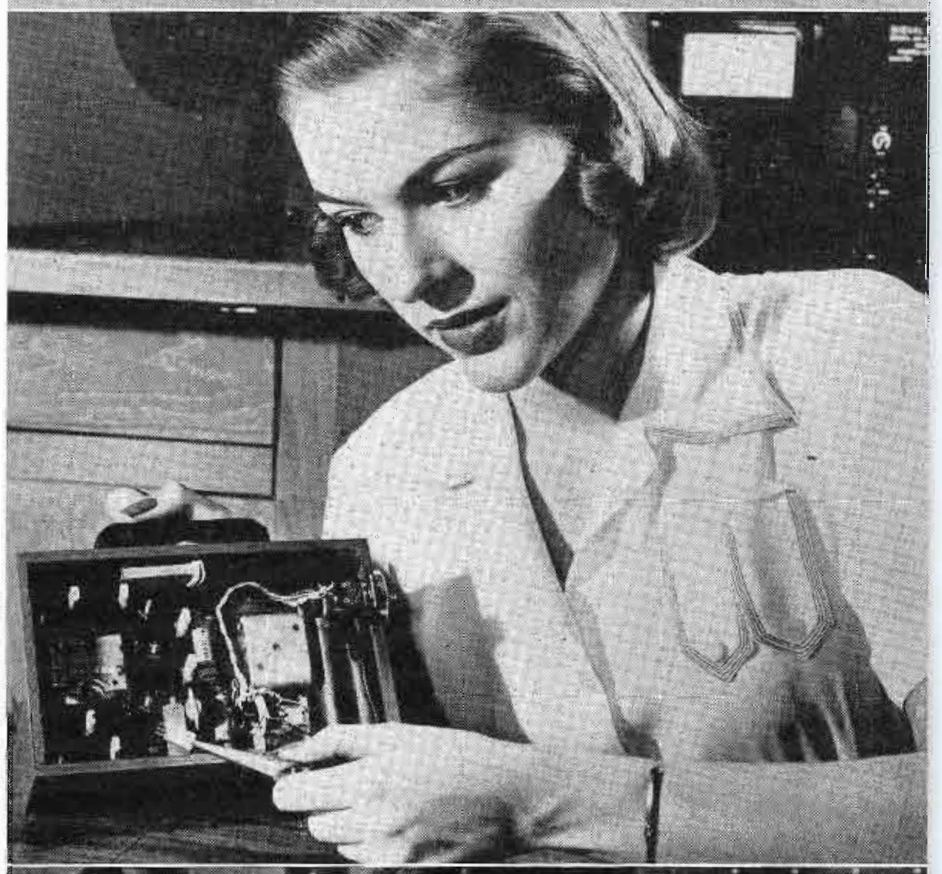
Portable FM receiver. To gain experience in the circuit operation of transistors in the VHF band, an FM receiver (88-108 megacycles) was built. Uses 11 developmental and experimental transistors, both junction and point contact. One developmental point-contact transistor is used as an oscillator operating in the region of 100 megacycles.

The experimental model is completely portable with self-contained battery supply and weighs five pounds, approximately half the weight of an FM receiver using tubes. In its present preliminary form, the transistor set is not as sensitive as a standard tube FM set.

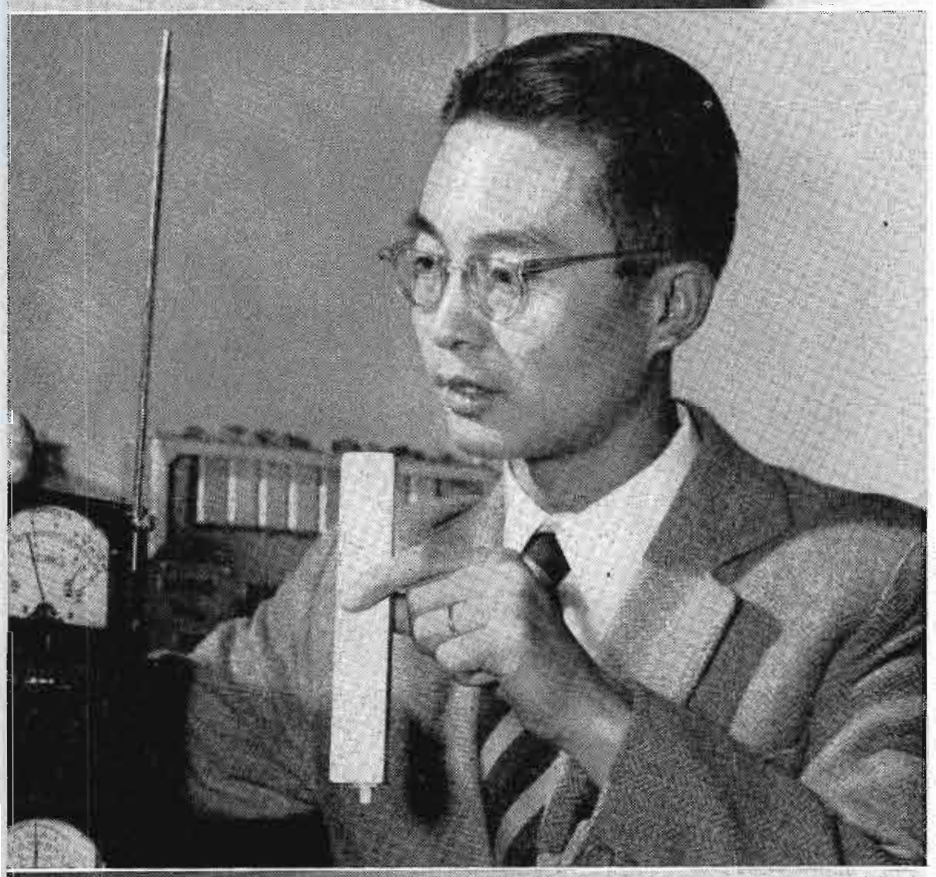
Transistor automobile radio. This experimental receiver employs eleven developmental and experimental junction transistors to provide an audio output comparable to that of present-day automobile radio receivers. It has been designed with push-button tuning. An important feature of this all-transistor set is the elimination of the high-voltage power supply common to present auto receivers. This power supply, comprising a vibrator, transformer and rectifier, which are a substantial fraction of the total cost of the set, is not necessary in a transistor receiver since the transistors operate directly off the six-volt automobile battery.

This experimental receiver uses one-tenth the current of present auto sets. In fact, the transistor receiver itself needs no more current than is necessary to operate the two dial lights.





Transistor portable phonograph. While investigating the possibilities for transistors in the phonograph field, a lightweight, spring-driven, 45-rpm portable model employing a battery-operated transistor amplifier was built. The low power consumption of the four developmental junction transistors enables a 22½-volt battery to provide for approximately 1,500 record playings (75 hours of operation). An internal switch automatically turns off the amplifier circuit when a record is not playing.

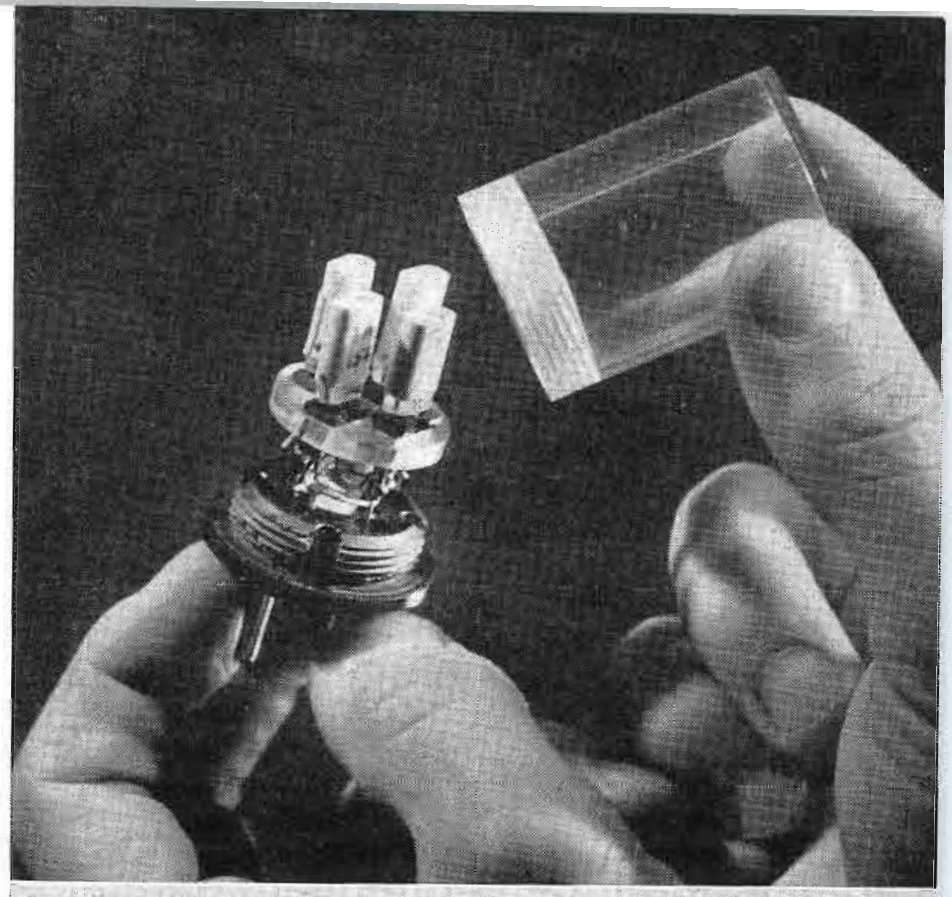


Wireless phonograph jack. A tiny radio transmitter, employing one developmental junction transistor and a few other simple components, has been constructed to feed the signal from a phonograph pick-up to a standard AM receiver. This 2-cubic-inch transmitter is effective two feet away. Its button-sized power supply, a 1.35-volt battery, enables an operating life of approximately 3,000 hours. Such a device could permit the use of a record player with radios that have no phonograph connection.

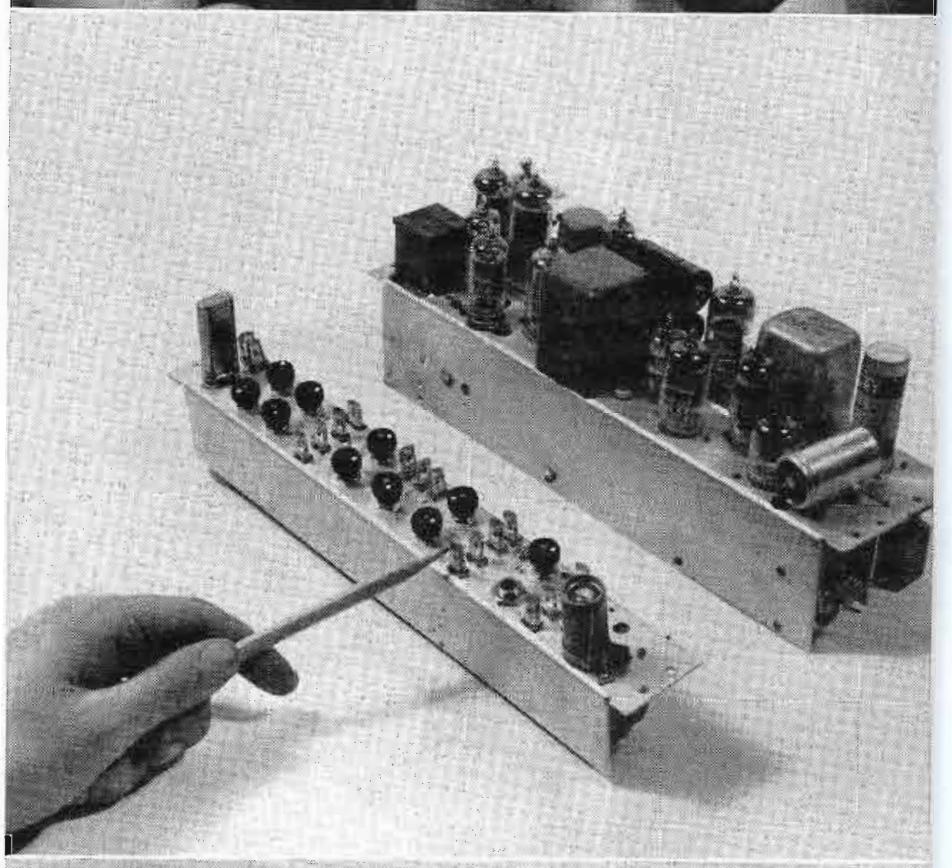
Roving microphone. This cigar-size experimental transmitter is modulated by a tiny built-in dynamic microphone instead of a phonograph pick-up, as in the application above. It employs two developmental junction transistors and a larger battery. It was made to explore the transistor possibilities of a low-cost wireless microphone-transmitter, the signal from which is picked up and amplified by any broadcast-band radio receiver. Its transmissions are effective within a radius of 25 feet.

Transistor ukulele. This device is similar in principle to an electric guitar except that transistors enable a small amplifier that can be completely contained in the ukulele itself. Four developmental and experimental junction transistors are used in the amplifier, the speaker of which is mounted in the hole of the ukulele. The self-contained battery allows a life of more than 10 hours. A magnetic pick-up transfers the vibration of the strings to the amplifier. Unusually sustained notes can be obtained because of feedback provided by the close proximity of the speaker to the strings. The transistor amplifier and battery supply increase the weight of a one-pound ukulele to about four pounds. A similar device appears feasible for any string instrument.

Transformerless power amplifier. This entirely new kind of power amplifier assembly consists in one of its experimental forms of nothing but four developmental and experimental junction transistors mounted on a small tube socket. The transistors used in this experimental circuit are pairs of p-n-p and n-p-n transistors in tandem operation, utilizing unique transistor characteristics known as complementary symmetry. For many audio applications in radio, television and other sound reproduction equipment it appears that such a device can do the job that now requires two or more tubes, a phase inverter, an output transformer, and other components to amplify audio signals into a loudspeaker. The same principle of complementary symmetry has been used in the audio amplifier circuits of the experimental portable TV receiver, the FM receiver, and the transistor ukulele described here. The principle is also employed in the vertical deflection circuit of the portable TV set.

