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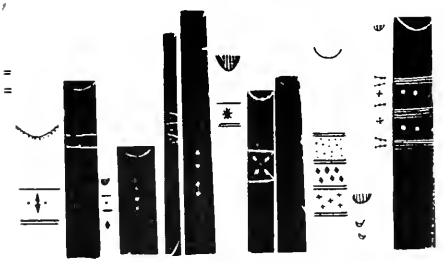

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RCA

RADIO CORPORATION of AMERICA

VOLUME 12 NUMBER 1

Radio Age

RCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

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*

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National Broadcasting Company, Inc. • Radiomarine Corporation of America
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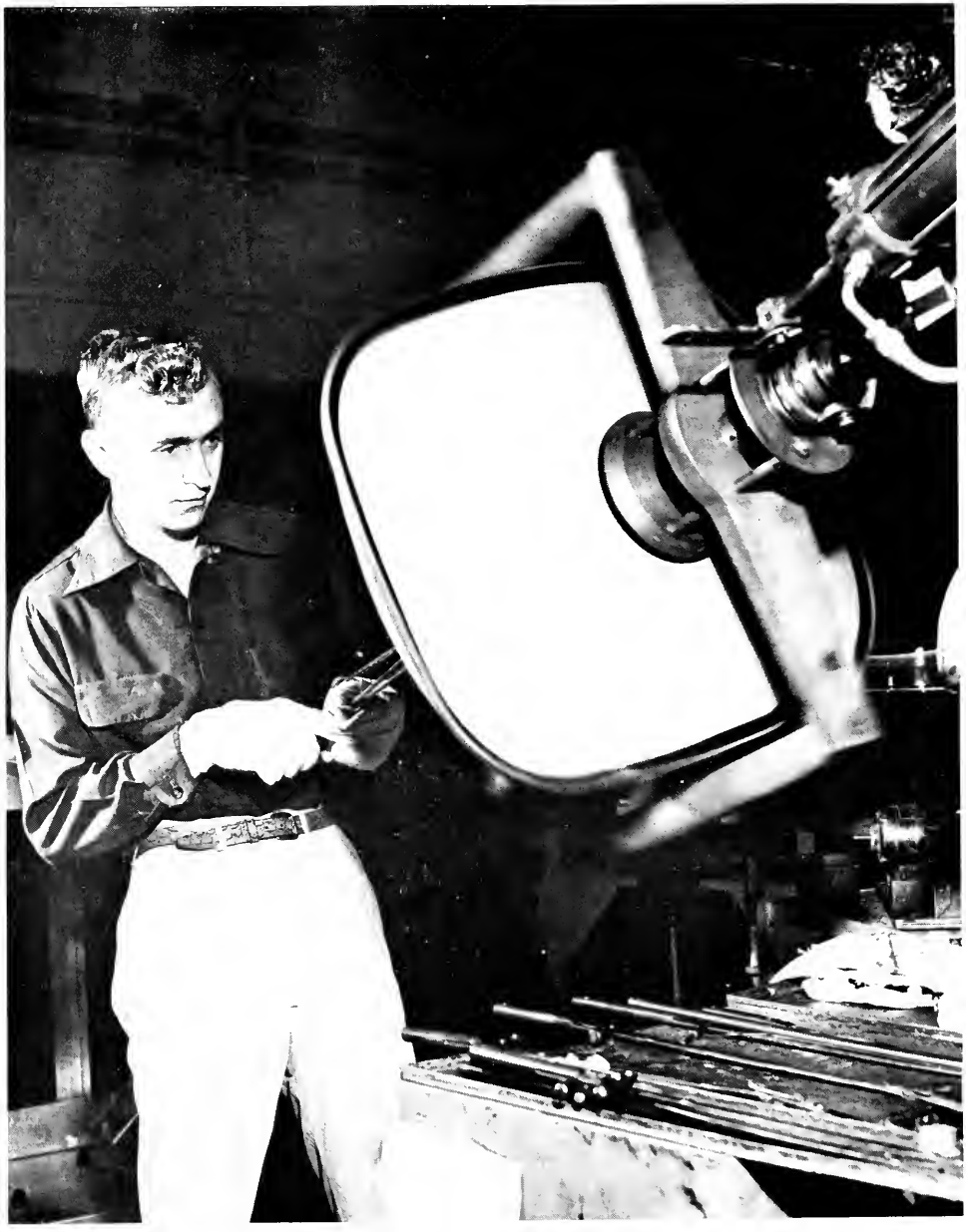


In making a picture tube for a television receiver, the kinescope is whirled rapidly while a graphite coating is applied to the inside of the glass neck and metal cone at the RCA plant, Lancaster, Penn.

"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."

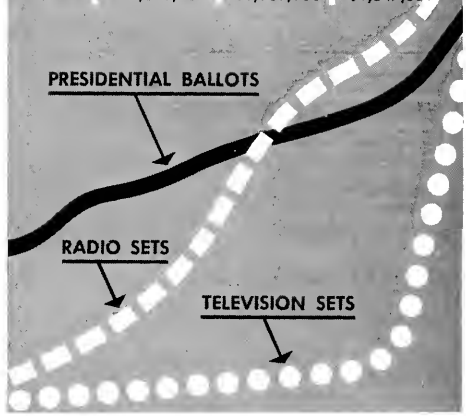
In the international field, he disclosed, RCA has supplied equipment for fifteen television stations in Canada, Brazil, Cuba, Hawaii, Dominican Republic, Mexico, Venezuela and Italy.

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 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."

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



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.

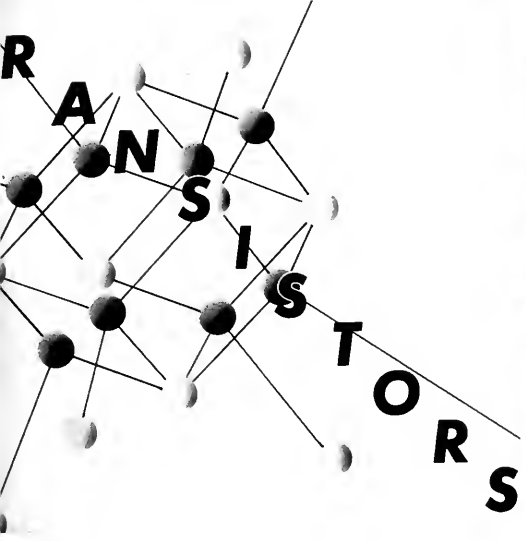
For the first Republican inauguration in 20 years, NBC will call in key personnel and latest model equipment from broadcast centers across the country. Fifteen fixed and mobile electronic cameras and 50 microphones will assist 25 reporters and commentators to capture the whole story of inaugural day. 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.

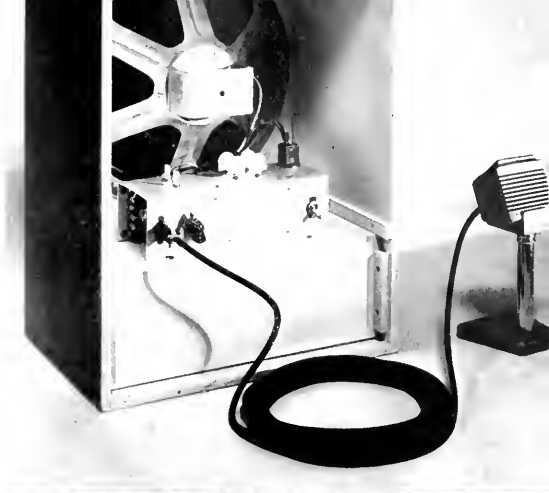
All-transistor personal radio. Employs nine developmental and experimental junction transistors. It has not yet been engineered for smallest possible size. In this AM-band transistor receiver, it is possible to get standard 100-hour battery life with five small batteries each about the size of a checker 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.

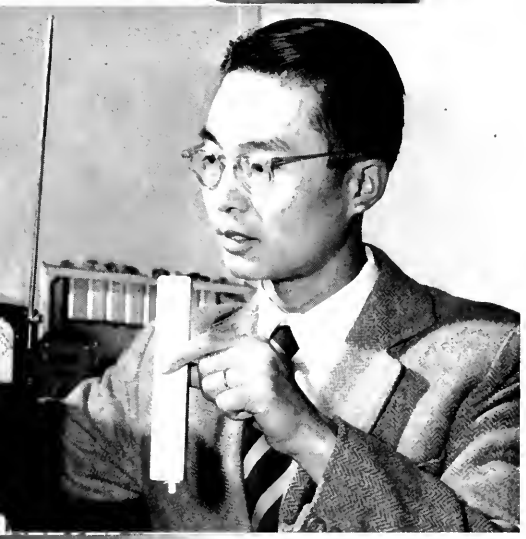
The experimental model is completely portable with self-contained battery supply and weighs five pounds, approximately half the weight of an FM receiver using tubes. In its present preliminary form, the transistor set is not as sensitive as a standard tube FM set.

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.



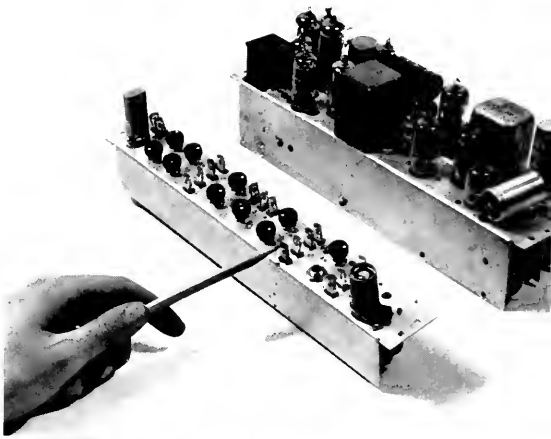
Wireless phonograph jack. A tiny radio transmitter, employing one developmental junction transistor and a few other simple components, has been constructed to feed the signal from a phonograph pick-up to a standard AM receiver. This 2-cubic-inch transmitter is effective two feet away. Its button-sized 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.

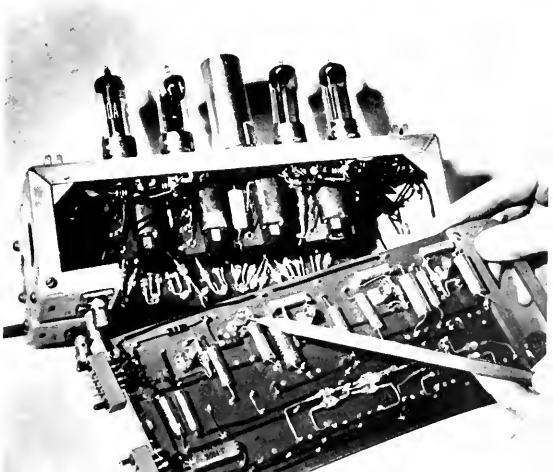
Transformerless power amplifier. This entirely new kind of power amplifier assembly consists in one of its experimental forms of nothing but four developmental and experimental junction transistors mounted on a small tube socket. The transistors used in this experimental circuit are pairs of p-n-p and 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%.