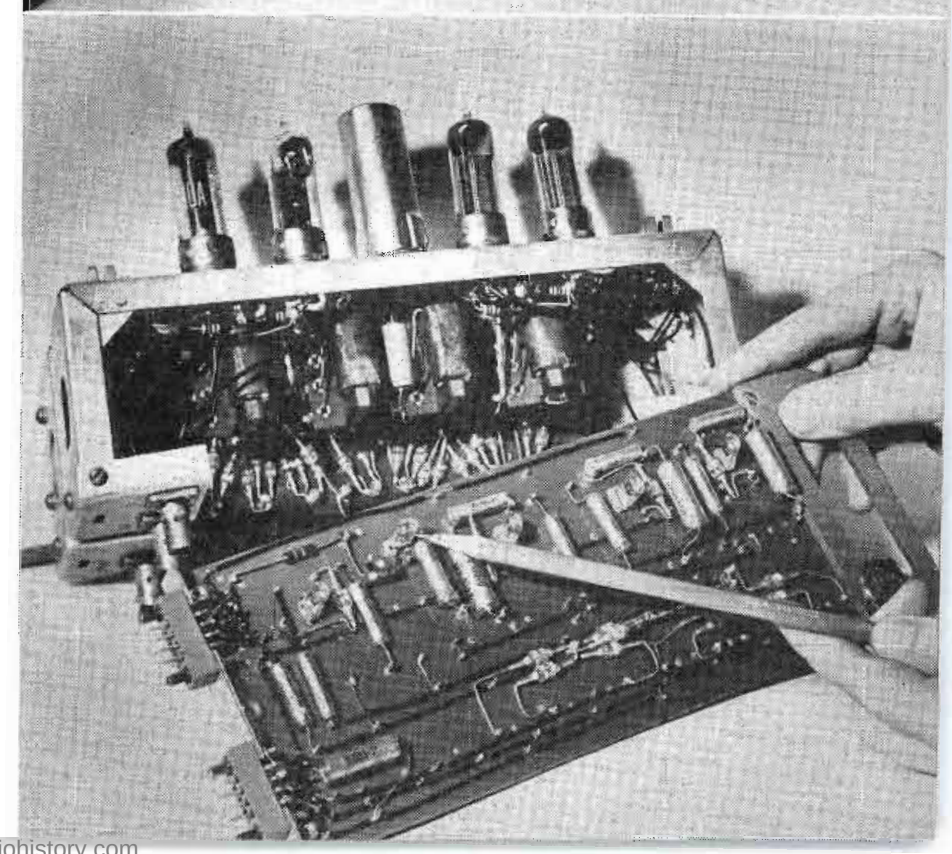


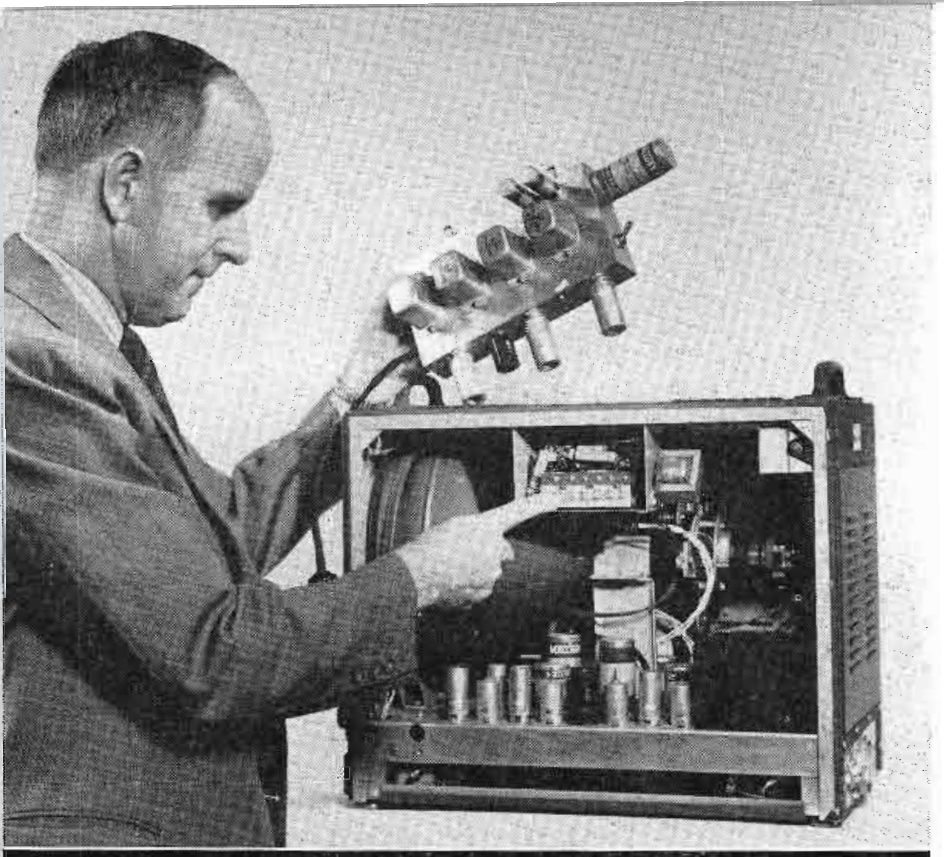
Transistor application in RCA "Walkie-Lookie". Since "Walkie-Lookie" TV equipment must be completely portable (at present the back-pack unit weighs 50 pounds), weight, size and power drain on the self-contained batteries are extremely important considerations. Initial employment of 17 developmental point-contact transistors in four circuits reduces power consumption of the back-pack unit by more than one-third, promising reductions in battery size and weight. By transistorizing more than half of the tubes in the unit, it should be possible to cut total power consumption and over-all volume by at least 50%.



Transistor adder. Another important element of a computer is an electronic adder. Developmental point-contact transistors in this experimental adder enabled 100,000 additions per second. The transistor adder requires one-quarter the power, and it enables a unit one-seventh the size and one-fifth the weight of a comparable unit using tubes.

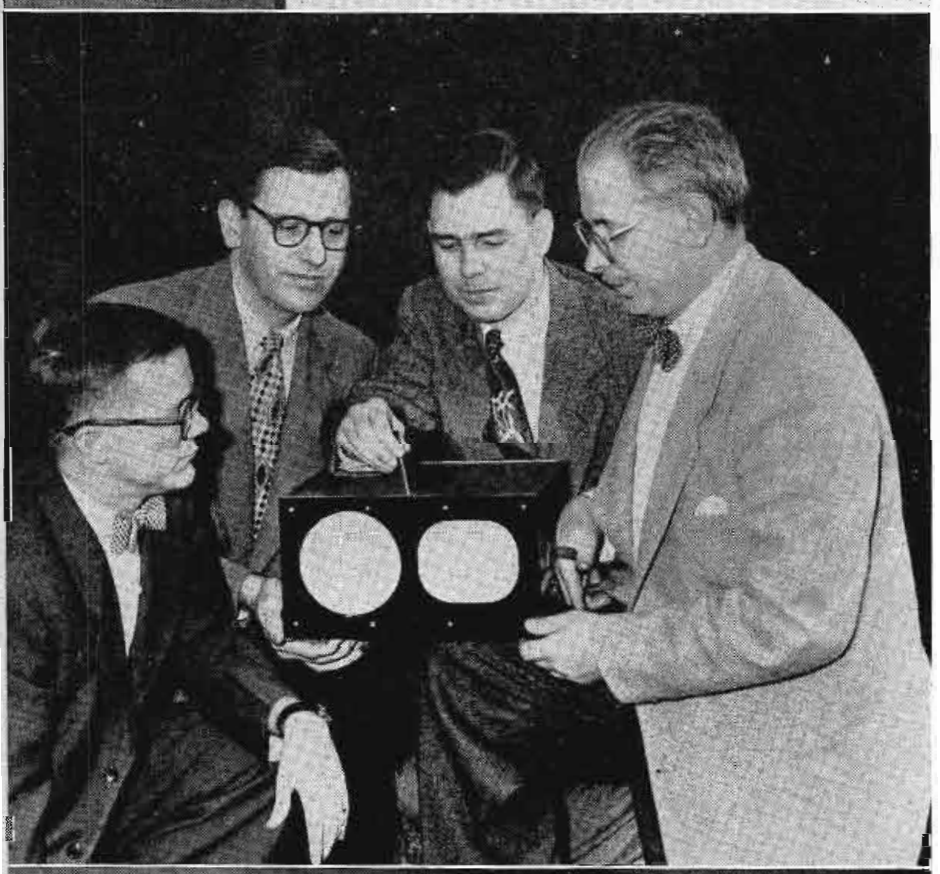
Transistor counter. The application of transistors to electronic computers in which thousands of electron tubes are now used has been anticipated for some time because of the transistor's promise of smaller size, lower power, less heating, and eventually lower cost. An electronic counter is a standard element of many computors and radioactivity measuring devices. The experimental transistor counter, which utilizes 66 developmental point-contact transistors, is capable of a million individual counting actions per second. The transistor counter requires 2 watts of power while a counter doing the same job with tubes would consume 60 watts. Weight of the transistor counter is ½ pound as against 4 pounds; size, 20 cubic inches as against 200 cubic inches for a tube counter.





Transistor applications in industrial television equipment. Study of partial introduction of transistors into the control (monitor) unit of industrial television equipment was initiated to find ways of reducing weight, size, power consumption and circuit complexity in this type of semi-portable, closed-circuit television equipment. With eight RCA developmental point-contact transistors used in the synchronizing generator circuit to do the job of three double triodes and four transformers, the initial result is a three-fold reduction of the size of this component and a ten-fold reduction in its power consumption.

Transistor applications in a standard TV receiver. In this item, developmental transistors were tried only in those circuits of a standard TV receiver where transistors, at their present stage, appeared most feasible. Five junction transistors perform the functions of four of the set's 22 tubes. The transistors are used in three of the eight principal stages of this experimental receiver.



A portable, battery-operated television receiver, tubeless except for the kinescope (picture tube). This item represents a pioneering attempt to build a completely portable television set using transistors in the place of all electron tubes except for the picture tube. The purpose was to try transistors in all TV receiver circuits so as to uncover the problems and make an initial effort towards their solution. The preliminary result is a single-channel receiver, with a five-inch screen, in a case no larger than that of a portable typewriter case (12″ x 13″ x 7″). In recent tests, the 27-pound battery-operated receiver produced a satisfactory picture when operated off its self-contained loop antenna five miles from the Channel 4 transmitter on the Empire State Building. With a small "rabbit-ear" antenna a similar picture was obtained fifteen miles from the transmitter. The experimental receiver has 37 developmental and experimental transistors, both junction and point-contact. Its total power consumption is 14 watts, less than 1/10th that of a standard table-model set.

Toy piano. To explore other aspects of transistor circuits, a minature electronic "piano" was built. About the shape and size of a pencil box, the device is battery-operated. When one of its eight keys is depressed it will sound a tone in a nearby radio receiver. It has one developmental junction transistor which serves as an oscillator.

Religion and Science—

Two of the Most Potent Forces In Civilization, Says Sarnoff

Two of the most potent forces in civilization—religion and science—can be used to create "One World" in its truest and greatest sense, Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, declared in an address before the annual meeting of the National Conference of Christians and Jews in Washington, D. C., on November 11.

"Through religion," said General Sarnoff, "we can minimize the evils of greed, intolerance and lust for power.

"Through science, we can reduce the physical burdens of mankind, make the earth more fruitful, create plenty in the place of scarcity, break down the barriers of ignorance and misunderstanding and make life more meaningful for everyone.

"We know that peace and brotherhood are the common aims of the vast majority of mankind, yet today we live in two worlds instead of one. This is because a few wicked and ruthless leaders who dominate hundreds of millions of their victims have trampled upon religion and all its spiritual values and have misused science for their evil purposes.

"We may face this threat, however, with the knowledge that religion and science can be far greater forces for good than they are for evil. The vitality of the human spirit that pulses with renewed vigor against aggression and slavery, against prejudice and persecution, against hypocrisy and censorship, is certain to triumph over such sinister forces."

General Sarnoff recalled that following the Armistice 34 years ago, hopes and prayers for an enduring peace faded with the years, and peace finally was blasted by a Second World War.

"Only seven years have passed since the second global conflict ended," he pointed out. "But the peace that followed once more has failed to be steadfast.

"Today, we are fighting again for freedom and justice. This time, in Korea. In the words of Kipling, there is 'no discharge in the war.' Indeed, we meet on this Armistice Day under clouds of war and under the threat that the storm may spread.

"Yet, as fervent as ever in American hearts is the deep desire to live in peace and world brotherhood. Our goal remains the same and we will not abandon our purpose and our hope.

Brig. General David Sarnoff addressing the National Conference of Christians and Jews in Washington, D. C.

"Our hope springs from the knowledge that peace and brotherhood can be achieved."

America furnishes a dramatic example of what a society based on brotherhood can produce, he continued, adding: "And we have the responsibility to give other nations a true picture of what we have built here. We can give much more to the world than the production line, or the telephone or television. All of these things —all the things we have produced—stem from our way of life . . . and it is that way of life itself which is the finest product we can offer to the world."

Science makes it possible to pierce the iron curtains and open the doors to the minds of men, declared General Sarnoff, recounting how radio, television, motion pictures and other means of mass-communications now are available to serve mankind everywhere. He said that science also can help to deter an aggressor and may even prevent another world war.

"The great hope for a peaceful world," he emphasized, "depends upon an understanding and an acceptance of the spiritual precepts, the moral values and the virtues of tolerance and brotherhood. In studying the lives of the scientists, we find their love of nature was generally linked to a devout spirit.