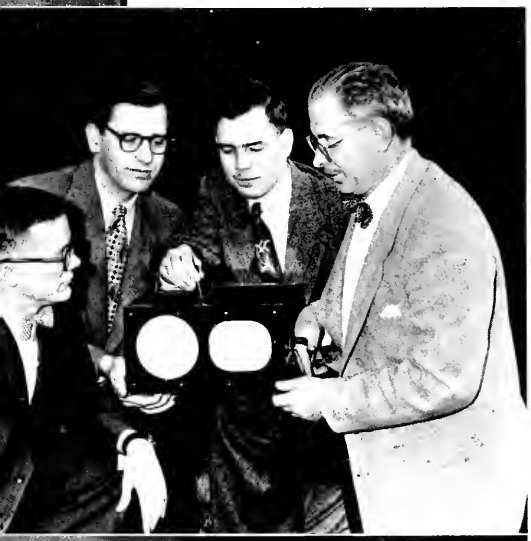
Transistor adder. Another important element of a computer is an electronic adder. Developmental point-contact transistors in this experimental adder enabled 100,000 additions per second. The transistor adder requires one-quarter the power, and it enables a unit one-seventh the size and one-fifth the 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 1½ 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.

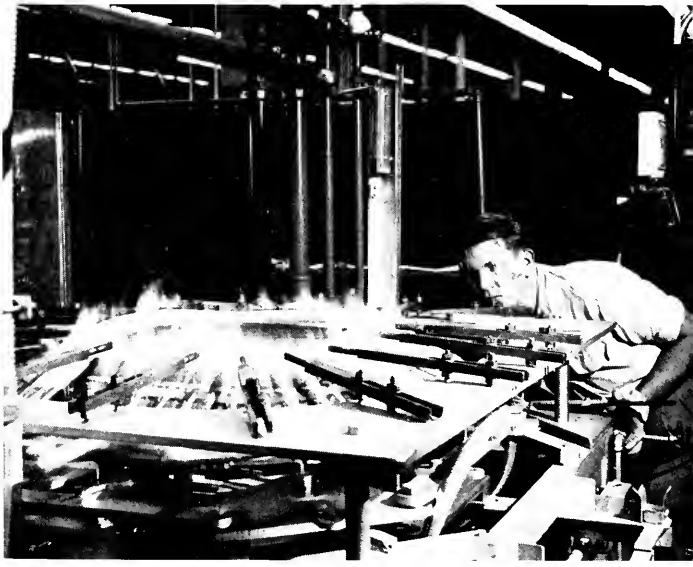
"Throughout the ages scientists have marveled at the communion of Nature's forces all working together. From the energy produced by electrons and atoms there is a lesson that humanity can learn of the power of individuals working together in harmony. Indeed, science preaches a great sermon of brotherhood.

(Continued on page 32)

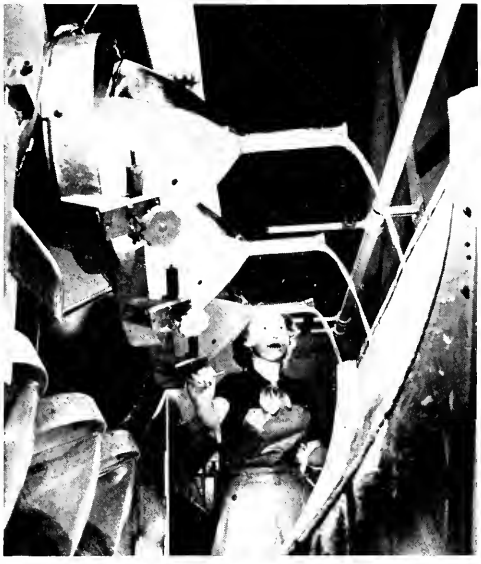
Production-Line Scenes in th
at Lancaster,

An inspector exomines the assembly of an electron gun, to assure that this fundamental element of o 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.



ne of RCA's employees at the Lancaster plant ads 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-s kinescopes are carefu move on to the

A Tube Plant

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

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

l-glass rectangular
d before the tubes
n 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 pawerful light allaws this inspecto
to give the screen surface of the picture tube
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.

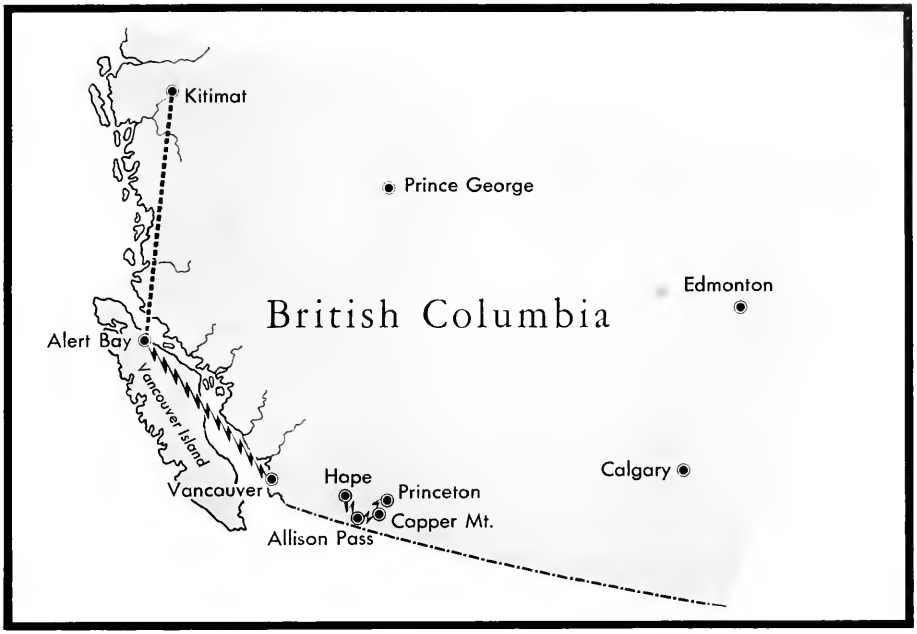
Two of the antennas at Hope, British Columbia, part af the communicatians system which is being extended thraughaut the Pravince.

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 rhe 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 insrallation 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 transprovincial 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 communicatians 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 appointmenr 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.

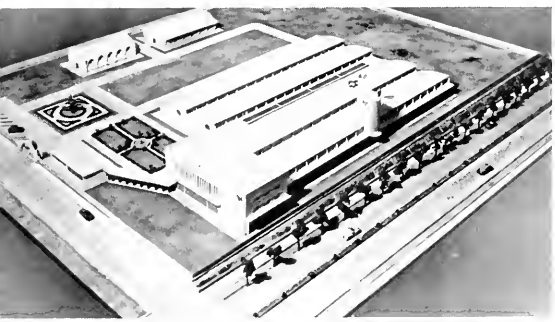
"We are honored to have leaders in Spanish industry as our associates in the company."

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. Hobort Corning, District superintendent of schools, and C. Melvin Sharpe, president, District Boord of Educotion.

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

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.

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.

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.

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.

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.

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.

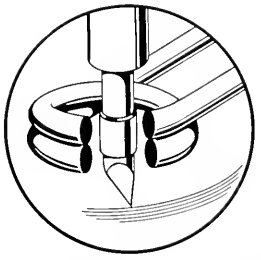
When this is done — and continuing study and experimentation have resulted in improved techniques — we achieve a well defined, brilliant orchestral tone with each instrument in proper perspective. It is then necessary that the recording equipment, the record manufacturing processes, and the reproducer 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.

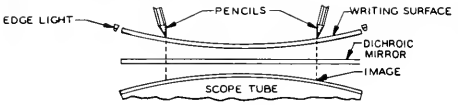
Test Record Aids Adjustments

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



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

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 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

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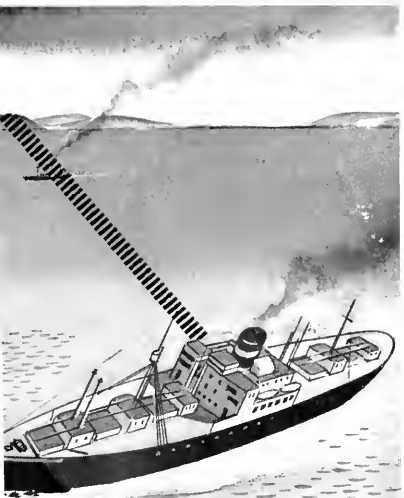


Marine radar provides the ship's navigator with a constant "picture" of distant objects, such as land-falls, and at the same time permits him to locate buoys and other aids to navigation, unaffected by darkness or limited visibility.

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.

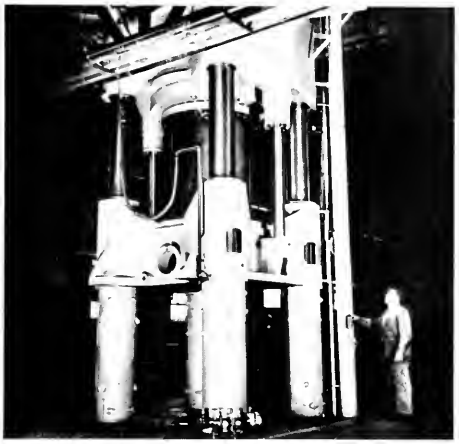
Based on these queries from Senator Sparkman, we prepared a report on procurement procedures of the RCA Victor Division. It covered a broad range of subjects, including general procurement policies, relations with small businesses, our system of meeting small businessmen and our methods of assisting 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

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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

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Our Small-Business Family

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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

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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."

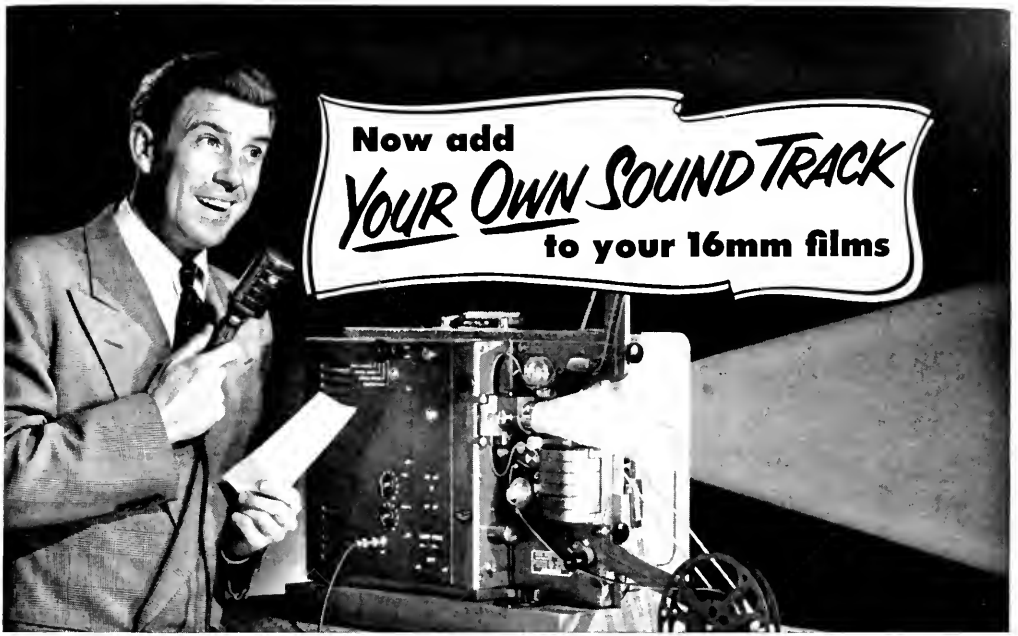
Dr. B. E. Shackelford, Director of the License Department, RCA International Division, has been elected an I. R. E. director for 1953-55.