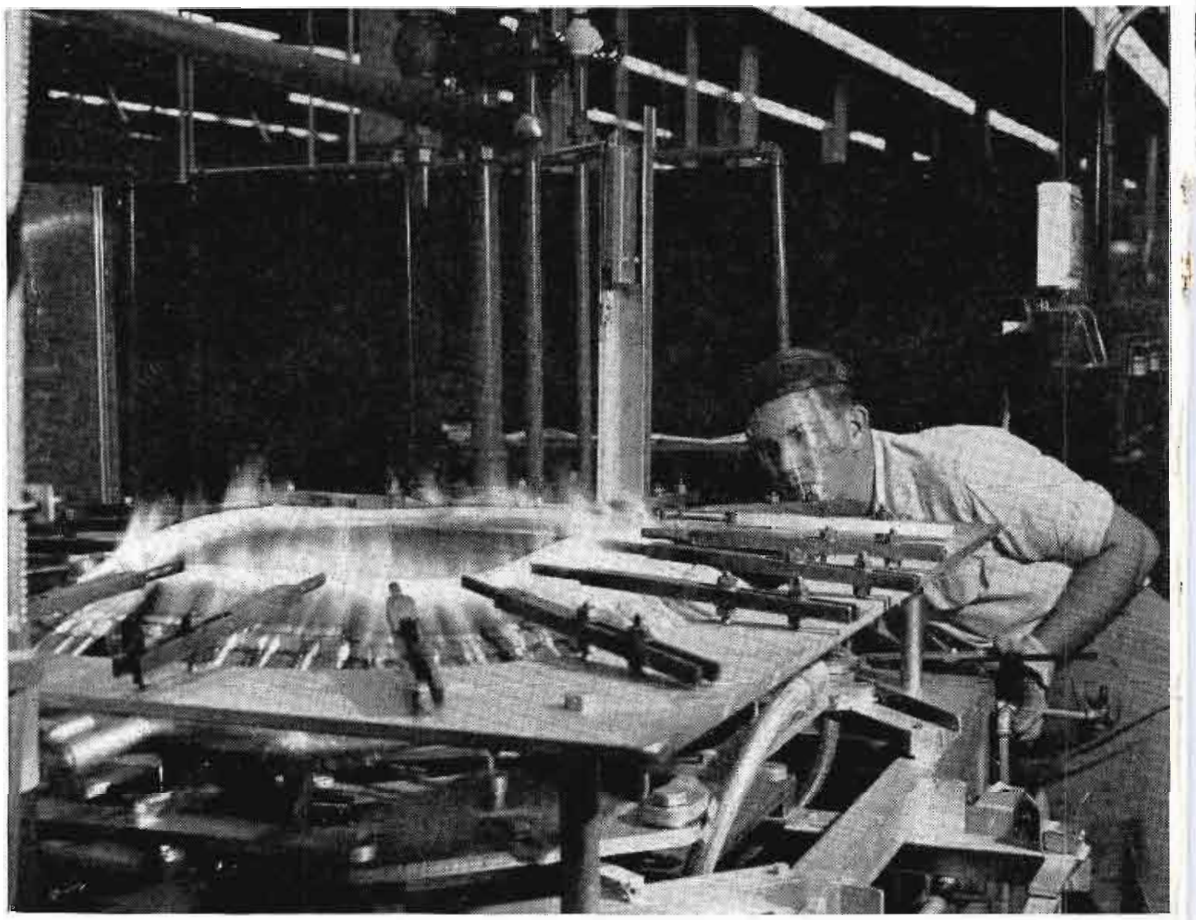
"Throughout the ages scientists have marveled at the communion of Nature's forces all working together. From the energy produced by electrons and atoms there is a lesson that humanity can learn of the power of individuals working together in harmony. Indeed, science preaches a great sermon of brotherhood.

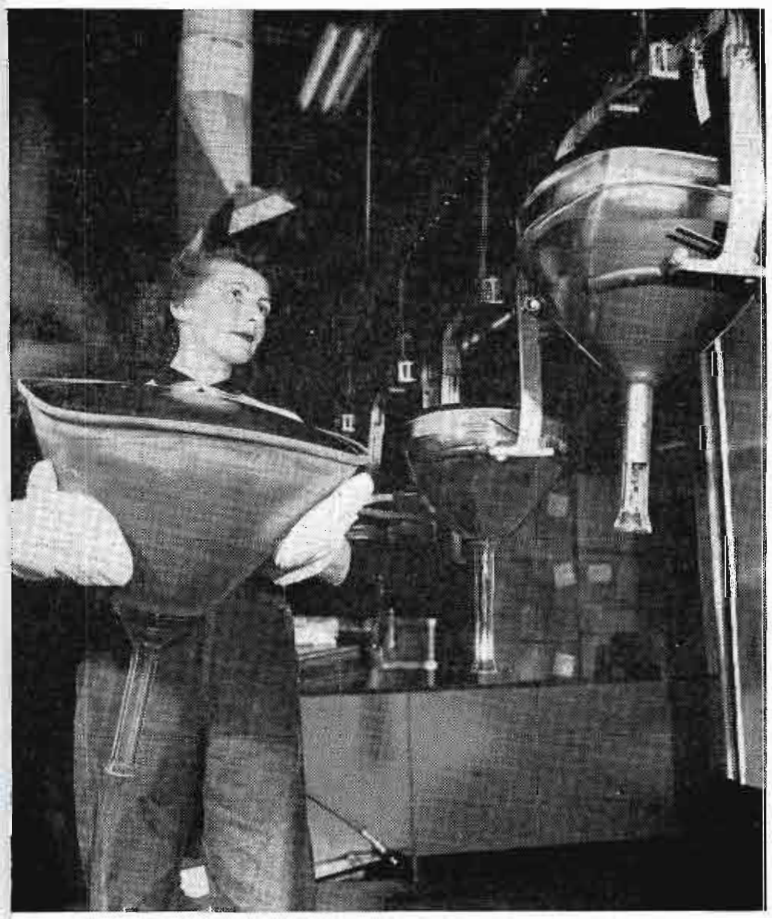
(Continued on page 32)

Production-Line Scenes in the
at Lancaster, Pa

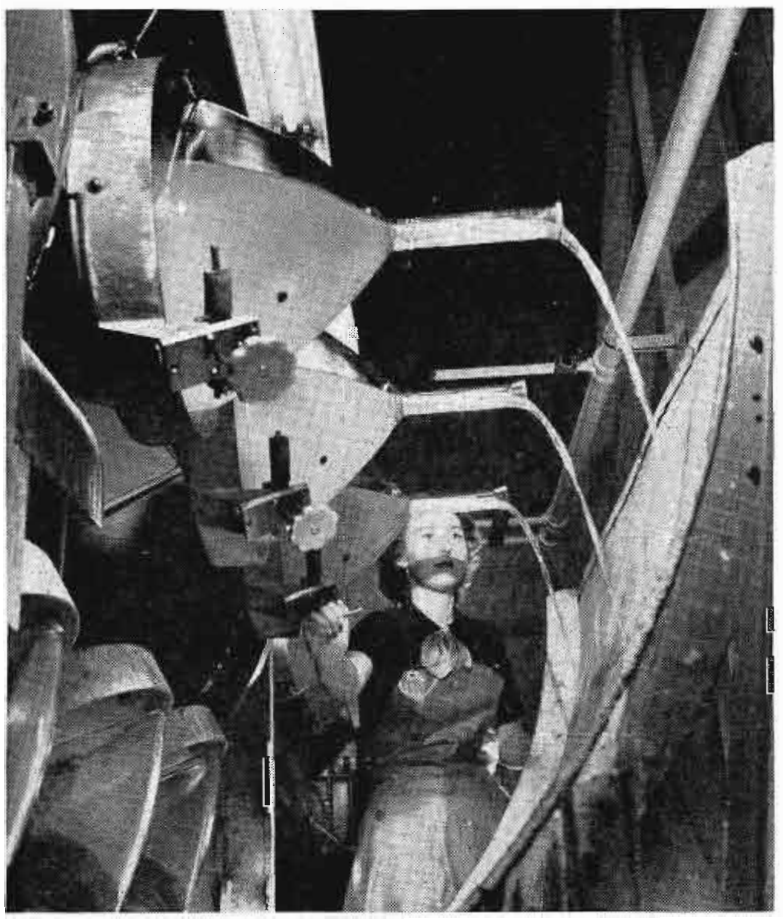
An inspector examines the assembly of an electron gun, to assure that this fundamental element of a television picture tube conforms to rigid specifications.

A ring of gas jets around the outer rim of a tube fuses the glass faceplate to the kinescope's metal shell.





One of RCA's employees at the Lancaster plant loads metal-shell picture tubes on the overhead conveyor system.



At the terminal of the "settling belt," the water of the phosphor solution pours out into a spillway, leaving a fluorescent coating on the faceplate.

Faceplates of metal-shell kinescopes are carefully move on to the next

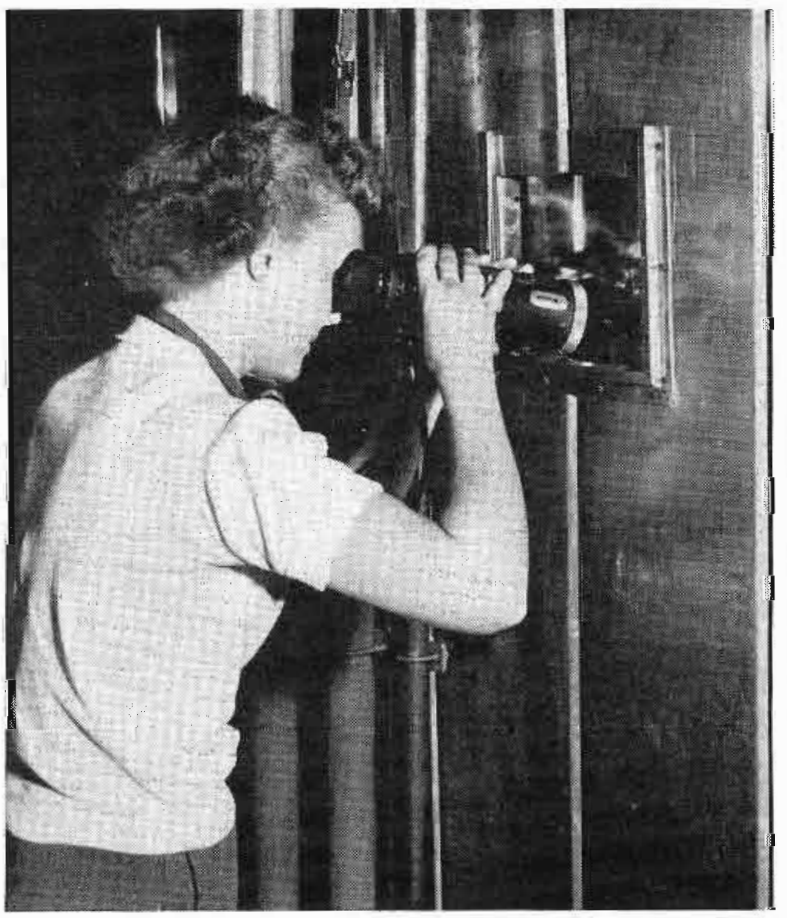
RCA Tube Plant

1.

This fork-like instrument, guided by a worker, lifts a hot tube onto a cooling belt.

A phosphor solution is poured into a kinescope which is then placed on a moving belt where the phosphor settles out to form the tube's picture surface.

and all-glass rectangular
cleaned before the tubes
step in production.

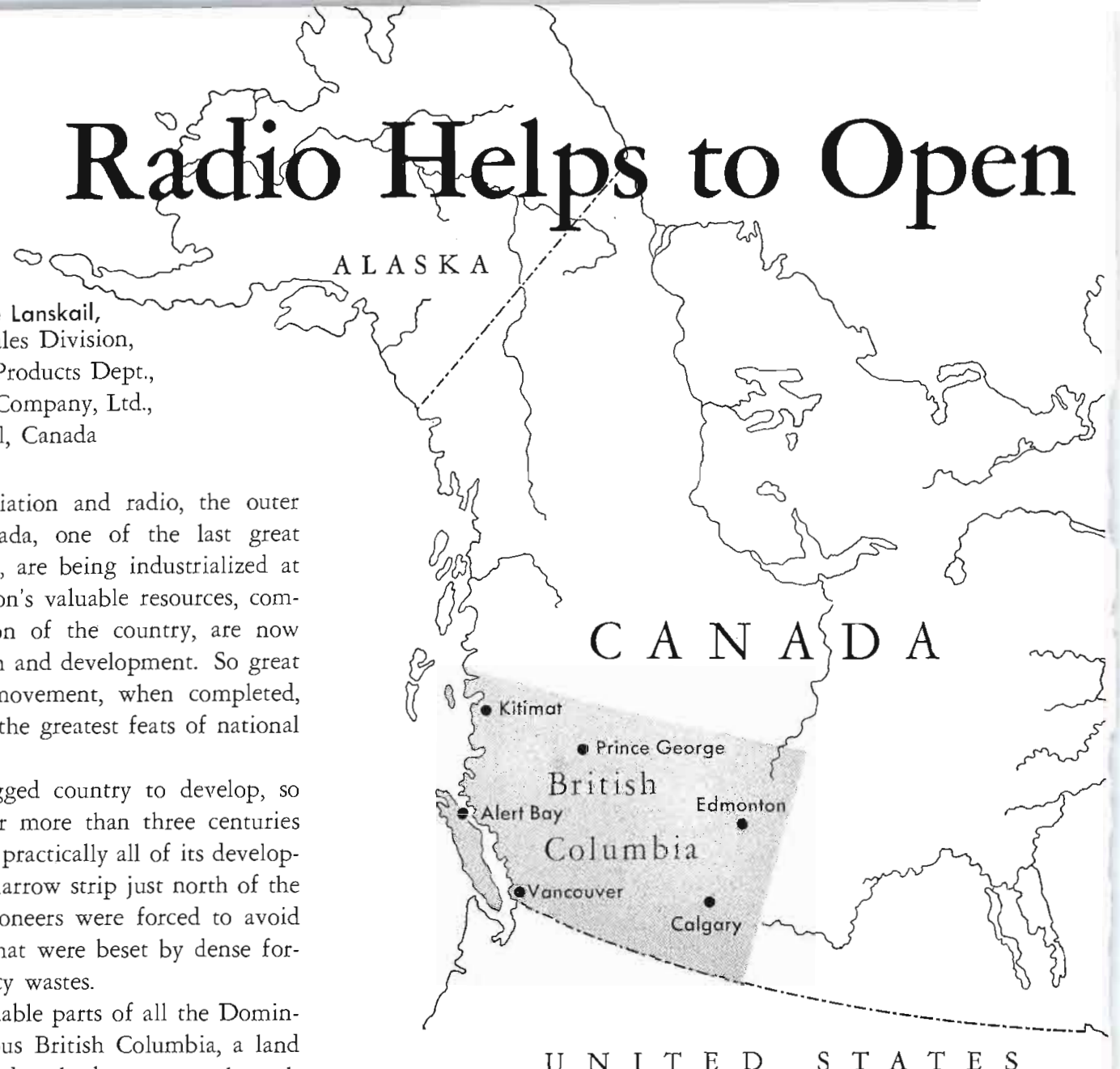


Using an optical pyrometer behind a protective shield, a worker measures the heat intensity of gas flames during the metal-to-glass sealing operation.

Exposure to a powerful light allows this inspector to give the screen surface of the picture tube a final inspection before shipment.

Radio Helps to Open

By Bruce Lanskail,
Manager, Sales Division,
Engineering Products Dept.,
RCA Victor Company, Ltd.,
Montreal, Canada

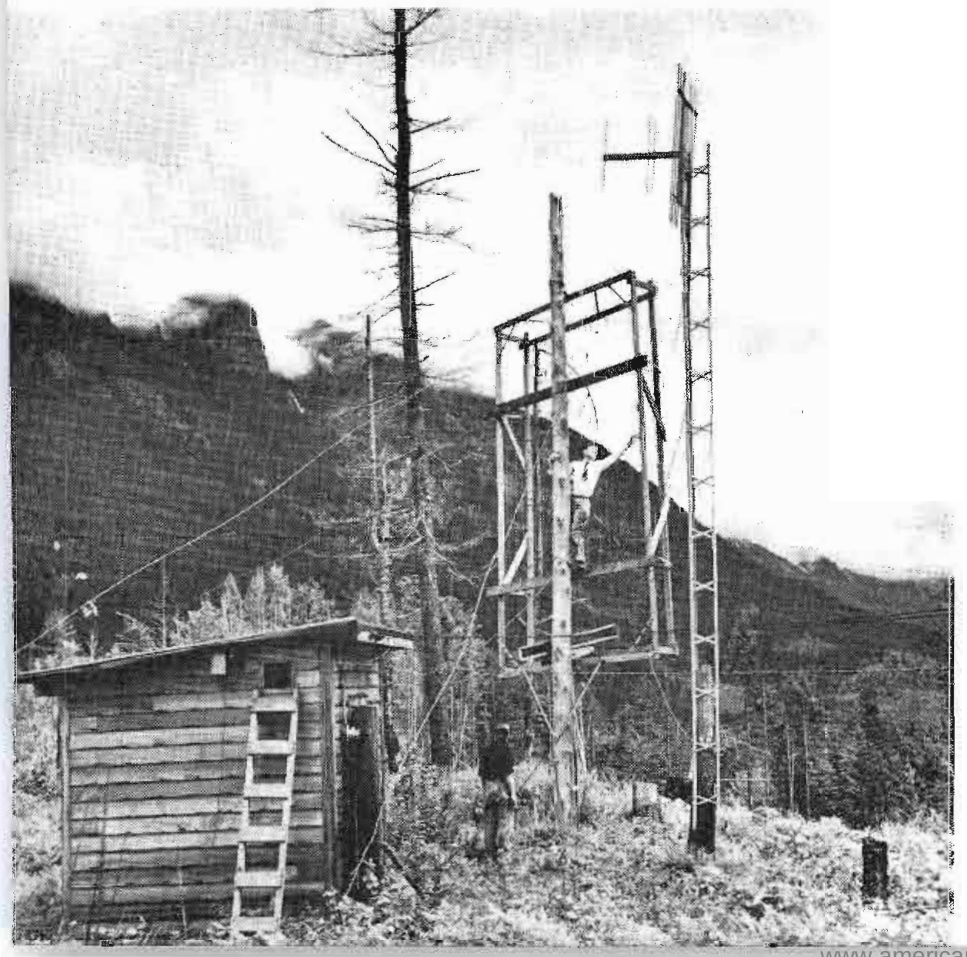


WITH the help of aviation and radio, the outer reaches of northwest Canada, one of the last great frontier areas of the world, are being industrialized at a rapid pace. The Dominion's valuable resources, common to this remote portion of the country, are now being opened to exploration and development. So great is the promise that this movement, when completed, may be recorded as one of the greatest feats of national industrialization in history.

Canada has been a rugged country to develop, so formidable in fact, that for more than three centuries after its settlement in 1604 practically all of its development was carried out in a narrow strip just north of the Border. Even there, the pioneers were forced to avoid hundreds of square miles that were beset by dense forests, lofty mountains and icy wastes.

One of the most formidable parts of all the Dominion has been in mountainous British Columbia, a land that once could be reached only by sea or through mountain passes. The few settled plateaus and valleys were hemmed in by towering mountain ranges.

Two of the antennas at Hope, British Columbia, part of the communications system which is being extended throughout the Province.

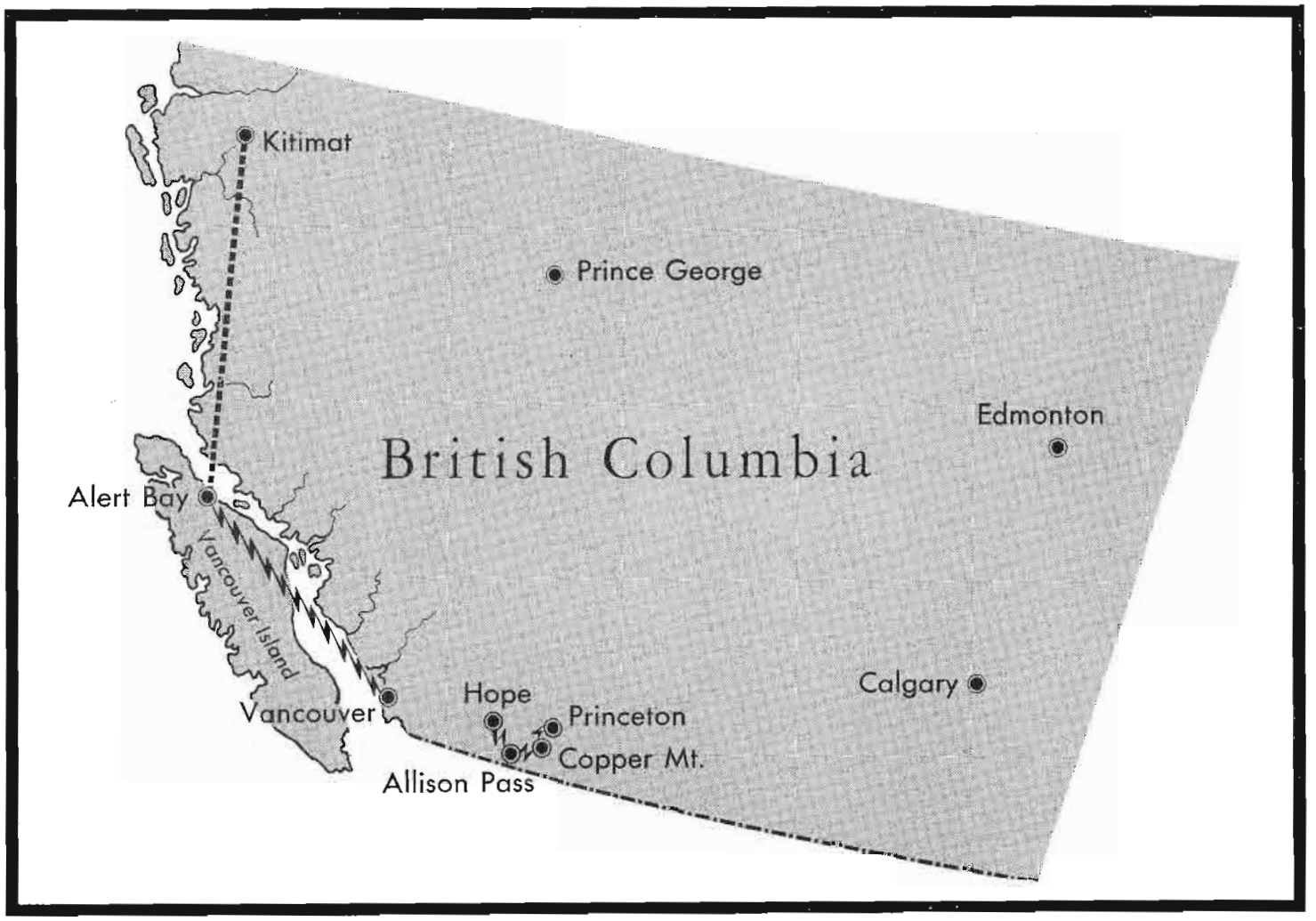


The oil-rich province of Alberta next door has also found a distinct use for radio to speed up its development and streamline its industry. In both cases, equipment supplied and installed by RCA Victor, Ltd., RCA's Canadian company, is helping to make these two provinces the most radio-conscious area on earth.

Today's present developments in British Columbia are taking place in the interior and to the north. Underlying much of the progress is the advance of communications. The North West Telephone Company was one of the first in Canada to use 150-megacycle equipment in place of wire lines to connect outposts with settled areas. The system uses a series of stations as repeaters between Vancouver, the provincial metropolis, and Alert Bay, 220 miles to the north. Under way now is an expansion of its radio relay system farther up the coast. Much of the North West Telephone Company's equipment is RCA.

To the Telephone Company, the use of radio instead of land line or cable means an extensive cash saving both in the original installation and in maintenance. Because of the extremely difficult terrain covered by this communications service, erecting and servicing land lines would have been almost impossible. The original

Canada's Western Frontier



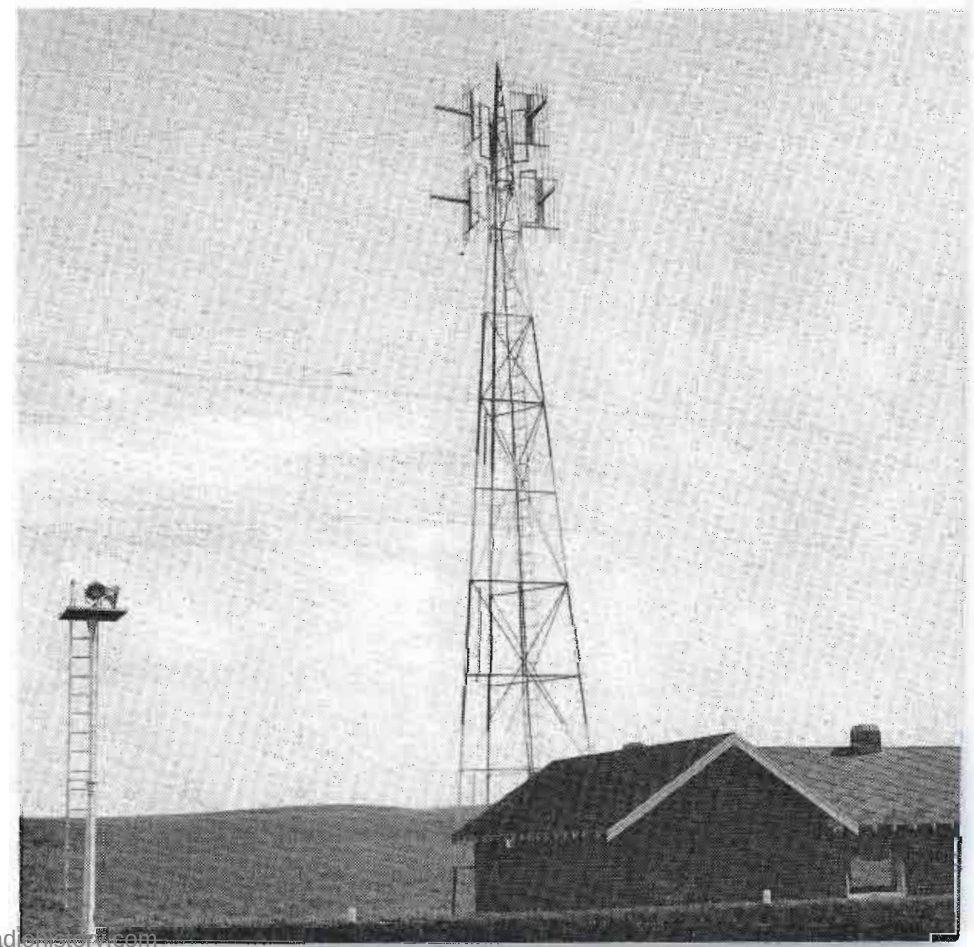
Enlargement of shaded area on map at left.

cost would be high since in many places construction crews would have had to cut their way through miles of forest, climbing thousands of feet of mountain on the way. And in a land of snowslides, landslides, windfalls and fierce winter storms, maintenance of lines would constitute an almost insurmountable problem.

Because of these difficult operating conditions, British Columbia has become Canada's largest user of radio relay communications. Radio serves not only outlying communities but also fishing craft off the coast, logging camps, fishing settlements, and mines. Eventually it will extend to Kitimat and Nechako, four hundred miles north in the mountain fastness, where the world's largest aluminum-power projects are being developed, and then another 350 miles northeast to Prince George, the province's northernmost railroad junction. In the land of tall timbers, the telephone pole may be on its way to extinction.

Highway transportation through the mountain ranges is now a vital part of the British Columbia economy and many of the same conditions which affect maintenance of telephone communications also affect highway upkeep. To combat these conditions, British Columbia again called upon radio, and RCA Victor

This tower near Calgary supports radio antennas which feed signals north and west of the Canadian city.



again helped provide the solution.

A particularly important link in the southern trans-provincial highway system is the highway between the towns of Hope and Princeton. Due to the mountainous nature of the country and the fact that the highway in places reaches an elevation of 4,450 feet, there is a constant problem of snow removal in wintertime and the clearance of small rock slides and road repairs at other seasons of the year. Today, radio makes it possible to get through without snow plows, blowers and shovels.

The virgin, mountainous nature of the country made the selection and equipping of radio station sites difficult. Point-to-point communication was required from Allison Pass, the operational headquarters of the highway, to both Hope and Princeton, as well as complete mobile coverage of the highway itself.

Fixed stations were set up at Hope, at Allison Pass, and at Copper Mountain. These stations employ RCA 150-MC transmitters and RCA receivers. Also, at Copper Mountain, an RCA 15-watt transmitter-receiver was installed to work a link into a similar RCA 15-watt unit at Princeton. The installation at Hope included a 12-element directional antenna array pointed in a southeasterly direction towards Allison Pass where there are two transmitter-receivers, one connected to an antenna headed directly west. The other receiver-transmitter is connected to a 12-element array headed in a southeasterly direction. It is located some 1,000 feet above the main public works camp at the highway level and power and control lines are brought up from the camp to the station on the mountain.

In addition to its communications and transportation services, radio in British Columbia is the accepted medium for provincial fire and police operations. The Royal Canadian Mounted Police, which also serves as the provincial police organization in British Columbia, has in use a large number of RCA two-way radio equipment. In the lower mainland area the Mounties operate six main stations, another six are in operation in the Vancouver Island area and additional installations were recently made in the Kootenay area.