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

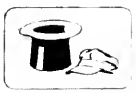
Give films the immediacy and impact of sound and voice. Record a fresh message minutes before a lecture. Or organize a project to prepare complete, professional scripts.

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

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Get started on your *new film program* today—Mail Coupon NOW

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Your guardians of quality in radio, television and recorded music

When you see these trade marks on television sets, radios, "Victrola" phonographs, and other electronic instruments you are assured the highest quality—born of research, fine engineering and craftsmanship.

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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.

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These same high standards of quality make NBC the nation's leader in radio and television broadcasting. You can depend on RCA and RCA Victor trade marks as *guardians of quality*—sure guides to finer performance, dependability, better value and service.

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Radio Corporation of America

World leader in radio—first in television

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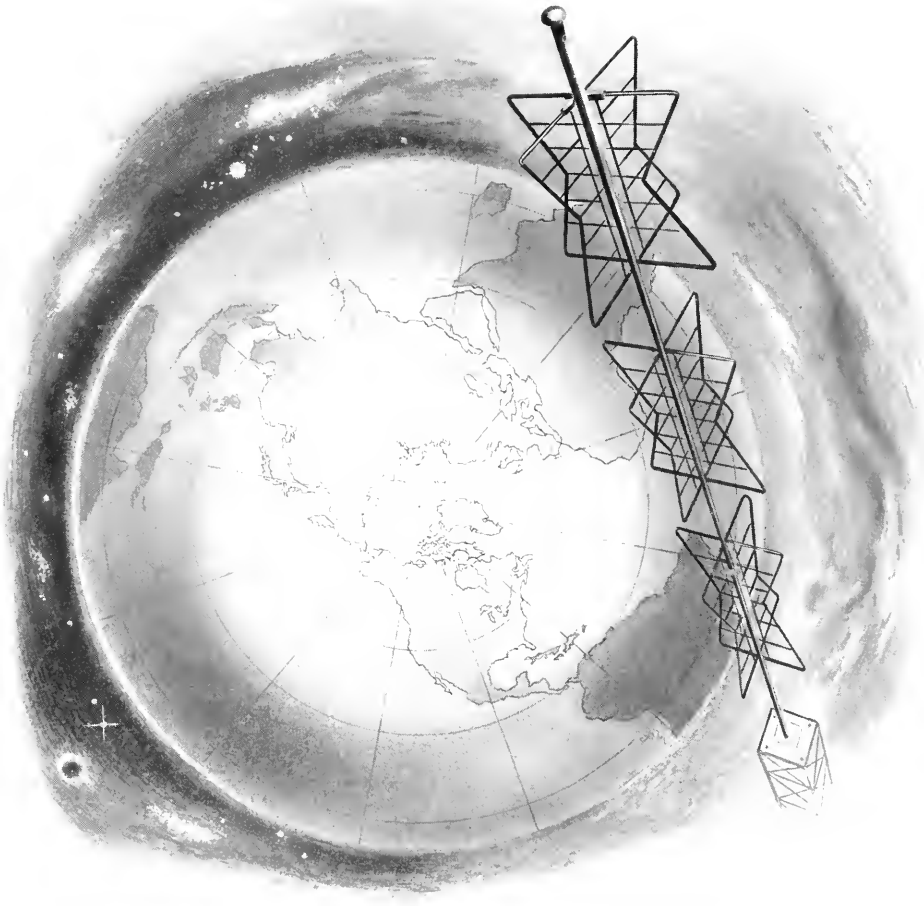

RCA Television Systems *now serve the world!*

TELEVISION TOWERS are rising round the world. They are symbols of a new era in education and understanding. Increasing numbers of RCA equipped TV stations are on the air or planned for early operation in Brazil, Canada, Cuba, Dominican Republic, Italy, Japan, Mexico, The Philippines and Venezuela.

More and more countries plan for video, the great new teacher. A world network of TV stations emerges, tapping the reservoirs of culture, improving markets, creating better understanding.

Abroad, as in the U.S.A., RCA has everything for television . . . from camera tube to antenna, from transmitter to receiver . . . and the service of distributors and companies long versed in the electronic needs of their countries.

Only RCA manufactures everything . . . from TV cameras, through studio and remote facilities which send clear, steady pictures out over the air from RCA transmitters, to the bright, sharp pictures and sound in homes, schools and many other locations.

Your RCA Distributor or company will be glad to offer information on RCA Television; or write to RCA International Division for the booklet, "World Experience" . . . a stimulating review of TV around the world today.

World Leader in Radio
First in Recorded Music
First in Television

RCA INTERNATIONAL DIVISION
RADIO CORPORATION of AMERICA
RCA BUILDING
30 ROCKEFELLER PLAZA, NEW YORK, N.Y., U.S.A.

VOLUME 12 NUMBER 2

Radio Age

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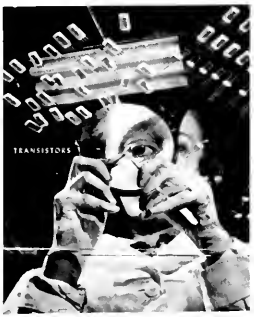
BROADCASTING • TELEVISION

APRIL 1953



COVER

Elements of a junction transistor are so minute that they must be assembled under a magnifying lens. Here are transistors in various stages of completion, as viewed through a glass table.

NOTICE

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CONTENTS

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.

The phanograph record players span more than fifty years af progress. (Left): the latest RCA Victor 3-speed "Victrola" phonagraph; (right) and early spring-wound record player.

Sarnoff Honored By Radio Engineers With First Founders Award

Chairman of RCA Tells Engineers that Radio-Electronics Offers Unlimited Fields for New Developments — He Points to Transistors, Electronic Home Appliances, Business Machines, Tape-Recording of TV Programs, a True Amplifier of Light, and Other New Devices — Industrial Television May Surpass Present Growth of Broadcast Television

BRIG. GENERAL DAVID SARNOFF, Chairman of the Board of the Radio Corporation of America, was honored as the first recipient of the Founders Award of the Institute of Radio Engineers at the annual banquet of the I. R. E. at the Waldorf-Astoria on March 25. He was cited for "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."

Acknowledging the Award, General Sarnoff delivered the main address at the annual dinner of the I. R. E., which was attended by more than 1,000 engineers. He told them that their future in radio, electronics and television is fascinating and promising, and that even their wildest dreams cannot encompass all the possibilities open to them in the years ahead. The fields of conquest in radio-electronics, he declared, are unlimited.

General Sarnoff told the I.R.E. of RCA's development of a much simplified closed-circuit television system, which provides a vidicon camera attachment for a standard home television receiver. The simple attachment, he said, is connected as easily to a television receiver as a record-player and does not affect the normal use of the receiver in any way. With the addition of this camera unit everyone of the 23,000,000 television receivers now in use becomes a potential closed-circuit system for schools, the home and other places.

"Until now," he added, "industrial television has been utilized mainly by larger business and industrial organizations, but the reduction in cost brings it within reach of thousands of small businesses."

General Sarnoff reported that uses are foreseen for closed-circuit TV in hotels, department stores and other business establishments. A visual intercommunication system between offices for checking papers and documents, between office, factory and warehouse, can now be realized economically, he stated, and declared:

"One of the largest fields ahead for the use of closed-circuit television is the home itself. Closed-circuit sound systems are familiar to Americans. We think nothing of voice communication between rooms in the same house, between offices in the same building, between upstairs and downstairs. We are destined, I believe, to become equally familiar with closed-circuit systems of sight transmission.

"When the cost of the camera attachments is sufficiently low to permit their use in the average home they may make the television receiver truly the control

Brig. General David Sarnoff (right) Board Chairman of the Radio Corporation of America, accepts the first Founders Award of the Institute of Radio Engineers from James W. McRae, president of the Institute. The presentation took place at the annual banquet of the I.R.E. on March 25.

Dr. V. K. Zworykin, (right) Vice President and Technical Consultant, RCA Laboratories Division, and staff members, demonstrate simplified closed-circuit television system for the home, using Vidicon camera attached to standard home receiver. Others, left to right, are G. W. Gray, W. S. Pike and L. E. Flory.

center of the home. The snap of a switch will turn the receiver from the broadcast program to view the children asleep in the nursery or at play in the yard, or the cooking on the kitchen range. The housewife will not only hear but see the caller at the door before she opens it."

Praising the engineers and their contributions to national defense, General Sarnoff called them "soldiers of science, defenders of the flag." They too, he said, are in the front line that bulwarks progress and prosperity.

"The future," he declared, "is in your hands and those of the engineers who will follow in your footsteps as we have followed the signposts erected by Marconi, DeForest, Fessenden, Armstrong, Zworykin, DuMont, Farnsworth — and others who have marched to fame in the I. R. E.'s great cavalcade of science and engineering.

"Between now and 1960 — and that is only seven years away — great changes in industry will take place as a result of developments in solid-state electronics. Indeed, the vacuum tube is approaching its 50th anniversary confronted by a mighty competitor — the transistor.

"Present day electronic devices, instruments and systems will be transistorized. This new tool of science will widen the usefulness of electronics. It will spread its applications into many fields which the electron tube has not been able to serve.

"Within these next few years we should not be surprised to see electronic appliances find their way into the home, Air conditioners, using electronics, eliminating motors, blowers and compressors, and therefore noiseless in operation, may lead a mighty procession of household products to new markets."

Industrial electronics offer many opportunities for substantial development and expansion, continued General Sarnoff, saying:

"It will revolutionize many phases of business, especially within large organizations. For example, electronic computers can translate, process, compute, store and print pertinent facts and information. They simplify the task, greatly increase the efficiency and perform the functions of an accounting system with utmost speed and accuracy.

"Electronics will change clerical operations, relieve men of routine and drudgery and effect enormous savings in time, money and materials. The world of business machines is ripe for electronics.

"Electronics can also serve in other directions. It promises new aids to health, safety and better living. There are countless applications for the development of inspection methods to insure the highest purity in liquids, vaccines, drugs and all bottled beverages, including milk. Electronics becomes the foe of impurity and contamination in all bottled, packaged or canned products."

He asserted that thus far the phenomenal growth of broadcast television has overshadowed many other applications which operate over closed-circuit systems,

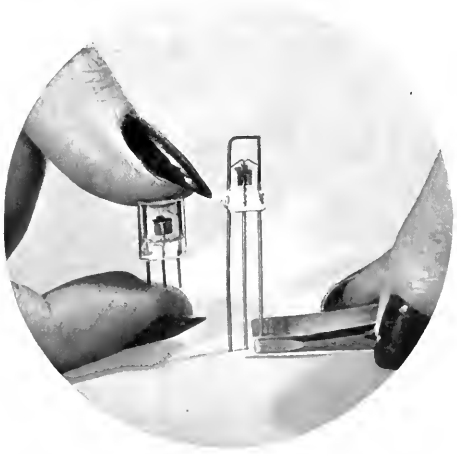
and constitute the growing field of industrial television. He continued:

"Wherever danger, remoteness or discomfort preclude the presence of a human observer, the industrial television camera can take his place. Handling of explosives, pouring of castings, watching the operations of furnaces and remote power sub-stations are examples of television's usefulness to industry.

"As yet only a negligible fraction of the potential of industrial television has been tapped. The major obstacle has been cost. That obstacle is being overcome by light-weight equipment using the vidicon camera tube. The dimensions of industrial television may surpass the growth in broadcast television we are now witnessing.

"Schools, in which television sets are becoming more and more a standard classroom fixture, may employ their TV sets to bring talks and demonstrations to the entire school or to selected classes, without the loss of time or the confusion attendant upon a call to assembly. On college campuses the linking of the lecture halls by television will permit exchange of instruction between departments, adding to the variety and interest of the courses. In biological research and technical education this form of television has proved a valuable tool.

"The availability of a simple closed-circuit system will put the television microscope as a new instrument for instruction within reach of every high school and college in the country."



Point-contact type transistors before and after embedment in plastic housing.

General Sarnoff recalled that in 1951, on the occasion of his 45 years in radio, when the RCA Laboratories at Princeton, N. J., were named "The David Sarnoff Research Center," he had asked for the "three presents" for his fiftieth anniversary in radio in 1956 — the tape recorder, an electronic air-conditioner and a true amplifier of light. Recently, he said that he was given a preview at the RCA Laboratories of some preliminary steps toward these 1956 anniversary presents.

"I was surprised at the demonstration I saw of a television program coming from New York and being simultaneously recorded on tape in the Princeton Laboratories 45 miles away. The recording was played back instantly. The quality of the recorded picture still needs improvement — but even its present performance convinced me that I will have the television tape recorder before the time I specified.

Tape Recordings Will Obsolete Films for TV

"Tape recordings will obsolete the use of film for television and reduce over-all costs. Small degradations which mark the various steps in the production of a film, creating a cumulative effect in the final print, will be eliminated. This new method will revolutionize the entire art. As a simpler and cheaper process, it will extend into color television. And it may extend into the motion picture industry as well.

"As you all know, the recording of sound on magnetic tape already has reached a high degree of perfection. When recorded sound has served its purpose it can be wiped off and the tape used over again. I believe that we now stand on the threshold of the same service for sight."

General Sarnoff said that the second "present" requested of RCA engineers two years ago — the all-electronic air-conditioner — is "still in the embryonic stage, but I saw signs of life!" He declared that the third "present" — the true amplifier of light — is the toughest problem to solve, but added:

"As you know, the present method is first to convert the light into electricity, next to amplify it, and finally to convert the electricity back into light. Most of today's limitations of television are due to this complicated and inefficient method of handling light. I still believe that one of these days we shall learn how to amplify light directly."

Viewing the future, General Sarnoff said:

"I hold to the conviction that if we intelligently accept the challenges that spring from our opportunities, the wonders we have witnessed in the past fifty years will be dwarfed. Indeed, the advances of the next half

(Continued on page 32)

Compatible Color TV Authorization Urged by RCA Before House Committee

Dr. Engstrom of RCA Laboratories Division Says RCA is Prepared to Expedite Production of Receivers for Sale to Public

THE Radio Corporation of America recommended on March 24 that the Federal Communications Commission immediately authorize commercial broadcasts of compatible color television signals and said that it is ready to commence such color broadcasts at once and to expedite the production of color sets for sale to the public.

Dr. Elmer W. Engstrom, Vice President in Charge, RCA Laboratories Division, appearing as the first witness in an investigation of the present status of color television by the House Committee on Interstare and Foreign Commerce, testified that RCA has spent more than $20,000,000 in the development of color television, $5,000,000 in the last year.

"We have the know-how to broadcast color programs, we have the know-how to build the equipment to do the job, and we have the know-how to build the sets that will receive these color programs," Dr. Engstrom said. "In addition, we have a nucleus of trained personnel ready and waiting to do the job."

Dr. Engstrom stated that RCA does not believe that the present FCC standards for incompatible color are satisfactory, because: "First, the more than 22 million black-and-white television receivers now in the hands of the American public, representing an investment by the public of billions of dollars, are 'blind' to incompatible color broadcasts. Second, the present incompatible color standards are, in our opinion, unsatisfactory from a technical engineering, and commercial standpoint for broadcast use.

Dr. Elmer W. Engstrom, vice president in charge, RCA Laboratories Division, appears before the House Committee investigating status of color television.

"We knew from our own experience that the authorization of an incompatible system would be a mistake. Today, we are convinced more than ever that we were correct in our earlier conclusion that the only system which would succeed is a compatible all-electronic system."

In the interests of bringing color television to the American public at the earliest possible date, Dr. Engstrom said, RCA believes that the Commission legally can proceed without the time and expense of formal hearings in this matter. The Commission and its staff, he continued, have been kept advised of the extensive research and development work which has been done on compatible color television by RCA and other members of the National Television System Committee.

Dr. Engstrom said that RCA recommends:

"That the Federal Communications Commission immediately authorize commercial broadcasts of compatible color television signals in addition to the broadcasting of incompatible color television signals it has previously authorized.

"The broadcasting of compatible color television will not interfere in any way with the present service being

House Committee Views Color TV at Princeton and New York

On April 14, members of the House Committee on Interstate and Foreign Commerce visited the David Sarnoff Research Center of RCA at Princeton, N. J., to witness a demonstration of compatible color television. During the afternoon of the same day, the Committee members inspected the NBC color television studio at the Colonial Theatre in New York.

rendered to black-and-white television set owners. Nor will there be any interference with the broadcasting of incompatible color television should any television station wish to broadcast incompatible color signals."

Dr. Engstrom said that RCA is "today prepared to commence broadcasting compatible color programs which can be received in black-and-white on sets now in the hands of the public without changing these sets at all and without any present set owner being required to buy any new equipment to receive these broadcasts.

"We are also prepared to expedite the production of color sets so that those members of the public who want to receive our compatible color broadcasts in color can buy color receivers.

"Given this opportunity to judge for itself the advantages or disadvantages of the compatible and incompatible system of color television, the American public would make the final decision as to which system it prefers. In our opinion, this is the quickest way to bring color television service to the American public."

RCA Strongly in Favor of Color TV

RCA has been, and is today, strongly in favor of color television, Dr. Engstrom said, and is doing everything that it knows how to do to advance color television for the home. RCA has everything to gain, he pointed out, by bringing color television to the American public at the earliest possible date. Dr. Engstrom said that RCA has planned to file a petition with the FCC for the approval of standards for compatible color television within six months or possibly sooner.

He continued:

"RCA engineers are now working with the National Television System Committee to complete field tests of technical signal standards for compatible color television. Rulings of the Federal Communications Commission require that field tests be completed before any petition for new color television standards will be granted by the Commission.

"RCA is already manufacturing prototype compatible color receivers, tri-color tubes and studio equipment. When the Commission approves technical standards for compatible color television, RCA will manufacture and sell this apparatus to the public, to broadcasters and to other manufacturers.

"At the same time, the National Broadcasting Company, Inc., an RCA subsidiary, will commence commercial broadcasts of compatible color television programs and will offer these programs to sponsors and to NBC affiliated stations throughout the United States."

Reporting on RCA's color television preparations in research, engineering, manufacturing, and broadcasting, Dr. Engstrom announced these major achievements:

1. *Tri-Color Camera Tube:* RCA has completed the basic work on a tri-color electron tube for use in a color television camera. This will make it possible at a future time to eliminate the present three-tube camera for compatible color television and to substitute a simple and efficient single-tube color television camera. This relates to the "pick-up" of television programs at the transmitting end and does not involve any question of standards.

2. *Pilot Production:* RCA has invested substantial sums in the establishment of a pilot operation for tri-color tube production in its Lancaster, Pennsylvania, tube factory. This manufacturing unit, which will have a production capacity of 2,000 color tubes per month, can serve as the prototype for other units in the establishment of factory facilities for large-scale, high-speed production.

3. *Color Studios:* NBC has a color studio in Radio City, New York, and has now completed equipping a second television studio for compatible color television. This second color studio occupies the whole of the Colonial Theatre at 62nd Street and Broadway in New York. It is equipped with all new color studio equipment built by the RCA Victor Division.

4. *Trained Personnel:* A special group recruited from the regular NBC staff has devoted its efforts to the development of color television broadcasting. In addition, other NBC personnel have been assigned

(Continued on page 16)

Tricolor kinescope tubes in pilot production at the RCA plant in Lancaster, Penna.

They Keep Communications Moving . . .

On ship and shore, in tropics and in the arctic, hundreds of trouble shooters, trained by RCA, keep the vital wire-and-radio systems of our armed forces in top working condition.

IT'S a small world today because of communications. Korea, 8,500 miles away, is our neighbor, Hawaii can be called on the phone, Greenland is easily available—all of these places and many more are "just around the corner" as long as there are enough engineers to keep our highly complex electronics systems operating.

To see that these circuits are not interrupted is the job of the Government Service Division of the RCA Service Company in carrying out its program of assistance to the U. S. Armed Forces and our Allies the world over. Engineers of the Division, under contract to the Army, Navy and Air Force, are working on more than 400 different types of military electronics equipment.

Although the Government Service Division is only a little over two years old, its nucleus goes back to the time before World War II, when the U. S. Government suddenly discovered that it lacked sufficient numbers of well-qualified technicians to cope with the mass of complex electronic equipments being rushed to our field forces.

When the shooting in Korea began, 50 people were assigned by RCA to Government work. This included office force and field engineers. Today, the Government Service Division employs hundreds of persons.

The objective of the Division, as outlined by Pinckney B. Reed, vice-president in charge, "is to provide the best possible electronics-assistance program to the Armed Forces, to make available trained field engineers backed up by the resources of RCA."

As a result of this long-range planning, RCA is prepared to assist in the five basic electronics needs of the Armed Forces: 1) supplying field engineers; 2) preparing technical publications designed and written by specialists; 3) developing training devices to give effective and rapid instruction in electronics fundamentals and military electronics circuitry; 4) working out training programs for military personnel, streamlined through the experience of fieldmen who work with military leaders and RCA experts; and 5) setting up special projects, which include repair and modification facilities, and unusual and specialized engineering operations.

Since three out of ten field engineers eventually turn up overseas, a man, before he is assigned to this Division, must agree to spend at least one year abroad. After signing up, he is put through a six-week indoctrination course at the home office in Gloucester, N. J.

P. B. Reed (right), vice president in charge of the RCA Government Service Division, and engineer Harold Dick stand beside a roadside sign in Tokyo.

Basically, the men are assigned to install, maintain and repair electronic equipment of all types and to instruct military people in its operation, installation and service. Actually, their contributions are limited only by the vision and initiative of the individual. In combat areas, these engineers share the life of soldiers and sailors. In the world's capitals, they learn the language and become a part of the lives of nationals. The ability to get along with strangers, to become integrated quickly into the life around them is of utmost importance to the personal success of field engineers.