Microwave station at Cascade, near Banff. The rugged terrain over which signals travel is in the background.

This microwave station at Edmonton, operated by Northwestern Utilities, serves as communications center for 40 mobile vehicles.

Folsom Says 1953 Will Bring Marked Expansion in TV

(Continued from page 7)

electronic devices as the electron microscope, X-ray, diathermy, and electroencephalograph will be added, it is expected, a number of new types of accurate and unique instruments of importance to medical diagnosis. Already developed by RCA Laboratories Division is an electronic viscometer that determines the rate at which an individual's blood coagulates.

"3. *Personal Services.* Miniaturization of tubes and parts, as well as the development of transistors (which perform many of the functions of electron tubes), holds great promise for the advancement of personal service devices in radio and recording.

"4. *Industry.* Now in substantial use by manufacturers, electronic devices of detection, control, inspection, and automatic operation can be expected to find increasing application in the next few years.

"5. *Printing.* All-electronic color correction instruments are under development to provide the first economical means of achieving quick and accurate color reproduction in magazines and daily newspapers. The RCA Victor Division has an electronic color correction device in an advanced stage of development."

Concluding, Mr. Folsom said: "The electronic symbol is a bright and guiding star that challenges science and industry to advance into new fields of endeavor, to create, and to improve with quality and efficiency as the standards."

Frank White Elected President of NBC

Weaver and Herbert Move to New Executive Posts with Network

FRANK WHITE, vice-president and general manager of the Radio and Television Networks of the National Broadcasting Company, has been elected President and a director of NBC, to succeed Joseph H. McConnell. Mr. McConnell resigned from NBC to join a company in another industry, and his new position will be announced by that company in the near future.

In announcing Mr. White's election, Brig. General David Sarnoff, chairman of the Board of RCA and NBC said: "We are fortunate in having within the NBC organization an executive so uniquely qualified to assume the presidency of NBC as is Mr. White. He brings to his new responsibility the practical experience of a long and distinguished career in broadcasting, an unusual executive ability, and a great talent for human relationships which is so important in any business, and particularly in the business of broadcasting. I know that the whole NBC organization, its affiliated stations and its advertisers and their agencies will share our pleasure and confidence in this new appointment.

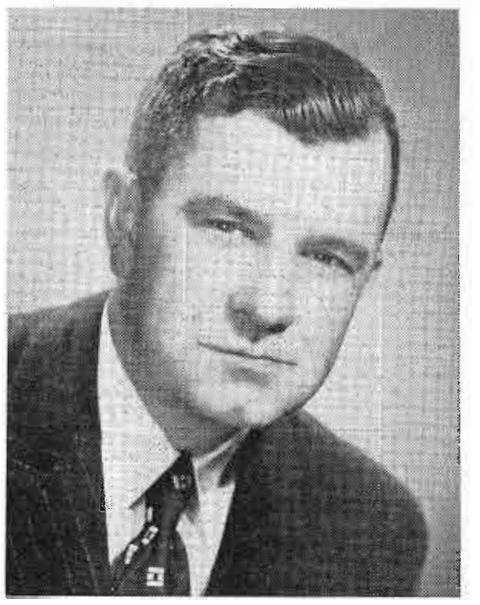
"During the past three years in which Mr. McConnell has been President, the National Broadcasting Company has grown in stature and strength and has further enlarged the scope of its service to the American people," said General Sarnoff. "The great strides which NBC has made in speeding the development of television and maintaining the strength of radio are in themselves the greatest tributes to Mr. McConnell's leadership. Our appreciation for a job well done and our best wishes go with him as he leaves to assume his new responsibilities."

Mr. Sylvester L. Weaver, Jr., vice-president in charge of the Radio and TV Networks of NBC, has been elected vice-chairman of the NBC Board of Directors.

Mr. John K. Herbert, vice-president in charge of Network Sales, succeeds Mr. Weaver.

General Sarnoff pointed out that the expansion of NBC's activities had prompted the establishment of the new position of vice-chairman of the Board to which Mr. Weaver has been named.

"We believe that progress in broadcasting is never-ending," General Sarnoff said, "and that new ways of using the power of radio and television, new forms of programming and new opportunities for the broadcast media can and must be developed. Under Mr. Weaver, NBC television had led the way in creating many of the new concepts which have become part of the pattern of television. In his new position as vice-chairman, Mr. Weaver will be enabled to concentrate on the problems of long-range development, both in radio and television, and will fill a vital function in a rapidly expanding industry."



Frank White

Mr. Herbert's designation as vice-president in charge of the Radio and Television Networks was Mr. White's first appointment as the new head of NBC.

"As vice-president in charge of Radio Sales and more recently as vice-president in charge of Sales for the Radio and Television Networks, Mr. Herbert has demonstrated not only great sales leadership but a grasp of our overall network problems and an ability to deal effectively with them," said Mr. White. "I am delighted to announce his appointment as vice-president in charge of both our networks. In this position, he will serve as the chief executive of the networks division of NBC and in addition will continue to exercise general supervision over our network sales department."

Sarnoff: Year-End Statement

(Continued from page 5)

"It is difficult to predict and unwise to limit the possibilities of the future in such a world-wide field of operations. In science, however, we are certain that progress will continue. The basis of our confidence is our faith in technology and in the ability of Americans to apply their talents in science, research, engineering and labor. The readiness of the American public to accept new ideas as well as new services and products is stimulating to all of these forces that operate within modern industry."

RCA to Build Manufacturing Plant in Spain

In Making the Announcement, President Folsom Revealed that New Factory Will Produce Records, Record Players and TV Sets

PLANS of the Radio Corporation of America to build a factory in Spain for the production of phonograph records, record players and television home receivers were announced on January 6 by Frank M. Folsom, President of RCA.

Mr. Folsom said that the proposed plant, combining America's streamlined manufacturing principles with harmonious Spanish architecture, is expected to be completed in 1953. It is to be erected at a 322,000-square-foot site overlooking Madrid, on the main highway to Barajas Airport and the City of Barcelona.

Arrangements for the project were made in cooperation with Gabriel Soria, President and Managing Director of Industria Electronica, S.A., associate RCA company in Spain. Mr. Soria is at present in New York.

Describing the plans, Mr. Folsom declared:

"This is a significant enterprise, because Spain opens great cultural as well as economic resources to us. We have had the honor of discussing our plans with General Franco, and we are deeply gratified by his interest in this project, which will help the Spanish worker as well as the Spanish artist.

"There is a favorable economic climate for electronic development in Spain. This was typified by the recognition accorded also to our organization by Joaquin Planell, Minister of Industry, and Manuel Arburua, Minister of Commerce.

"Our factory at first will make 45-rpm records, record players and TV sets. The Spanish nation has a great heritage of talent and we hope to further it as an international cultural medium in this new electronic era.

"Thus, we hope to have all countries know Spanish composers and artists better through their recorded music. Our RCA world distribution facilities will help in this cultural interchange.

"International television will receive a great impetus when Spain adds her wealth of material to world video. Millions of people are looking forward to telecasts of the immortal paintings in the Prado museum and other art centers of Spain. That is only one of the wells of inspiration which TV can tap in Spain.

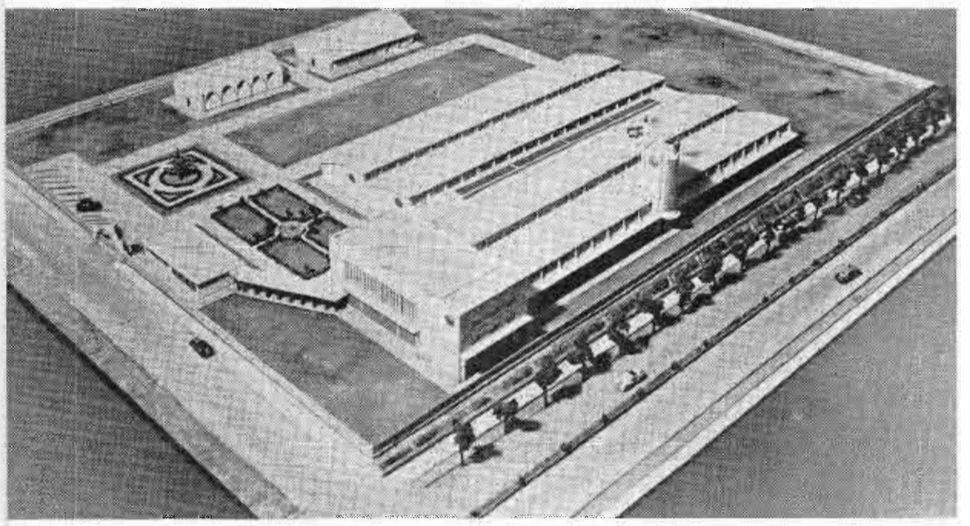
"We are honored to have leaders in Spanish industry as our associates in the company."

Mr. Folsom explained that the firm, Industria Electronica, has as its Chairman of the Board Demetrio Carceller, former Spanish Minister of Industry and Commerce who is prominent in the oil industry of Spain. Another former Spanish cabinet minister, Jose Luis de Arreses, also is a member of the Board. He is at present a ranking counselor to the Government of Spain.

Besides Mr. Folsom and Mr. Soria, the administrative head of the new company as well as its President and Managing Director, other Directors include Mr. Soria's brother, Antonio Soria, with whom Mr. Soria has handled RCA product distribution in Spain for the past seven years, and Meade Brunet, a Vice President of RCA and Managing Director of the RCA International Division.

In a statement describing plans for the new factory, Mr. Soria declared that the site was well adapted for expansion, and added:

"The site will be beautifully landscaped and the factory will be modern, clean, well lighted, with easy access to transportation. It will combine the best of American production concepts with Spanish building techniques."



Architect's model of RCA's proposed plant to be erected near Madrid, Spain.

Sacks Named V.P. and General Manager of Record Department

Emanuel (Manie) Sacks has been elected Vice-President and General Manager of the RCA Victor Record Department.

In addition to his new responsibilities, Mr. Sacks will continue to function as Staff Vice-President of RCA. Mr. Sacks was elected to this position December 1, 1950. As head of the RCA Victor Record Department, he succeeds Paul A. Barkmeier, who has been named Vice-President and Director of Regional Offices of the RCA Victor Division.

Mr. Sacks joined RCA as Director of Artists Relations for the RCA Victor Division and the National Broadcasting Company on February 1, 1950. He has had many years of experience in the phonograph record and music business.

Prior to his new and broader assignment, Mr. Barkmeier was Vice-President and General Manager of the RCA Victor Record Department. He was appointed to that position on January 6, 1950, having previously served for two years as General Manager of the Department. His experience in merchandising covers many years. He is a past President of the Chicago Controller's Association and Director of the National Controller's Congress.

Emanuel (Manie) Sacks

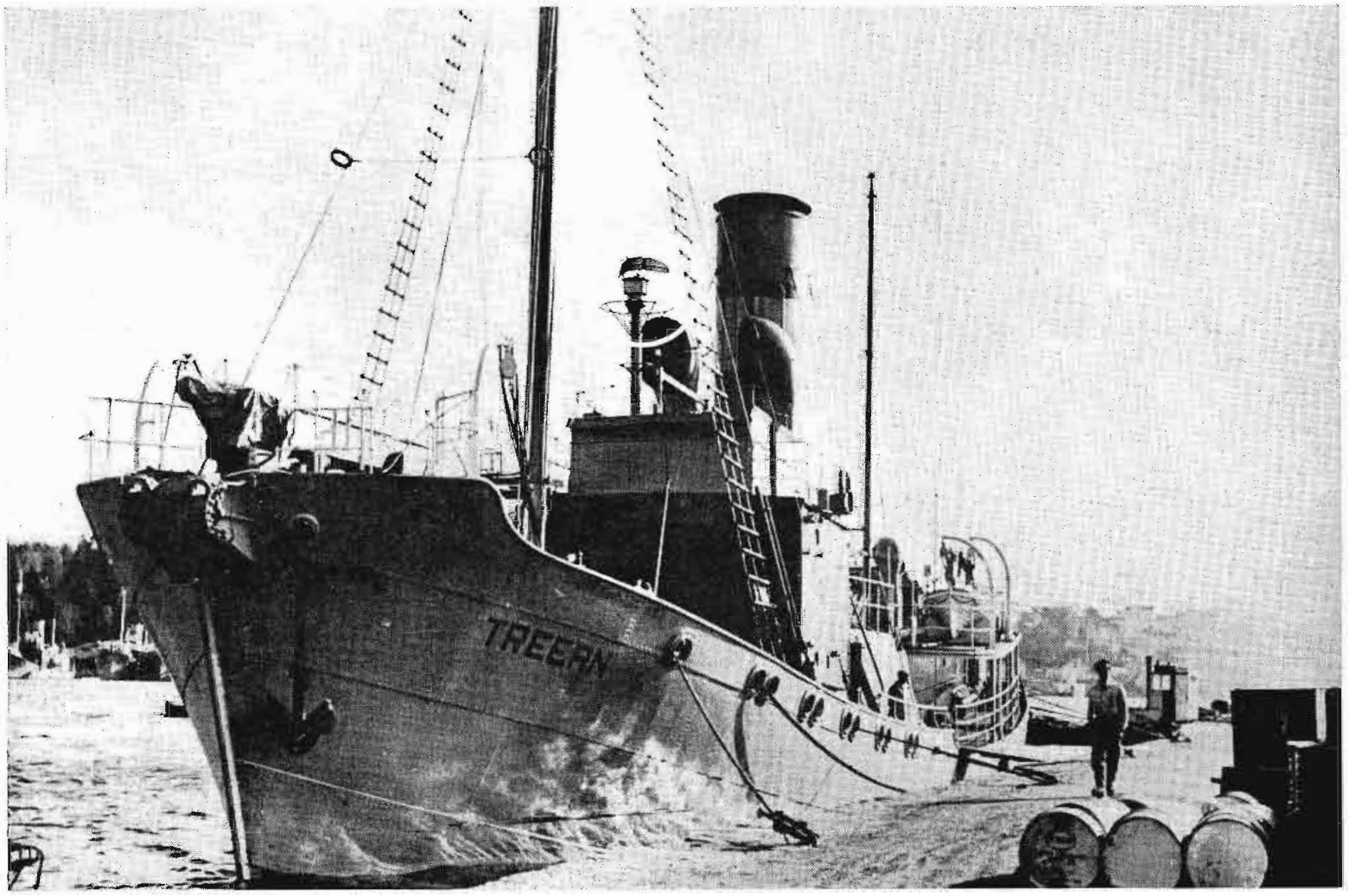
Henry G. Baker, an RCA Victor vice president, shows a student how to operate one of the television receivers donated to District of Columbia schools. In the rear are Rosel Hyde, Federal Communications Commissioner; Dr. Hobart Corning, District superintendent of schools, and C. Melvin Sharpe, president, District Board of Education.