Technicians' Deeds Cited by Military

Home office files are loaded with letters from commanding officers of commendation for "special service" by our field engineers. In these reports are the names of men who have helped to accomplish actual combat missions, a number whose standard equipment includes a carbine.

Captain John Taylor, USN, commander of Destroyer Squadron Six, commended the performance of David Rennie, in these words:

"I have noticed that the usefulness of civilian technicians on independent duty of this sort depends greatly on the initiative of the individual concerned . . . Mr. Rennie has displayed such initiative."

A new method of handling low-frequency transmission in the North Atlantic, suggested originally by John Heffernan, an RCA field engineer, was under intensive examination in 1952. If the initial success continues, Heffernan will have made a really significant contribution to the reliability of military communications in this critical area. The problem is of utmost importance, because of the position this installation holds in the global communications network. Heffernan's idea involved the use of pulse detection, coupled with a particular form of loop antenna. The combination shows promise of overcoming such obstacles as magnetic storms and the type of static caused by ice and snow on antennas.

Field engineer Earl Cowden drew an assignment that took him to the Behring Sea.

An RCA expert in maintaining radio teletype machines and circuits imparts his knowledge to U. S. airmen at an unnamed base.

The first wave of Government Service Division engineers arrived in Korea, in September, 1950. Morris Patneaude, one of the first volunteers for front-line duty, landed at a soggy airstrip almost at the same time as the enemy, then thrusting downward from the north. Technical service was a life-or-death matter. With carbine at hand, he followed the fighting front up and down the peninsula, helping to keep communications open through the terrible Korean winter. For his devotion to duty, RCA gave him the Award of Merit, the Company's highest honor which is presented annually to only 15 out of more than 20,000 employees.

When Patneaude was brought home, he was replaced by Chuck Lane who maintained tradition. When rotation turned up his number, Lane refused to come home because "the job is still going on over here."

George Ross, who came back to the States last fall for a visit, after two years in the Far East, is now back at his Yokohama post. He is group leader, inspector and technical advisor in the radar shop, U. S. Signal Corps Depot. One of his special contributions, commended by Brig. General Hammond, was his research on the SCR-548 radar set, during which he tested the effects of high humidity on the accuracy of information fed to warplane gun directors.

Bill Bjorman, also in the Far East, found his second year "more interesting than the first." According to a letter of commendation, "he went into combat areas . . . In one instance, his work was responsible for establishing a very critically-required communications link in time to fulfill a classified mission."

John Longenecker covered 50,000 miles of the Pacific on his solo job, flying from one island to another as RCA's representative with the 1808th AACS Wing. He spent a year changing continuous wave (air-to-ground) communications to voice. He did the field work, drew up plans, scrounged hard-to-get equipment, and assisted on-the-spot installation.

Reliability is Essential

Because the field engineer is on his own with an important mission to carry out, reliability is essential. The Company carefully screens each applicant for character as well as technical knowledge and skill. Because they must work at all times with a minimum of supervision, one of the big problems is to keep them from feeling cut off from the Company as a whole.

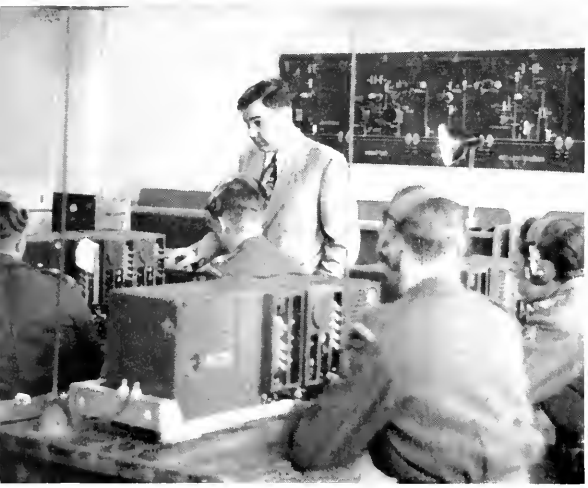
Refresher courses are held periodically for field men. Once a year, managers and supervisors are recalled to the home office for a conference. They meet with vice-president Reed and his staff, consisting of Col. Mike Fried, assistant; Tom Whitney, operations manager; Paul Melroy, contact negotiations manager; Andy Conrad, chief engineer; Lloyd Yoh, contract administrator; Dick Propst, Air Force contract manager; Louis J. Depass, Army and Navy contract manager, and Jim Jackson, technical publications head.

The biggest user of RCA's services is the Air Force. Under contract with the Air Defense Command alone there are more than 150 engineers assigned to bases and radar sites throughout continental U. S. A. Many more are with the Airways and Air Communications Service. The majority are overseas in Alaska, Canal Zone, Korea, Europe, etc., where they are supervising the installation and servicing of radio and teletype communications gear, and navigational aids.

In Europe and North Africa and in this country, the Tactical Air Command is employing RCA field men on navigational aids, air and ground radar equipment. Many are employed by the Strategic Air Command in this country, Puerto Rico and Okinawa.

The Bureau of Ships has more than 100 men at work with the Atlantic and Pacific Fleets, and at bases overseas in the Atlantic area (Mediterranean, Cuba), Japanese areas and Pearl Harbor. These engineers are installing, maintaining and training naval people in shipborne radar, shipborne and ground station communications, loran and sonar.

In this country, men under contract to the Navy are doing project engineering, producing shipyard guidance plans for installation of electronic equipment on board fighting ships.



Technicians of the RCA Government Service Division explain the circuitry and maintenance procedures of radio equipment to Netherlands' soldiers (left) and to members of the Air Defense Network (right).

Thirty-Four Million TV Viewers Watch Award of "Oscars"

For the first time in history, television audiences throughout America and radio listeners in many parts of the world shared the suspense and excitement of the annual "Oscar" awards ceremony of the Academy of Motion Picture Arts and Sciences. On Thursday, March 19, the National Broadcasting Company telecast and broadcast the proceedings which originated alternately in Hollywood and New York. An estimated audience of 34,000,000 televiewers witnessed the two-hour program which was sponsored by the RCA Victor Division.

Sixty-one stations of the NBC television network and 195 NBC radio stations carried the ceremony. NBC fed the Armed Forces Radio Service which beamed the program through 69 foreign stations to American troops stationed throughout the world. The AFRS station at Bremerhaven and stations of its Blue Danube network broadcast the "Oscar" ceremonies behind the Iron Curtain. Other AFRS stations as far north as Point Barrow, Alaska, and as far south as Pago Pago, Samoa, carried NBC's broadcast of the presentations to movieland winners.

Bob Hope, noted comedian, served as master-of-ceremonies for the Hollywood ceremonies. Conrad Nagel, a former president of the Motion Picture Academy, was emcee in New York.

Top honors went to Cecil B. DeMille's "Greatest Show on Earth" which won the "Oscar" for the best picture of 1952. Shirley Booth was named best actress of the year for her first starring screen performance in "Come Back Little Sheba." Gary Cooper was named best actor for his leading role in Stanley Kramer's "High Noon." Actor John Wayne accepted the award for Cooper.

Television added glamour to this year's Academy award presentations. NBC-TV cameras, manned by cameramen dressed formally in dinner jackets, captured scenes of the arrival of limousines at the RKO Pantages Theatre in Hollywood, and the capacity audience there and in the International Theatre in New York. Other NBC-TV cameras caught the faces of the winners as they walked from their seats to the stage to accept their "Oscars." NBC provided glimpses of the backstage rooms at the Pantages where members of the press interviewed the winners.

Robert Welch, an NBC-TV producer, was in charge of network coverage of the 25th Annual Awards ceremony. Richard Clemmer produced the first telecast of the New York "Oscar" ceremonies in history. William Bennington was TV director in Hollywood, Warren Jacober in New York.

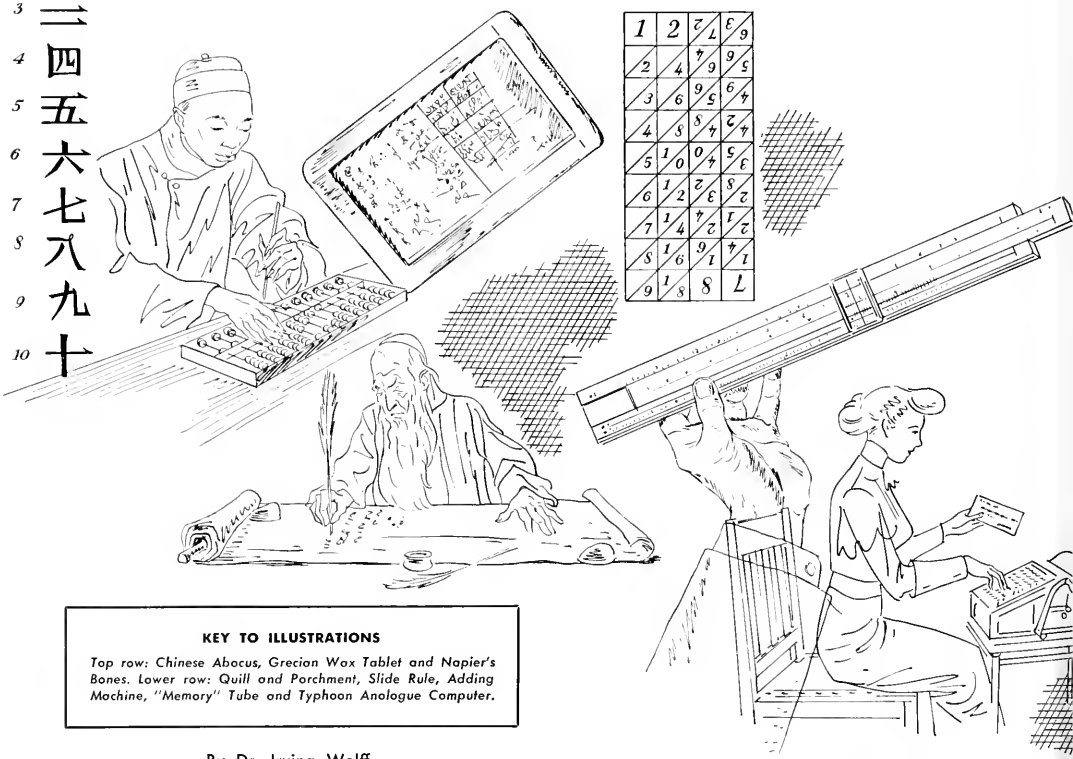
All but two of this year's "Oscar" winners were in Hollywood. In New York, Shirley Booth hurried from the Empire Theatre where she is starring in a Broadway play entitled "The Time of the Cuckoo" in time to receive her "Oscar" from Fredric March. Miss Booth's brief word of thanks to "old friends for faith, new friends for hope and everyone for their charity" brought more than a few tears to TV audiences and to the audiences seated in the theatre. Boris Vermont won the other New York bestowed award for producing the year's best one-reel short subject, "Light In The Window."

John Ford, who was in England, won his sixth award for best director, this year for Argosy-Republic's "The Quiet Man." Gloria Grahame earned the "Oscar" as best supporting actress for her part in "The Bad and The Beautiful." Anthony Quinn won the award as best supporting actor for his part in "Viva Zapata!"