RCA Donates 25 TV Receivers To Educational Project

Ceremonies marking a major step forward in the District of Columbia's pioneering experiment in classroom training by television were held November 26 in the studios of WNBW, TV outlet of the National Broadcasting Company in Washington.

Dr. Hobart M. Corning, superintendent of schools, formally accepted a gift of 25 television receivers from RCA Victor, in a telecast from the Wardman Park studios. Henry G. Baker, vice president and general manager of RCA Victor home instruments department, made the presentation.

Expressing "deep appreciation for this generous contribution" to the Washington schools, Dr. Corning said, "I wish also to acknowledge with appreciation the cooperation of the staff of WNBW in the production of television lessons during the past three years, the generous use of time and facilities made available without cost to the Board of Education, and the continued interest of RCA and NBC in developing educational television in collaboration with the Board of Education of the District of Columbia."



The *Treern*, a typical whale "catcher", is one of a fleet of 55 vessels equipped with RCA radar for a Norwegian whaling firm. The radar antenna, indicated by the circle, is installed above the bridge deck.

Radar Helps to Modernize *The Whaling Industry*

In the rugged days portrayed by Herman Melville in his classical "Moby Dick," whaling was an industry peopled by characters almost legendary in their robustness, fortitude, and exploits. Every foray into the formidable ocean was a gamble in ships and men, and accepted as such. Lacking means of communication, the whalers and their crews were out of touch with land sometimes for 6 months or more; with only human eyes to detect their quarry, crew members were handicapped in spotting whales in the broad, often fog-bound expanse of open water.

Radio and radar have changed all that. With modern steel whaling ships equipped with powerful radiotelegraph and radiotelephone systems, communication is available at all times between ships and between ships and shore. Radar has proved invaluable in the search for whales and in keeping track of the small boats that scour the sea far from the mother ship. But the operations of the fleets are otherwise much as they were before the days of applied science. Despite technological advances, the battle between hulls, men, the seas and the world's largest mammals remains a thrilling saga.

When the whaling season begins in late Fall, whalers weigh anchor in swift squadrons. The big factory ship, "mother" to the fleet, races southward with smaller "catcher" vessels cavorting at her sides like playful dolphins. But once the convoy has reached the hunting grounds at the bottom of the hemispheres, the 1,200-ton catcher vessels — far bigger than the factory ships of a century ago — leave the mother ship for the hunt, scatter-

ing for miles across the barren sea. Through it all, the ships talk back and forth by radio, while radar — the silent sentinel — keeps constant vigil through fog and darkness, spotting the floating mesas of ice, preventing collision, keeping close contact with the vessels. It is a common event for the mother ship and her flock to lose sight of each other in the swirling fogs. The smaller craft may develop engine trouble or run out of fuel. But today losses from these causes are rare. The hardy skippers and their men have learned to depend on radar with a deep feeling of confidence.

But radar does far more than perform its function as a safety measure. Its usefulness begins soon after the familiar "Whale Ho!" sounds out from the lofty crow's nest of the catcher vessel. The harpooner first takes his place in the bow as the swift craft noses forward. Aiming his high-powered harpoon gun, he waits until the whale is in range, then touches the trigger. The grenade-headed harpoon streaks to its mark. There is an explosion, and in a few minutes the behemoth is dead.

At this point, the catcher edges in and makes fast to the gigantic carcass. The body of the whale is inflated with compressed air to prevent it from sinking. Then a steel reflector rod, bearing the catcher's number flag and an electric light, is stuck upright in the side of the floating whale, after which the catcher goes on to seek further prey. The floating carcass is soon located by radar aboard a corvette which tows the whale to the mother ship for processing.

When a full cargo of oil is ready, a tanker is summoned by radio. The oil is pumped into this vessel allowing the factory ship to remain in the hunting grounds until the ice begins to close in and make further operations dangerous. Thus, in a good season, several cargoes of oil can be processed without requiring the mother ship and catcher boats to return to their distant home base.

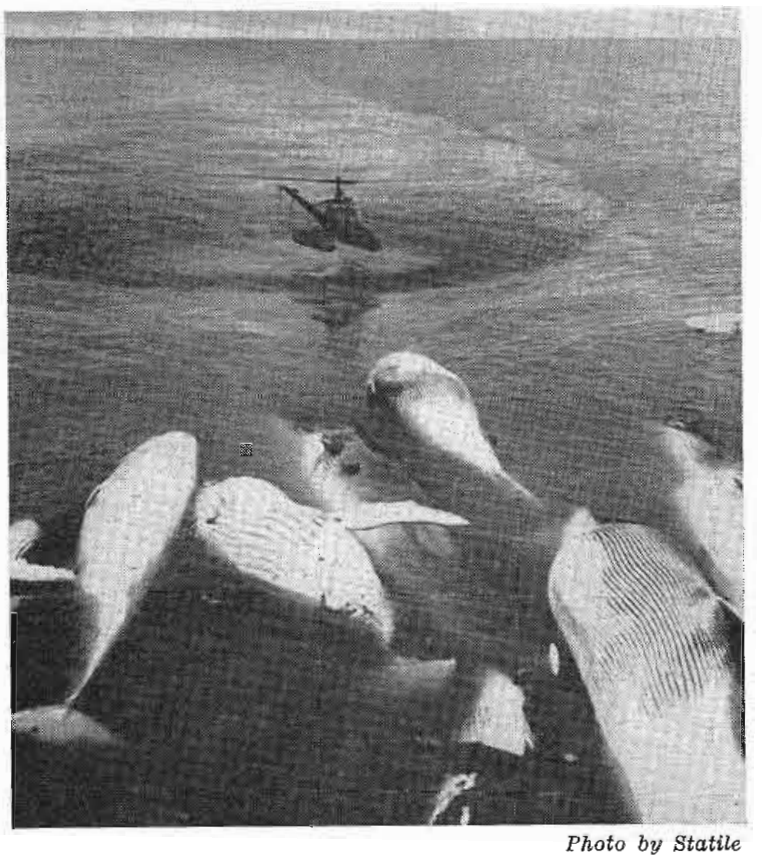
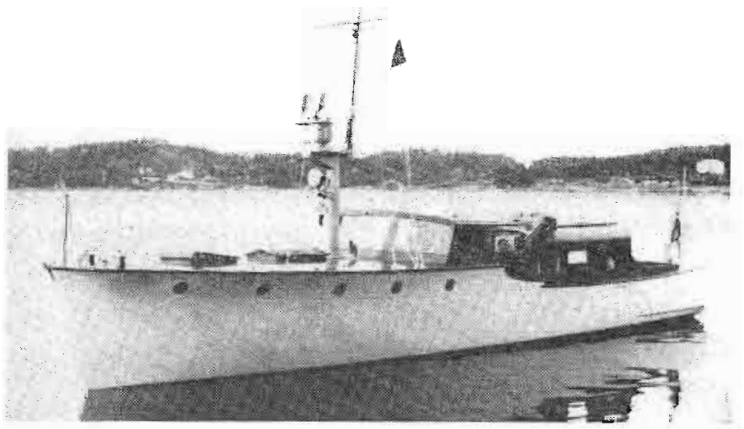


Photo by Statile

Radio-equipped helicopters, together with radar, increase the scouting range of whalers and add materially to the annual production of oil and by-products obtained from the mammals. The whales in this picture have been inflated with air which keeps them afloat until located by radar on a corvette and towed to the mother ship for processing.

One whaling fleet has successfully used the helicopter-radio combination to spot whales. The "flying windmill" scouts a wide front, sometimes 90 miles ahead of the fleet. From the air a spouting whale can be sighted 15 miles away on a clear day. Then a radio message from the plane directs a catcher vessel to the prey. One helicopter, aided by radio, is reported to have sighted 560 whales in 60 days, 494 of them confirmed catches.



Advantages of RCA radar are demonstrated to ship owners by an installation on the yacht "Nera" which Olaf Bordewick, general manager of A/S NERA, Norway distributor for RCA International Division, uses in his visits to harbor towns along the country's coastline.

Many ships sailing under proud and historic house flags go to sea with RCA radar aloft. The lives of seamen — a priceless commodity — are watched over by the magic eye that sees through fog and darkness.

Some owners have equipped their entire fleets with radar. Since World War II, the RCA International Division — through its worldwide distributor organization — has equipped more than 1,000 ships of foreign registry with radar, of which approximately 150 have been installed on whalers operating in the Antarctic.

RCA Records Have Improved Quality

By H. I. Reiskind

Manager, Engineering Section, Record Department
RCA Victor Division

OVER the years the goal of all of the people who work on phonograph records — development engineers, musical directors, and recording engineers — has been the same, viz., to bring to the listener in his living room the same emotional experience he would have received had he attended the actual performance. Over the years the continuing improvement in phonograph records and reproducers has resulted in sound more nearly approaching this goal.

One of the big steps forward — at least one of the more obviously apparent ones from the standpoint of the consumer — was the introduction of the "45" and the long-playing record. Since that time, development work has continued, both in the laboratory and in the recording studios, and has now resulted in a further improvement which we have called "New Orthophonic" — "Orthophonic" meaning correct sound.

RCA Victor's "New Orthophonic" records are characterized by four principal features. They are: 1) complete frequency range; 2) no loss of high-frequency response from the outside to the inside of the record; 3) ideal dynamic range for home listening, and 4) improved quiet surface. A few words of explanation of each of these features might be worth while.

In order to reproduce the full orchestral color, it is of course necessary that all the instruments be recorded and reproduced with the same balance that would be heard in the concert hall. It is necessary that the low notes of the tuba, the bass viol, and the tympani, as well as the high notes and the overtones of the violins, the oboes and the other treble instruments, be recorded and reproduced so that they are relatively as loud with respect to the other instruments as they were in the original performance. This requires that the acoustic environment of the orchestra be properly selected, that the orchestra be properly seated, and that the micro-

The author examines a master recording produced by the advanced "New Orthophonic" techniques developed by RCA Victor engineers. The cutting stylus is electronically heated to give a wide frequency range throughout the length of the groove.

phones be properly located with respect to the various instrumental choirs.

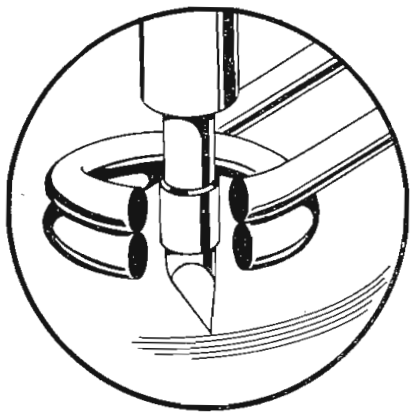
When this is done — and continuing study and experimentation have resulted in improved techniques — we achieve a well defined, brilliant orchestral tone with each instrument in proper perspective. It is then necessary that the recording equipment, the record manufacturing processes, and the reproducer be such as to permit the listener to hear, in his home, the same sound that the recording engineer and musical director heard in their loud-speaker when they made the recording. Recent improvements in disc recording equipment have extended the recorded range and have made it possible to produce records which have on them all the sound heard at the recording session.

Heated Stylus Improves Brilliance

One failing of the disc record has been that as the recording goes toward the inside, which means that the groove moves past the stylus more slowly, some loss in brilliance has resulted. A scheme of electronically heating the recording stylus, which was developed and incorporated in our equipment, eliminated this loss in brilliance towards the inside of the record. The same technique also results in a subsidiary advantage. Grooves cut with cold styli had microscopically small "horns" projecting above the surface of the record. These "horns", because of their extremely small size, were very delicate and, therefore, easily damaged by rubbing the surface of the record. The use of electronically heated styli has eliminated these "horns" and thus has made the record less susceptible to scuffing.

The third feature of "New Orthophonic" records is that their dynamic range is ideal for home listening. It is sometimes suggested that the objective of the recording engineer should be to bring the performer into the living room. While this may sometimes be the desirable objective for an instrumental or vocal record, it is obviously not for an orchestral record. If we were to reproduce the full volume and the full volume range of a symphony orchestra in the living room, the results would be unpleasant, to say the least. Actually, it has been established that the dynamic range (the spread between the quietest and the loudest passages) needed to produce concert hall illusion is a function of the size of the room in which the sound is to be heard. Therefore, careful attention is given to the adjustment of the dynamic range on the record for living room reproduction. The best results are achieved when, as in "New Orthophonic" recordings, the adjustment is made through the choice of the proper acoustic environment and microphone placement.

Surface noise, whether it be a steady hiss, ticks, or any other type, has long been a bugaboo to the listener, the engineer, and the manufacturer. Basically, there are four sources: 1) the operation of cutting the groove in the original master; 2) the plating processes used to make the stamper that molds the record; 3) coarse material in the plastic compound, and 4) imperfect molding of the record.



Electronic heat applied to the cutting stylus through the two wires at the right adds to the brilliance of tone in the "New Orthophonic" method of recording developed by RCA.

These four areas have long received engineering attention, and improvements are being made continually.

The use of electronically-heated styli has, in addition to the advantages outlined earlier, eliminated practically all of the noise that occurs in the original cutting. Improvements in electroplating processes and in molding methods have materially reduced noise from these sources, and the use of synthetic plastic compositions for the record has virtually eliminated that source of noise in addition to the more obvious advantage of producing a nonbreakable record. While the ultimate goal of complete elimination of all forms of noise has not yet been reached, we believe that "New Orthophonic" records represent a new high (or, lest there be some mistake, a new low) in amount of surface noise.

Test Record Aids Adjustments

With the major improvements that have been made in disc records in the past five years, a great deal of interest in wide-range, custom-built reproducers has developed. Owners of such instruments are often interested in adjusting their equipment so that its reproducing characteristic complements the recording characteristic of the record. Because of the number of requests we have received for such information, we have recorded a special test record which, with the addition of an output meter, makes it possible to adjust the reproducer to the "New Orthophonic" characteristic. These records (both "45's" and 33⅓-rpm) are available through RCA Victor distributors. We have also prepared written information describing the "New Orthophonic" recording characteristic and its derivation. Judging by the number of requests we have received for this information in the few weeks that it has been available, there is a definite interest on the part of the "high fidelity" fan.