"Forbidden Games," a French picture released in the U. S. by Times Film Corporation, won the award as best foreign language film of the year.

Film star Shirley Booth receives "Oscar" from Fredric March as "best actress of the year," in ceremonies telecast and broadcast coast to coast by NBC under the sponsorship of RCA Victor Division.

Electronics' Next Era



KEY TO ILLUSTRATIONS

Top row: Chinese Abacus, Grecian Wax Tablet and Napier's Bones. Lower row: Quill and Parchment, Slide Rule, Adding Machine, "Memory" Tube and Typhoon Analogue Computer.

By Dr. Irving Wolff,

Director of Research,
RCA Laboratories Division,

THE transistor and some of its companions in non-vacuum devices appear to have arrived at the right time to make practical some dreams which have been developing and gathering headway since shortly before World War II. I am referring to what might popularly be called a super-electronic brain.

The predecessor of today's electronic computer was first the abacus and later the office mechanical calculating machine which performed some simple arithmetic processes such as addition and multiplication. This was followed in succession by Vannevar Bush's mechanical calculator at the Massachusetts Institute of Technology which could solve some simple problems in calculus and, later, the early electronic computers using vacuum tubes which could solve the same type of problems more rapidly. Meanwhile, the number of vacuum tubes in each of these devices grew from one or two to a total of thousands. Special buildings were required to house these computers and air-conditioning systems were needed to take away the waste heat power of their tubes.

Our general concepts of the functions performed and the method of operation of these machines was becoming much better organized. We began to realize that the ability to store information (memory) was an important function of the electronic computer. We realized the analogy between the operation of the electronic machines and our thought processes. Some ma-

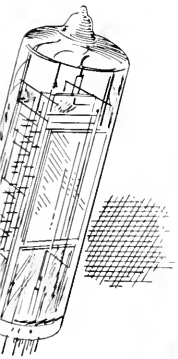
chines have been built which can start in ignorance and can learn by trial and error, a method of learning which is used by many animals. We could see how to make the electronic machines many-fold more useful but the thought of putting in and maintaining the thousands of vacuum tubes required seemed fantastic. The advent of the magnetic and ferro-electric switches and memories and the development of the transistor have now changed our concepts of what is practical. We can foresee the time when we will not be staggered by the thought of a million or more electronic amplifiers or switches in a single machine. A recent test showed that the power consumption taken by the so-called counters in one machine could be reduced by a factor of 30 — from 18,000 watts to 600 watts — by the substitution of early experimental transistors for tubes. This is only a start compared to what we will be able to accomplish within a few years.

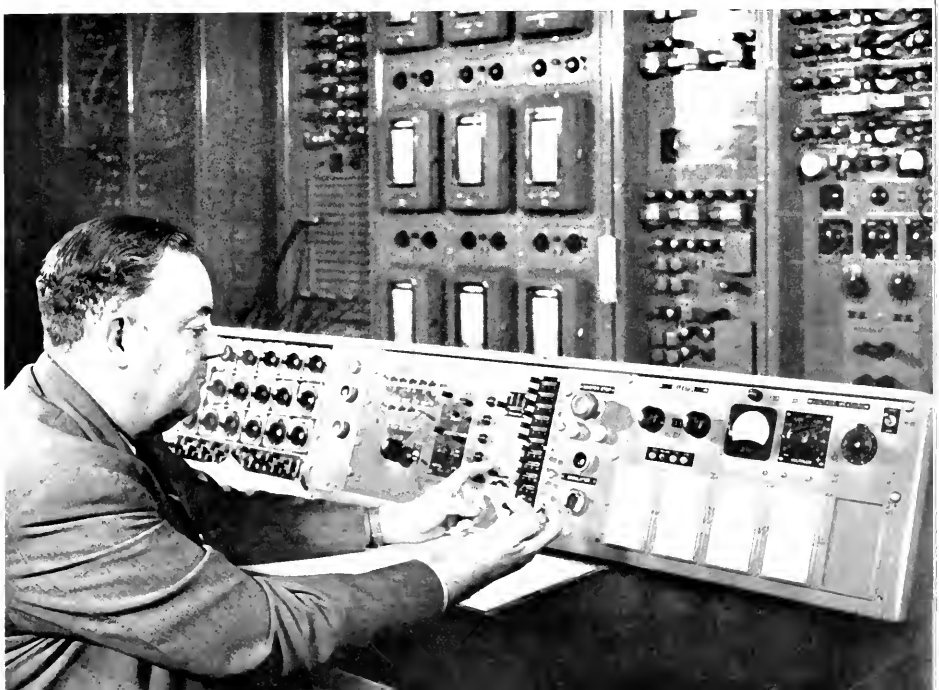
What does this all mean in terms of the services that can be rendered by electronic computer equipment? At this time we probably see only a little of what is ahead. One thing is, however, apparent. We will be able to design equipment of enormously greater complexity than any that, up to now, has been considered practical.

I don't believe that the full impact of what the electronic brain will mean to our civilization is generally realized. On the one hand it will act as a labor-saving machine in many business activities which use relatively unskilled clerical labor; on the other it will provide the individual with enormously greater mental power. Just as a large scoop shovel gives the individual power to move tons of earth with the touch of a few controls — something which would have taken days to do by hand — so the electronic computer will permit the solution of problems in a few days which the individual would not have been able to solve during his lifetime.

For one hundred years or more we have been going through what has been called the industrial revolution. This has involved mainly the substitution of machines for manual labor in the production area. We have just scratched the surface in the substitution of machines for people in the mental and clerical areas of industry. We can foresee that the new electronic computers will cause just as great a change in locations where large numbers of clerical workers are used, as the development of machines caused in the manual labor field. They can, for example, be used for automatic inventory control, cost accounting and billing. Presently, a system is actually under construction for the Ordinance De-

(Continued on page 31)





RCA Executives Promoted to New Positions

L. W Teegarden

Election of L. W. Teegarden as Executive Vice President of the Radio Corporation of America, was announced on February 19 by Frank M. Folsom, President.

Mr. Teegarden, a pioneer merchandiser, has been active in the electrical and electronics industries for many years. Prior to assuming his new post, Mr. Teegarden was Vice President in Charge of Technical Products of the RCA Victor Division.

Since joining RCA in 1930, as a District Sales Manager, Mr. Teegarden has held increasingly responsible positions on behalf of RCA Victor activities.

Six years later Mr. Teegarden was named Assistant General Sales Manager of all RCA Victor product activities. He was appointed General Manager of the Tube Department in 1944, and a year later was named Vice President in charge of this Department.

Mr. Teegarden's responsibilities were increased in 1949 to include, in addition to his other activities, supervision of RCA Victor Engineering Products Department, which has since established new sales records under his direction.

Mr. Teegarden is a native of Salem, Ohio, and now resides with his wife and two children in Berwyn, Pa., a suburb of Philadelphia.

Edward M. Tuft was elected Vice President in Charge of Personnel (including labor relations) of the Radio Corporation of America on March 5. In his new position, Mr. Tuft will be the general administrator of RCA's over-all personnel activities and organization development as well as labor relations.

Mr. Tuft has been Vice President in Charge of Organization and Development of the RCA Victor Division since July, 1951, coordinating activities concerned with developing manpower. He served previously for four years as Director of Personnel of that Division and as a Vice President from October 1950.

Mr. Tuft joined the RCA Tube Department in 1930 as an inspector. He rose through various promotions to Manager of Personnel at the Harrison, N. J., plant in 1941 where he remained until his transfer to the RCA Victor Division six years later. He studied industrial relations at Princeton University and is a Member of the American Management Association.

Edward M. Tuft

Thompson H. Mitchell

Thompson H. Mitchell was elected President of RCA Communications, Inc., on April 1. Mr. Mitchell, Executive Vice President of RCA Communications since 1944, succeeds H. C. Ingles who has retired.

Mr. Mitchell, a graduate of the United States Naval Academy at Annapolis (Class of '25), entered the communications field in 1927. He worked for two years in the Pacific Sales Division and Engineering Department of RCA Communications, and in 1929 became District Manager for the Radiomarine Corporation of America in Los Angeles.

He returned to the United States in 1935 to become Manager of the Southern California District Offices of RCA Communications. He continued in that position until 1942, when he accepted a commission of Major in the U. S. Army and was assigned to the Office of the Chief Signal Officer. In March, 1943, he was promoted to Lieutenant Colonel in Charge of the Traffic Operational Engineering Section of the Army Communications Service, Washington, D. C. Subsequently, he was promoted to Colonel, a rank he now holds in the Army Reserve.

Mr. Mitchell rejoined RCA Communications in 1944 as General Manager and soon after was elected Executive Vice President.

NBC's Film Division:

what it is—how it operates

By Robert W. Sarnoff

Vice President in Charge of Film Division, National Broadcasting Company

A closely-knit activity which has expanded so rapidly that to many outsiders it must have appeared to be Topsylike in its growth, the Film Division of the NBC Television network is now functioning as the third principal operating division of the company. The other major operating units are the Networks Division, which includes radio and TV networks, and the Stations Division, embracing the five radio and five television stations owned and operated by NBC.

This expansion of the Film Division has been accomplished in the relatively short period of 10 months since it was established in June, 1952. On March 3 of this year it was set up as a self-contained operation by NBC's president, Frank White. Under this new arrangement, we hope to make the Division a centralized source of film services to the network, to the owned-and-operated stations, to our affiliates, and to other enterprises which may want our help.

Currently the Film Division functions with four major departments: sales production, film-and-kinescope operations (which includes the development of our vast film library), and the procurement of films for showing on the network as well as on our owned-and-operated stations.

The department heads report to Carl Stanton, director of the Film Division, a recently created position. Stanton was formerly manager of TV network programs for NBC. His task will now be to operate the Film Division and to shoulder much of the increasing administrative burden, so that more time can be devoted to the all-important job of long-range planning by the vice-president in charge of the Division.

The growing sales force, managed by John B. Cron, now has offices in New York, Chicago and Los Angeles —and will open additional offices as markets and stations increase. Among the major film series which are currently offered for sale to local stations and local sponsors all over the world (Canada, Cuba, Mexico and Italy are already included) are "Douglas Fairbanks Presents," "Hopalong Cassidy," "The Lilli Palmer Show," "Dangerous Assignment," and a daily and weekly film-news summary.

Some of the 15,000,000 feet of motion picture film stored in NBC's Film Library.

Film Features for Local Sponsors

Such outstanding NBC network TV series as "Victory at Sea," and "The Doctor" (under the new title of "The Visitor") will soon be offered for local sponsorship in line with our belief that a popular film program should remain available to the general public and to new television stations as they go on the air.

In other words, through reissue, these programs will penetrate to millions of homes which may not have been reached on the first run. Fine network programs are a source for syndication after their initial broadcasts.

One of the advantages we can now offer local sponsors and stations when we sell an NBC Film program is a complete, professional and streamlined advertising-promotion-merchandising-publicity-exploitation campaign to go with the program.

The production department, under Stanton Osgood, manager, is responsible for supervising the production of film series—such as "Douglas Fairbanks Presents"—made especially for the NBC Film Division. It is also responsible for the re-editing of programs similar to "The Doctor," and the production of special film shows from footage now in the growing NBC film library. We may be able to develop everything from quiz shows to weather, sports and special holiday services to local stations.

Film and Kinescope Operations and Services, originally part of the television network, is managed by Frank Lepore within the new Film Division sphere of operations. This department handles the shipment of kinescopes of NBC network programs to our affiliates and to our owned-and-operated stations, as well as the shipping of our film programs which are syndicated on a local basis. This has now become one of the largest film exchanges in the country, and we hope to expand this phase of our activities to include a shipping service for other film distributors.

More than 2,000 Subjects in Library

We expect also to expand the scope of the business done by the film library, now one of the largest of its kind in the world. In fireproof vaults at 105 East 106th Street, New York, are row on row of metal containers holding in excess of 15,000,000 feet of film. More than 2,000 subjects are covered and catalogued so effectively that the most abstruse topic can be located in a matter of minutes.

With new film arriving at a weekly rate of about 55,000 feet (principally from the various NBC-TV news programs), we expect to make the film library a valuable source of film material for operations inside and outside of NBC.

Another important aspect of our work involves the procurement of films — features and shorter subjects — as a service to the network, to our owned-and-operated stations, to our affiliates, and to any other potential customers. David Savage, formerly manager of the WCBS-TV Film Department in New York, now heads Film Procurement for us. Last year, though not a part of the Film Division, this operation provided more than 600 films and short subjects for network programming and WNBT, New York.

As a result of the establishment of the Film Division as a separate operating unit of the company, a business office has been created. Managed by Robert Anderson, formerly of the NBC comptroller's office, the Film Division business office handles all budgeting, accounting, billing, pricing and office management.

It is much too early to foretell the future pattern of the television broadcasting industry. Only time and experience will indicate the relationships of film and live programming. Our present objective is to develop the Film Division on a sound business basis with a strong organization and with enough flexibility to meet the challenges ahead. We expect not only to be a part of the future pattern but perhaps to have some influence in establishing it.

Readying a film program for air express delivery by NBC to its west coast television affiliate.

Compatible Color TV

(Continued from page 7)

to color on a limited basis in order that the personnel with experience in this field would be increased. RCA Victor Division has developed a nucleus of trained operators, supervisors, and engineers for a tri-color tube mass production unit.

5. *Field Testing:* During 1952, RCA and NBC carried on field testing of color receivers, exhaustive tests devoted to compatibility, and other technical phases of the compatible color system.

6. *Experimental Broadcasts:* Since 1949, NBC has been conducting experimental color broadcasts over its stations in Washington and New York. During that time, compatible color television signals have been on the air almost 2,000 hours.

7. *Color Receivers:* Since the introduction of our early color television receivers models, RCA has constantly refined and improved color receiver design. Current RCA color television receiver models contain less than one-half the number of tubes required by our early laboratory model receivers.

Dr. Engstrom pointed out that NBC's experimental work provides practical solutions to the new problems which the broadcaster faces in color. The NBC experience, he said, is also valuable as an aid in formulating plans to produce commercial programs on a regular basis.

A Teleprompter user, reading his speech as it unrolls before him, is able to make his delivery sound extemporaneous. At left: An operator in the wings, working from an identical typewritten version of the text, adjusts the speed of the Teleprompter to the vocal speed of the speaker.

Teleprompter Aids the Orator

By E. C. Buurma
Sales Manager, Teleprompter Service, RCA Service Co., Inc.

THROUGH the use of Teleprompter service, established by the RCA Service Company and now available to public speakers in all parts of the United States, persons addressing business meetings, conventions and public gatherings no longer need worry about forgetting their lines. This new service now offered through the district offices of the Service Company in New York and Philadelphia, will soon be extended to other major cities. In addition to its service, RCA supplies Teleprompter equipment on a rental or lease basis. Already, one hotel, the Statler in New York, has arranged to make the Teleprompter available for banquets, sales gatherings and other groups using its public rooms.

Although the Teleprompter has been in use for less than two years, it has won high praise in both television and motion picture fields.

The Teleprompter service begins with the receipt by the Service Company of a typewritten copy of the speech. The text is then copied on a continuous roll of specially designed, glare-proof paper by an electric typewriter called the "Videotyper." This typewriter prints in large-size, clear, black letters which may normally be read from a distance of 25 feet. A half-hour speech can be prepared on the Videotyper in less than two hours.

After the typed speech has been carefully checked by experienced proofreaders, the paper roll is inserted into the Teleprompter script machine. An operator sits at a master control unit out of sight of the audience, and, with a duplicate script before him, can easily regulate the speed of the speaker's machine to conform with his speed of delivery. If the speaker adds comments not in the text or is interrupted by applause, the operator merely halts the movement of the script. When the lecturer returns to the printed speech, the paper begins again to move.

Use of more than one Teleprompter is sometimes required when it is desirable for the speaker to move about while demonstrating products and using charts or other visual aids as may be used at sales meetings, training courses or conventions. In such cases, the RCA Service Company is equipped to install as many as

(Continued on page 32)

SIZE OF SCRIPT

Electronic Action in Solids

By H. W. Leverenz

RCA Laboratories Division
Princeton, N. J.

THE German word for monument is Denkmal, that is, a reminder to think. In the thought-provoking sense, this article is a monument to electrons, with special emphasis on the innumerable environments in which they can exist and exhibit useful activity.

Electrons, the star performers in electronics, are obtained and generally used in combination with other particles. It is these other particles that make possible so many varieties of electron behavior. Fundamentally, then, there is a strong dependence of electronics on chemistry.

It is well known that electrons are negatively charged and are intrinsically identical. Relief from this monotonous condition is provided by the presence of positively charged protons which attract electrons monogamously, one electron wedded to each proton. A simple pairing-off would provide only hydrogen atoms, however, and so it is fortunate that protons can cling, with neutrons, as stable groups to form nuclei or cores of atoms. The known nuclei contain from one to 98 protons, and up to 146 neutrons.

Electrons cluster around nuclei and neutralize the positive charges of the nucleus. The nucleus-plus-electrons arrangements afford 98 species of atoms, ranging from one electron (hydrogen) to 98 electrons (californium). About ninety of these atomic species occur in nature and they are the usual chemical elements. The others have been synthesized by "atomic-energy" techniques. They are particularly radioactive, that is, their nuclei disintegrate spontaneously within a relatively short time.

There are noticeable differences of electron behavior in the various atoms. The behavior differences occur because a lone electron is bound (attracted) more securely to a nucleus with many protons than to one with fewer protons. Likewise, an electron interacts (mostly by replusion) with other electrons, and the interaction varies for different numbers of electrons in the atom. The number of distinguishable electron environments in the 98 different atoms is 4851. That is, there are 4851 different energy levels, or strengths of bonding, of the electrons in the 98 kinds of atoms.

It is impressive that from essentially two elementary charged particles, the electron and proton, and one neutral particle, the neutron, there may be obtained 98 different atoms. It is even more impressive that the atoms can combine with each other to form millions of compounds, and the compounds can unite to form countless materials. Electrons behave differently in the multifarious compounds and materials, where they are influenced by numerous unlike atoms and ions.

There is practical allure in the potentialities of an infinite number of materials and electron behaviors. There is also a challenge to determine, (1) all the kinds of electron activity, (2) the best material for a given activity, and (3) the best techniques for producing and using a given material, alone, or in combination with others. Research in this field should always be interesting, because the possibility of finding new and greatly intensified electronic effects is ever present.

Three Kinds of Electron Activity

A somewhat similar challenge occurs in games. Different kinds of human activity, such as running, jumping, and throwing, have been used alone and in combination for different games. Recognition of the best performer, or group of performers, for a particular game is a matter of record. New games and new records are always possible.

Three of the known kinds of electron activity have been particularly useful in electronics. They are:

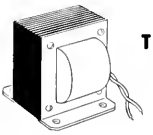
1. Orientation of the axis of the electron's spin.
2. Excitation of an electron (to a higher energy level) with subsequent emission of light.
3. Motion of an electron carrying charge and energy.

The first two activities are chiefly by electrons that are bound in a particular atom, or group of atoms. The third activity is by electrons that are freed from their parent atoms. These electron activities, with a representative solid for each, are outlined in the table.

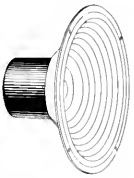
Of the listed kinds of electronically active solids, all may be used, and many are indispensable, in an electronic system such as television. For example, the camera tube needs a photoconductor or photoemitter to transform light images into freed charge-carrying electrons. Free electrons are multiplied in number with secondary emitters, which emit several secondary electrons for each incident electron. In the receiver, amplification and detection are done with semiconductors and

1 ELECTRON REMAINS BOUND TO, OR NEAR, PARENT ATOM

A **FERROMAGNETIC SOLIDS** (Orientation of Spin)

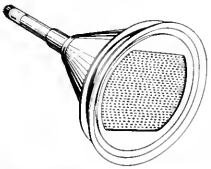


TRANSFORMER CORES
Non-Permanent (Soft)



RADIO AND TV LOUDSPEAKER CORES
Permanent (Hard)

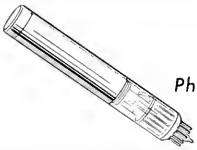
B **LUMINESCENT SOLIDS** (Excitation and Photon Emission)



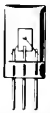
DOT-SCREEN TUBE FOR COLOR TV
Spontaneous Emission

RADAR SCREEN
Non-Spontaneous Emission

2 ELECTRON LEAVES PARENT ATOM TO MOVE THROUGH CRYSTAL
Carrying a Charge



VIDICON
Photoconductors



TRANSISTOR
Semiconductors

3 ELECTRON LEAVES PARENT ATOM, MOVES THROUGH CRYSTAL, AND EMERGES INTO SPACE
Carrying Charge and Energy

PHOTOTUBES
Photoemitters

CATHODES OF ELECTRON TUBES
Thermionic Emitters

MULTIPLIER TUBES
Secondary Emitters

Pictarial representation af the three known kinds of electron activity and their corresponding practical applicatians.

vacuum tubes (which need thermionic emitters). From the thermionic-emitter cathode of the kinescope, or picture tube, there is produced a beam of free electrons. This beam is modulated and then deflected in a scanning pattern by deflection coils cored with a "soft" ferromagnetic solid, and driven by circuits with similarly cored transformers. The electrons in the beam are accelerated and expend their energy in a coating of a luminescent solid where the original visible image is reproduced. Simultaneously, the sound is reproduced by a loudspeaker using a "hard" ferromagnetic solid.

A similar account can be given of the vital role of electronically active solids in radio, radar, electron microscopes, fluorescent lamps, high-speed computers, and many other modern devices. Frequently, the solid is custom-made for the particular use. The number of useful solids, therefore, is much larger than the few listed in the table.

Inorganic Materials Most Fruitful

The best solids for the uses outlined in the table are inorganic and crystalline. Inorganic materials have been most fruitful because they may be made with all kinds of atoms, they have many degrees and combinations of ionic and non-ionic bonding, and they are relatively stable. Most of the useful materials are made by solid-state reactions at temperatures above 1,000° C. When these materials are cooled for use at room temperature, their chemical and physical stabilities are excellent. A few organic materials have been used, as in scintillation counters, but their performances and stabilities are generally unfavorable.