Radar Development Simplifies Plotting of Vessel's Course

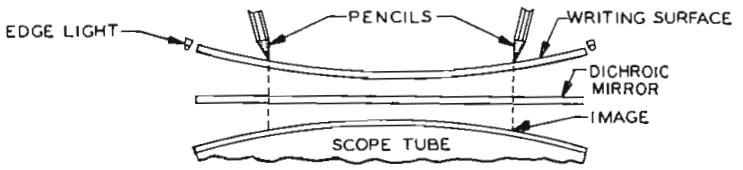
Position Tracker Permits Navigator to Trace Target Positions on Face of Scope.

By Thomas P. Wynkoop
President
Radiomarine Corp. of America

EFFICIENT as radar has proved to be in its role as an outstanding aid to marine navigation, it has now been made even more effective by the Powergraph Position Tracker, an advanced devolpment of the Radiomarine Corporation of America. As a result, a ship's navigator, supplied with the Tracker, is now able to trace the movement of other vessels directly on the radar scope itself thus maintaining a continuous plot to show his course in relation to the courses of other vessels.

Prior to this latest development, the plotting of the course of a radar target required additional personnel and cumbersome equipment with inevitably inaccurate results. After numerous attempt to evolve an effective plotting method, experts concluded that the only logical solution was to plot the target's course directly on the scope. To do this, it was obvious that means would have to be found to eliminate the optical error called parallax. Parallax is a fault which is introduced when the navigator, standing in front of the radar scope, changes his viewing position so that the pin-point reflection of the target "pip" seems to have shifted to one side or the other.

The Powergraph Position Tracker is permanently

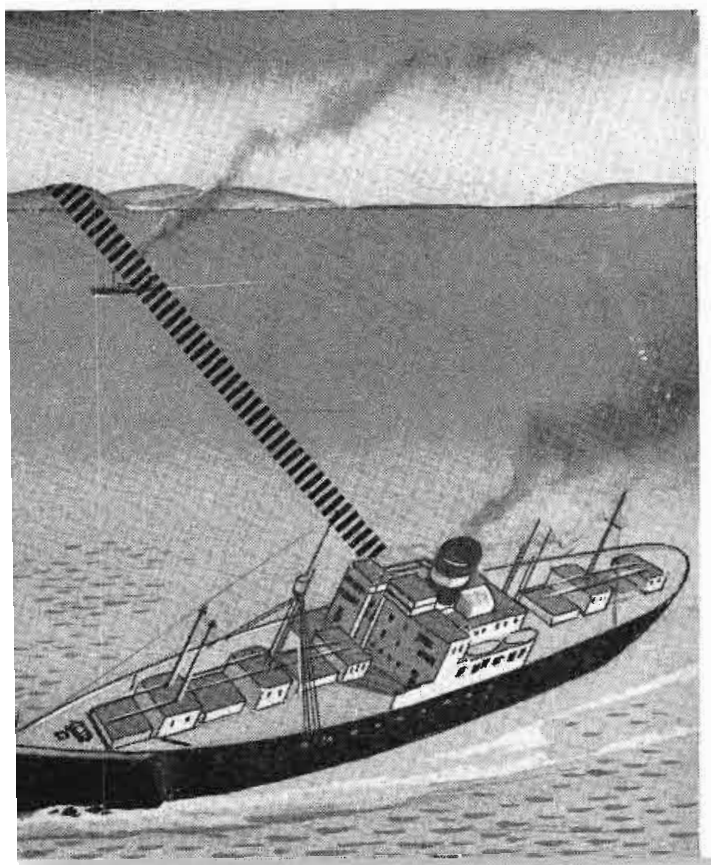


Sketch explains how navigator's notations on face of radar scope (top) provide traces of target movements.

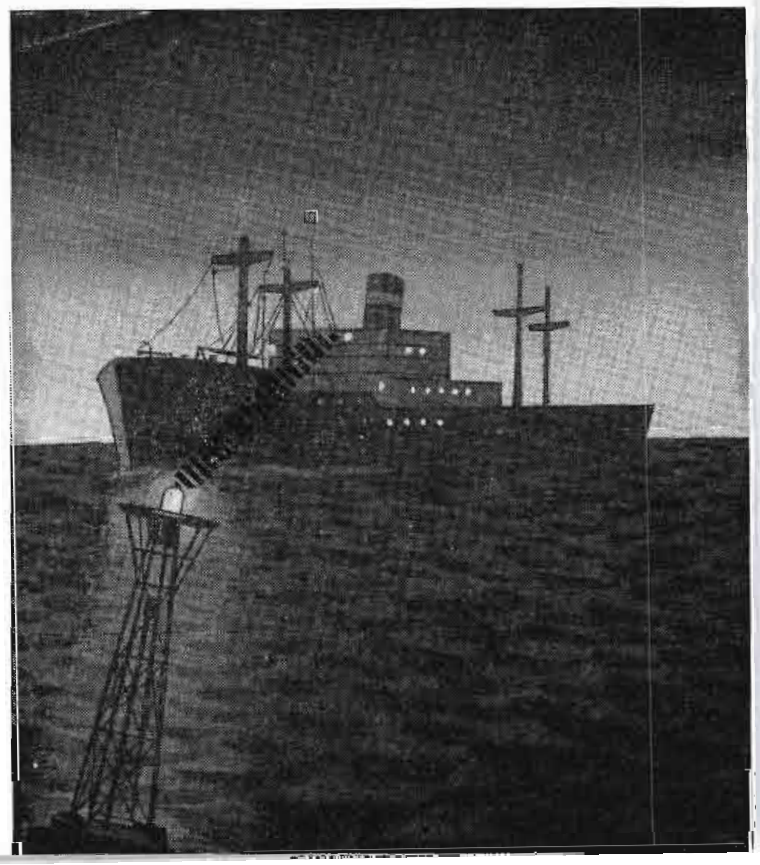
mounted on the radar indicator directly over the scope tube. It comprises an edge-lighted concave glass writing surface and a special dichroic (two-color) mirror. This mirror has the unique property of reflecting downward as a red image on the scope any wax pencil marking that is placed on the writing surface.

At the same time the mirror permits the normal yellow glow of the radar targets to pass upward to the observer's eye. In this way, the Tracker provides a convenient method of recording the relative positions of objects within range of the radar. New marks are made

(Continued on Page 32)



Marine radar provides the ship's navigator with a constant "picture" of distant objects, such as land-falls, and at the same time permits him to locate buoys and other aids to navigation, unaffected by darkness or limited visibility.



Our Small-Business Family

By Vincent deP. Goubeau

Vice President and Director of Materials
RCA Victor Division

THE chief investigator of the United States Senate Small Business Committee, Mr. William D. Amis, recently visited our Camden office to obtain, as part of a general industrial survey, information concerning RCA Victor's subcontracting program. He came at the request of Senator John Sparkman of Alabama, Chairman of the Committee, who had previously directed a number of written queries to us concerning the scope of small business participation in our defense contracts.

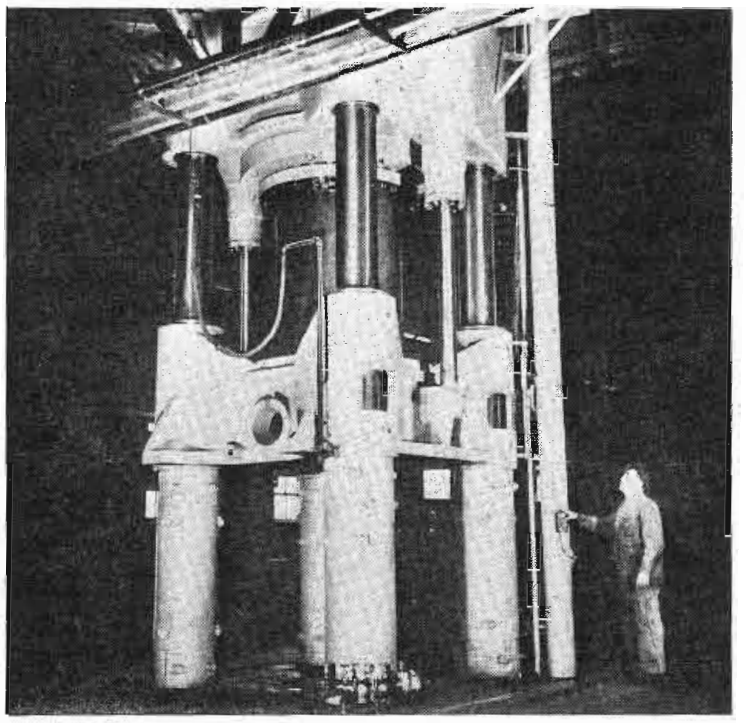
Based on these queries from Senator Sparkman, we prepared a report on procurement procedures of the RCA Victor Division. It covered a broad range of subjects, including general procurement policies, relations with small businesses, our system of meeting small businessmen and our methods of assisting small vendors in the execution of contracts. The report included a number of case histories of small businesses in various sections of the country whose growth and well being were, in part at least, attributable to our association.

Mr. Amis' reception of the report indicated that RCA's program for collaboration with the American small businessman would be of value to the Committee in charting future courses of action.

The report established that three-fourths of the 5,000 vendors who have worked on our Government and commercial contracts over the past two and one-half years are small businessmen, according to Government classification. It further showed that approximately 50 cents of every dollar spent by RCA Victor on vendor contracts in this period went to the small businessman.

With this yardstick for measuring small business participation in our procurement program, the report emphasized the following activities and procedures of the RCA Victor Division:

1—*General Policies:*—Within the framework of competitive bidding, RCA Victor seeks to establish long-term and stable relationships with its suppliers in each industry. It views its suppliers as adjuncts of the company, as associates and partners rather than outsiders. It emphasized the importance of personal contacts between suppliers and our purchasing representatives in the negotiation and execution of contracts.



Scene in the Chicago plant of the Molded Products Corp., one of the many small-business vendors who supply RCA Victor with components for electronic products.

2—*Relations with Small Business:*—RCA Victor makes a continuing effort to broaden its national supply base, thus insuring full small business participation in our subcontracts. It works closely with small business officials of the Department of Defense and the three branches of the Armed Forces, advising and assisting in the execution of the Department's program. Through public relations programs and advertisements, it seeks to dramatize the contributions of our small business associates to the defense effort.

3—*Small Business Contacts at RCA Victor:*—The General Purchasing Division of RCA Victor has created machinery for the personal reception of small businessmen seeking work with us. When the small businessman approaches our offices, he is guided from receptionist to commodity specialist, to product department purchasing agent. His qualifications and his ability to fulfill our requirements are thoroughly investigated — often by on-the-spot inspection of his plant.

4—*Statistical Check on Small Businessman's Share of Contracts:*—To keep abreast of our subcontracting orders and to determine what percentage small business is getting, we have devised a

(Continued on Page 31)

1,892 Employees of RCA are Members of 25-Year Clubs

As of December 1, 1952, 1,892 employees of the Radio Corporation of America had accumulated more than 47,000 years of service in the company. These are the members, by latest count, of the 25-year clubs of the Corporation and its subsidiaries.

Among these long-term employees are some who worked for RCA's predecessors, prior to 1919. In their time they have seen RCA grow from an organization of 475 to 53,000 persons, who comprise the backbone of a team famous around the world for quality products and dependable service. Each year, as additional members of the RCA family reach the quarter of a century milestone, their loyal and faithful service is recognized by admittance to the 25-Year Clubs.

The RCA Victor Division leads the list with the greatest number of quarter-century veterans. At the end of 1952, more than 1,350 Victor employees, 1,110 men and 240 women had joined the select group. During the past year, 158 persons from plants at Camden, and Harrison, N. J., Lancaster, Pa., Hollywood, Indianapolis, Detroit, Cincinnati and Chicago became members and received gold watches, the established emblem of honor.

Typical of Victor's veteran employees is Charles J. Glenzinger. Now 63 years old, he joined the Victor Talking Machine Company as an order clerk in 1905, and now boasts the greatest length of service with the Division. For several years he was employed in the materials handling section of Victor Talking Machine Company, the RCA Manufacturing Company and the present RCA Victor Division, always in Camden. Since 1951 he has been a storekeeper with the Engineering Products Department.

One Club is Located in Manila

RCA Communications, Inc., established its first 25-Year Club in 1944. Today, there are three clubs located at New York, San Francisco and Manila. The present membership is 322, consisting of 305 men and 17 women.

RCA Communications' employee with the longest service record is Henry G. Heisel, General Office and Service Manager of the Operations Department in New York. He joined the Marconi Wireless Telegraph Company of America in 1912 as an office boy. In later years he became successively Auditor of Receipts of RCA, Manager of RCA Laboratories' Finance Department and Assistant Treasurer of RCA Communications.

Although the RCA Laboratories Division was formed as late as 1942, 82 of its employees have been honored for 25 years of service with RCA. These persons, including four women and 78 men, have received gold watches and 25-year certificates at annual dinners held at the David Sarnoff Research Center in Princeton, N. J. Seventeen employees became members of this distinguished group during the past year.

Has Service Record of 44 Years

With 44 years of service to his credit, Wilbur A. Murphy, now a Staff Assistant at Princeton, has the longest service record of RCA Laboratories' employees. In 1908, Mr. Murphy joined the Victor Talking Machine Company at Camden, N. J., as an office boy, with a starting salary of $2.00 a week. Subsequently, he became a Payroll Clerk and in 1924 was transferred to Victor's phonograph record plant at Oakland, Calif. After the formation of the RCA Manufacturing Company, Mr. Murphy returned to Camden as a Staff Assistant. In 1942, he joined the Princeton laboratories.

The National Broadcasting Company, which celebrated its 25th Anniversary in 1951, marked the occasion by forming a 25-Year Club. The present membership in the club totals 56 employees from NBC offices in New York, Hollywood, San Francisco, Washington and Chicago. During the last two years, 43 men and 13 women have received watches in recognition of their quarter-century service.

According to the records, Harry F. McKeon, Staff Controller of NBC, has the greatest length of service with NBC and organizations which were acquired by RCA. In 1916 he joined the American Telephone and Telegraph Company and six years later became Auditor of A. T. & T.'s Radio Department. When RCA purchased radio station WEAF in 1926, Mr. McKeon was appointed Auditor of NBC, and in 1942, he was named Controller of the Company.

The Quarter Century Club of Radiomarine Corporation of America, formed in 1948, has 56 members including two women. Certificate of Honor scrolls and gold watches are awarded to new members.

Radiomarine's veteran with the longest service is

(Continued on Page 31)

Our Small-Business Family

(Continued from Page 29)

comprehensive system of statistical reports. Each month, reports on the dollar volume and number of purchase orders from each product department are tabulated. All our current vendors are divided, according to Government classification, as small or large. An IBM card index system digests this information and allows us to prepare semi-annual reports showing total dollar volume of business with each vendor and whether that vendor is small or large. This has helped us maintain a constant and equitable allocation of subcontracts between businesses of all sizes.

5—*Assistance to Small Business:*—We believe that the success of a subcontracting program is dependent on more than a written contract. It requires a comradely relationship between the prime contractor and the vendor; it requires a willingness to swap information and technical know-how; it requires a desire to help the other fellow out in a pinch, to expedite supplies, to lend financial encouragement. The story of how RCA Victor contributes these "extras" was told in terms of a few small companies which are typical of the many. We provided capsule descriptions of our association with the Atkron Company, of Cuyahoga Falls, Ohio; Dielectric Products, of Jersey City, N. J.; the Independent Manufacturing Company, of Riverton, N. J.; E. R. Capewell & Sons, of Mt. Holly, N. J.; Grayhill Company, of LaGrange, Ill.; D. S. Kennedy Company, of Cohasset, Mass.; and Kusic-Haines Manufacturing Company, of Weirton, W. Va. In each instance, we showed how these companies had grown as a result of their association with us; in each instance, we demonstrated that close collaboration had reacted to our mutual benefit.

Through this report and our subsequent meeting, Mr. Amis had an opportunity to become acquainted with our company's traditional belief: that small and large businesses are completely interdependent, that by working together they can meet the dual needs of defense and home consumption and thus sustain our unmatched standard of living.

1,892 Employees of RCA are Members of 25-Year Clubs

(Continued from Page 30)

Daniel J. DeCoste, Senior Clerk at the Boston Office. Born 62 years ago, Mr. DeCoste joined the Marconi Wireless Telegraph Company of America in the summer of 1909. For many years he was responsible for the operating and servicing of communications equipment.

The RCA International Division's roster of 25-year veterans consists of four women and 20 men. Of this group, Traffic Manager Howard M. Spellman has accumulated the longest service, begining in 1907 with the Victor Talking Machine Company.

In 1913 he became first assistant in Victor's Export Department. After performing various billing and shipping duties, he was made Traffic Manager of RCA Victor in 1935 and ten years later was transferred to his present position in the International Division. Mr. Spellman is now Chairman of the Overseas Freight and Traffic Committee of the Radio and Television Manufacturers Association.

Two of the present employees of RCA Institutes have served with RCA or its predecessor companies for 25 years. Cornelius Peterson, veteran instructor of the Institutes, conducts classes in radio physics and mathematics. Mr. Peterson began his teaching career in 1924 with the Radio Institute of America, which later became RCA Institutes. During World War II, he spent two years with the Radiomarine Corporation of America. Mr. Peterson is believed to have taught the subject of radio transmitter theory for more years than any other man in the United States.

A review of RCA's veteran employees and the clubs which have been established to recognize their years of faithful service can present only a small cross-section of the people who compose the RCA family. Throughout the vast army of RCA's employees are hundreds of persons who have devoted 5, 10, 15, 20 and more years within the ranks of the Corporation. These men and women are at work as clerks, technicians, secretaries, engineers, machinists, assembly line workers, accountants, executives and in many other fields. The progress and accomplishments of RCA in the last 33 years can be attributed in large measure to the outstanding cooperation and teamwork of these veterans.

Radar Development Simplifies Plotting of Vessel's Course

(Continued from Page 28)

as the target vessel changes location, thus facilitating the working out of courses, speeds, passing distances or the solution of other navigational situations.

The use of the dichroic mirror is a notable stride in marine navigational plotting. Much work has been done with these mirrors in the development of color television cameras but it is believed that the Powergraph Position Tracker represents the first application of these color filtering mirrors to a radar plotting device.

The logic behind the gradual evolution of the Powergraph Position Tracker becomes apparent when previous plotting methods are analyzed. With the early True Plot method the radar findings had to be relayed to another person who recorded them on a sheet. Next came the Relative Plot or Maneuvering Board method in which the investigating ship was used as the basis for the problem. This provided a more substantial base for calculations. The United States Navy took the next step with its swifter, more efficient plotting system which embodied the Plastic Maneuvering Board. This system utilized a series of concentric and parallel lines drawn directly on the plotting surface of the board. A still later innovation, the Navy's Dead Reckoning Tracer, moved the plotting surface over the mark designating the ship's position in direct relation to her speed.

Radar is still regarded by many laymen as one of science's greatest mysteries. Although it may appear complex, in principle it is surprisingly simple. The name itself is derived from the combination of the first letters of the words RA-dio, D-irection finding, A-nd R-anging. In the actual operation of radar, a directed radio beam is transmitted in a complete circle from the ship's revolving radar antenna. This beam "hits" any surrounding objects (targets) up to 25 miles or more distant and is reflected back to the source. The returned signal is made to appear by electronic means on a calibrated kinescope which makes it possible to calculate the exact position of the target. As the ship moves along its course new targets are indicated by the beam.

Now that navigators the world over can use the magic of radar to calculate a target's position, bearing and speed by merely flicking a switch and making several notations on a visible screen, credit for much of this accomplishment is due Radiomarine engineers who have contributed so much to make this mariner's dream come true.

RCA Executives and Engineers Receive Honors from I. R. E.

Brig. General David Sarnoff, Chairman of the Board of RCA, will receive the first Founders Award of the Institute of Radio Engineers at the Institute's annual convention in New York in March. He will be cited for his "outstanding contributions to the radio engineering profession through wise and courageous leadership in the planning and administration of technical developments which have greatly increased the impact of electronics on the public welfare." The new award has been established to commemorate the three founders of the I. R. E.: Dr. Alfred N. Goldsmith, John V. L. Hogan and Robert H. Marriott.

Effective January 1, 1953, ten engineers and scientists of RCA became Fellows of the I. R. E. in recognition of outstanding contributions to the electronics art. Recipients were Edmund A. Laport, International Division; John L. Callahan, Russell R. Law, Jan A. Rajchman, Bertram Trevor and Charles J. Young, Laboratories Division; Kenneth A. Chittick, Lewis B. Headrick and Philip J. Herbst, Victor Division, and Allen B. Oxley, RCA Victor Co., Ltd., Canada.

The 1953 Editor's Award of the I. R. E. will be received by Edward O. Johnson and William M. Webster, Jr., RCA Laboratories Division, for their paper in the June, 1953, *Proceedings of the I. R. E.,* entitled, "The Plasmatron, a Continuously Controllable Gas-Discharge Developmental Tube."

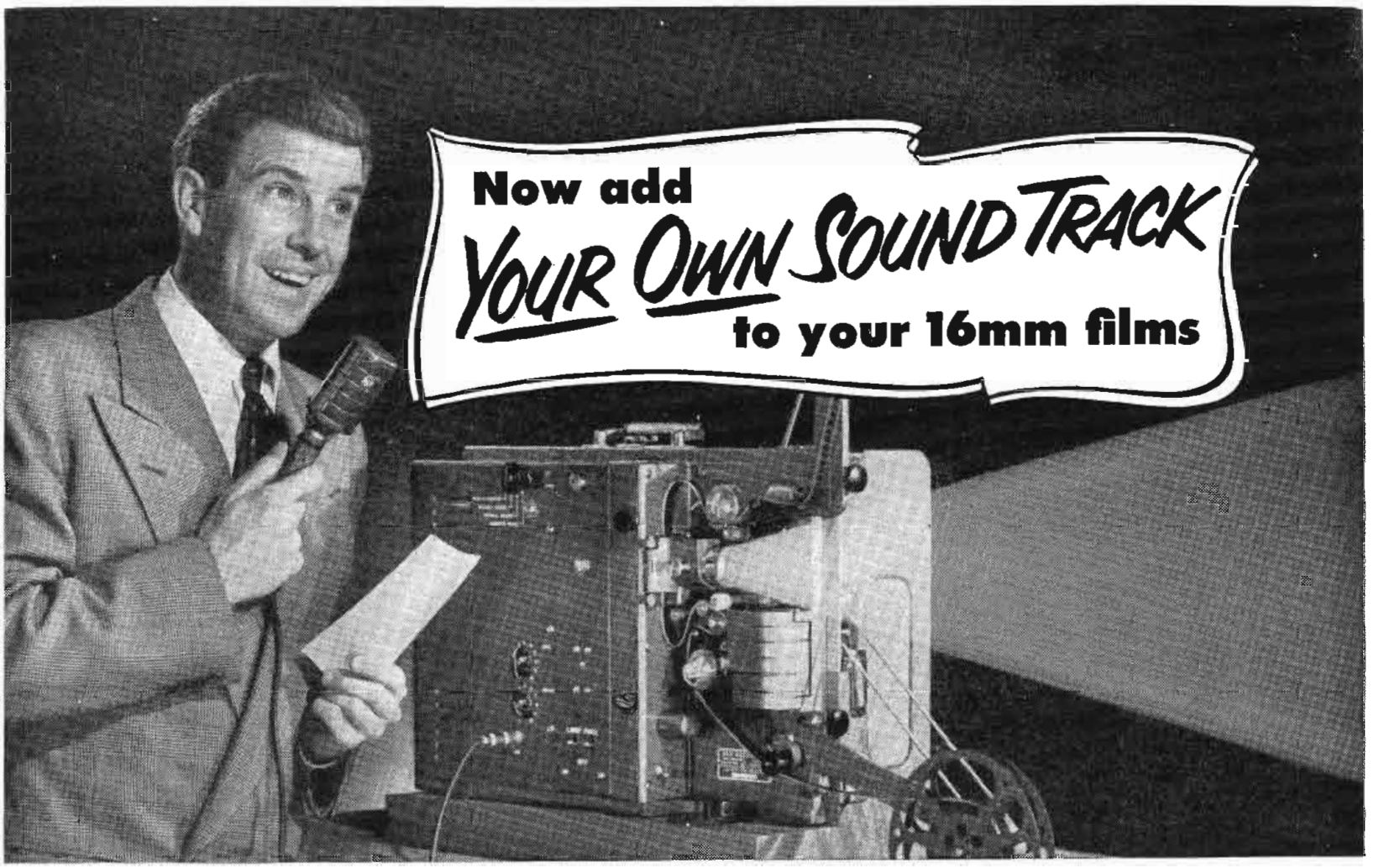
Dr. B. E. Shackelford, Director of the License Department, RCA International Division, has been elected an I. R. E. director for 1953-55.

Religion and Science

(Continued from Page 15)

"Scientists have seen this truth applied to their own activities. They have beheld the importance of a brotherhood among them which transcends racial, religious and geographical boundaries. Whether pathfinders, pioneers or inventors, they come to realize that in their achievements they have built upon the foundation of ideas and theories established, possibly long years ago, by their brothers in science.

"Men must learn to live and work together or all will perish together. This concept of the relationship between men is not new. The ideal of brotherhood has pervaded the teachings of all religious thinkers—Christians, Mohammedans and Jews alike—whose moral and philosophic precepts form the bedrock of our modern institutions and culture. And this concept, as we all know, is basic to a true democratic way of life."



Use the RCA MAGNETIC Recorder-Projector

Now, make your entire film library work *harder*, train *faster*, explain *more clearly* . . . let every 16mm film you own tell a brand-new story with the new RCA magnetic recorder-projector that puts sound on film in an instant.

Look at these 5 Important, New Training Aids

1. Make your own sound films

Now you can actually make your own sound films—without studio facilities—at amazingly low cost. Shoot film with your present camera. Add sound to developed print with the new RCA recorder-projector.

2. Add sound to *silent* films

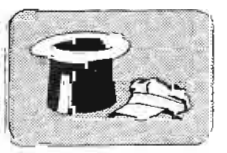
Give films the immediacy and impact of sound and voice. Record a fresh message minutes before a lecture. Or organize a project to prepare complete, professional scripts.

3. Make sound films tell a *new* story

Revamp distracting, out-of-date commentary. Interpret films in terms of current trends. Revive expensive films that are gathering dust on your shelves. Get sound quality you never dreamed possible on 16mm film.

4. Make your message specific

Record a narrative on any 16mm film to place it exactly on your audience's level—make it directly applicable to those it addresses—bring it into the scope of your discussion.



5. Let films speak *two* languages

Your present optical sound track plus new magnetic track do double duty, give films two tongues. For example: English and Spanish, technical and non-technical, elementary and advanced . . . *both on the same film!*

HERE'S ALL YOU DO. Have a narrow magnetic stripe added to your 16- or 24-frame sound or silent 16mm film. Laboratory services are set up to do this quickly and expertly—without destroying your present optical sound track—for a few cents a foot. (Films with perforations on both edges must be duplicated on single-perforation stock.)

Project film in your RCA recorder-projector, and speak into the microphone as you watch the film. Play back instantly. Keep it as long as you want it. Erase and re-record at any time. (Here's sound on film for 11% of the cost of optical sound!) It's simple as that.

It's three equipments in one. (1) It's an excellent instrument for projecting and reproducing 16mm sound motion picture film—recorded both optically and magnetically. It has all the operating conveniences of the RCA "400" line including the famous "thread-easy" feature.

(2) It's an unequalled device for recording your own sound track on 16mm film.

(3) It can serve as a public address system.

—— LISTEN BEFORE YOU BUY ——

Before you buy any type of sound projector, listen to the superb magnetic reproduction of the RCA recorder-projector. There's nothing like it anywhere on 16mm film. Listen . . . and compare . . . before you buy.

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The sun never sets on these trade marks, and millions of people around the world turn to them with friendly confidence.

RCA, as the pioneer, continues to lead in every major advance . . . in all phases of television.

RCA Victor has made radio a household word to millions of Americans. "Victrola" phonographs have extended great music from the concert halls to homes everywhere . . . from Broadway to Every Street, U.S.A.

You also see these trade marks on records so rich in "living presence" that artists seem to be performing in your home.

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Trmks. ®

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