These solids must usually be in crystal form because particle motion, with minimum loss of energy, is easier through a crystal than through a non-crystal, for the same reason that it is easier to travel through an orchard than through a forest.

Controlled purity is necessary, also, because foreign atoms in the path of a particle may deflect the particle, or dissipate some or all of its energy as heat. Foreign atoms may also liberate or trap electrons to give spurious electronic characteristics. Harmful impurities, therefore, must be assiduously eliminated from ingredients, and excluded during reaction and crystallization. In some solids, as little as 0.00001 per cent of certain impurities markedly affects their electronic characteristics. Purification is then required just as it is necessary to clear a calculating machine before use.

There are beneficial impurities, as well as harmful ones. Foreign atoms, when controlled in kind and proportion, can be very useful in some host crystals. In luminescent solids, such perturbing atoms can produce, for example, (1) activator centers wherein localized excitation and photon emission occur, (2) trapping centers that can detain electrons, for later release, in temporary storage of energy and information, and (3) sensitizer centers that can convert certain radiations into useful excitation energy that is transmitted to activator centers. In semiconductors, for example, foreign atoms can function as donors (convenient sources) of electrons, or as acceptors (traps) that take electrons from their host-crystal neighbors. A host-crystal atom that is so deprived is the site of a positive hole, because it lacks one electron charge. A positive hole can move by borrowing an electron from another host-crystal atom, which then becomes the site of the new positive hole, and the positive hole may continue to move by repeating the borrowing process along a line of atoms.

An intimate subatomic description has been used here, because it emphasizes the fundamental nature of research on electronically active solids. The unit processes are quantum phenomena of common interest to the various scientists involved. Some of the major sciences represented in this teamwork are: chemistry, crystallography, physics, ceramics, metallurgy, physical optics, and electronics. Major subdivisions of these sciences are also well represented. Important branches of chemistry, for example, are: synthetic inorganic chemistry, crystal chemistry, physical chemistry, kinetics, and analytical chemistry.

Sciences Benefit by Cooperation

There is mutual benefit in the cooperation of the different sciences. Chemical, optical, and electronic behavior, for example, depend strongly on the environments of the outlying loosely bound electrons of atoms in a solid. A scientist in one of these fields is, accordingly, encouraged to become more familiar with the others and thereby increase his knowledge and capability.

Research on electronically active solids is now mostly divergent. Creative effort is devoted to synthesizing new solids, as well as to analyzing the constitution and behaviors of old ones. This is characteristic of a young and vigorous enterprise.

Within the past few decades, some of the solids have become sizable production items. The production, which is usually done by electronics companies themselves, exceeds 2,000 tons a year of ferromagnetic spinels (ferrospinels), and 1,000 tons a year of luminescent solids (phosphors). It is reasonable to expect that chemical activities of electronics organizations will expand. Their unique research efforts should continue to provide new products for their own industry, and useful by-products (such as hyper-pure substances) for other industries as well.

Going Abroad?

This article was prepared by the RCA International Division for the guidance of staff members assigned to foreign posts. Although directed specifically to Division employees, the sage advice applies equally well to any American living or traveling abroad.

You are going abroad—perhaps for a few weeks, maybe for years. You are going not as a representative of business in general, but of our company, RCA, and of our country, the U.S.A.

How shall you behave? And how shall we advise you to behave? Shall we assume that you are perfect? If we were all people of culture and tolerance, there would be no courts of law, no crime, no wars, no mistakes.

Shall we assume you are *human,* like all the rest of us, subject to heat and cold, errors of commission and omission?

You are going abroad not primarily as an ambassador, a liaison worker, a goodwill agent—although you will be all of these. You are going as a business man. There is nothing wrong with business. In fact, that is why we are all *in* business—in the U.S.A. and in all the countries you will visit. Many of the people you will visit have a business ancestry going back thousands of years. If you have any reservations about business, its dignity and necessity, its services and its rewards—you had better drop the whole idea of your trip right now.

Business Is A Wonderful Thing

Let's get it straight: There is a lot of talk from the Communists about what they like to call the capitalist system. The Communists don't like to call it by its right name: The *private enterprise incentive system,* with opportunity for everyone. More than anything else, it is an *opportunity* for *growth,* the development of *your talent.* The Communist talk is double talk. Business is a wonderful institution. Everywhere you go, people will respect you if you feel that way about it. You don't have to shout business day and night to believe in it. The important thing is your training for it; how *you feel* about it.

For RCA, we want you to feel proud. You already do. Feel prouder when you go abroad.

Our reputation abroad is excellent. It has been won by character: That of our products; our conduct; our dealings with our customers and our friends. Ours is not the *legend* of leadership, but the *actuality.* We have a reputation all over the world for leadership. It is the fruit of wise management. It signifies quality. RCA is dedicated to the principle: Service with integrity. We have built upon firm foundations—our research and manufacturing experience in the U.S.A. We have chosen distributors of immense prestige and great stability. They enjoy the highest respect of their communities. The same is true of our own RCA associate companies.

We have organized manufacturing, distribution and service overseas with one thing in mind: *Our good name.* That sums up our service, whether it is to the home with a radio or TV receiver; records or Victrola* phonograph; or to the television station with a complete system; or to the government with the vision to plan ahead with microwave communications systems, or to take 16mm projectors into its villages to teach its people how to grow more from the land.

Our radio or TV set, the Victrola* phonograph, the record, the TV station, the microwave communications system, the 16mm projector has not been made or shipped or sold on a *price* basis only. It is fairly priced. It may cost a little more originally than its competitors. In the long run, we believe, it will cost much less. It incorporates engineering and research on which you could not put a price. It is extremely well made. It is one of the best values in the field. It will perform under the toughest of conditions. It will give years of perfect service. It will make its owner proud—of RCA.

So what shall you take with you when you go abroad for RCA?

You will have been advised about exchange, clothes, food, hotels, housing, education for children and the many other aspects of working outside of the U.S.A.

We are concerned here with your *attitude:* what

*Victrola is a registered trade mark of the Radio Corporation of America.

Pack understanding qualities. They're good everywhere.

you take in your mind and heart. If you could pack only two things, take with you tolerance and friendliness. Leave behind all intolerance and suspicion.

You have read of mistakes made by our fellow countrymen. We are never judged by the *best* of us, but by the *worst* of us. Let's see what Mark Twain wrote in "Innocents Abroad" in 1875.

"We were troubled a little at dinner today by the conduct of an American, who talked very loudly and coarsely, and laughed boisterously where all others were so quiet and well behaved. He ordered wine with a royal flourish, and said: 'I never dine without wine, sir' (which was a pitiful falsehood), and looked around upon the company to bask in the admiration he expected to find in their faces. All these airs in a land where they would as soon expect to leave the soup out of the bill of fare as the wine!—in a land where wine is nearly as common among all ranks as water! This fellow said: 'I am a free-born sovereign, sir, an American, sir, and I want everybody to know it!' He did not mention that he was a lineal descendant of Balaam's ass; but everybody knew that without his telling it."

We Learn From Canucks

But we are not alone. Here is an excerpt from an editorial from *MacLean's,* the widely read Canadian magazine. The editorial by Lionel Shapiro is called: "When the Canucks Hit Europe Again."

. . . "Every French person of my acquaintance, without exception, has his or her 'American story' to relate . . . mostly of an inexplicably arrogant attitude—and it is related with all the more bitterness because Parisians have lived with the problem since 1944.

"At the moment this is an American problem because American troops are the only ones to be seen in Paris in any numbers. But it will soon become a Canadian problem, too. Before the end of the year Canada will have almost fifteen thousand uniformed men in Europe and there is no reason to believe they will prove any more immune than their American comrades to the traditional behavior forms of the soldier away from home.

"In 1944 and 1945 the Canadians were equally unpopular in Brussels and, after the fighting, in Amsterdam. Many of them were rowdy, thoughtless, overbearing and in some cases, criminally cruel. Many of them behaved as they would never *dare* or *dream* of behaving at home.

"At that period there was some excuse for battle-weary men. Today there are no such excuses. And today the consequences of bad feelings between the North American serviceman and the European civilian can be far greater than they were in 1945. The solidarity of the Western world, which is essential to its survival, cannot be guaranteed by treaties alone. Its real guarantee —and that guarantee does not as yet exist—is the understanding of continent for continent, the *tolerance* of nation for nation, the *respect* of man for man.

"In combating rowdyism the first task for the Canadians, *while they are training in Canada,* is to weed out the potential trouble-makers and to leave them at home. This is not an insuperable requirement. Within a few weeks of the beginning of training every company commander knows the two or three chronic trouble-makers in his outfit.

"The problem of arrogance is not so easily tackled. In the soldier it usually stems from ignorance of the country where he is stationed and from a mistaken conception of the mission in which he is engaged. On both points, trouble can be avoided if the soldier is properly indoctrinated *before he is dispatched overseas.*

Welcome Guest—Not Necessary Evil

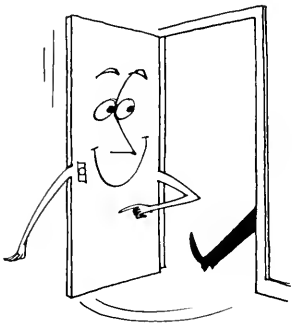
"It is the rare and exceptional soldier who is aware of the truth: That the defense of his country depends on the defense of Western Europe, that if anyone is

"It can't turn her head to have several servants."

being imposed upon in this common effort it is the Western European who finds himself sitting in the first line of the defense of North America.

"This point of indoctrination must be hammered home to the young Canadian destined for European duty. If he understands this thoroughly it will make the difference in his attitude between *arrogance* and an *easy tolerance*. It will make him a *welcome guest* in Western Europe and not a *necessary evil*. He will have a better time on his tour of duty; he will learn more; and he will return a better citizen, *a more enlightened man*."

That's straightforward talk. Any soldier in any uniform can profit by it. So can the man in mufti.



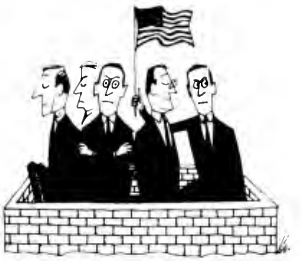
"Keep doors open. Be wanted back."

Times have changed; and they keep changing. Social and political upheavals of vast significance have changed whole countries. But good manners *never* change.

Going abroad requires a truly international outlook, today more than ever. No matter what your personal convictions may be on religion or politics, or education, for example, you must cultivate an *understanding* point of view, toward the situations you will encounter. By all means, lead your own spiritual life, according to your conscience. If any missionary work is to be done, let it come from *good example*.

You will have studied the countries you are going to visit, their political history, their racial strains, their culture. Keep up these studies. There are social customs in Asia or Africa that you may not find in Latin America or Europe. Some of these customs you adopt. Others you do not. This does not set you apart. It may indicate your *respect* for a local tradition.

National customs vary but the basic pattern of our



"Flag waving is a bore and a sin."

behavior does not. Here are navigating beacons for any traveler:

Be polite: The first commandment. We, in the U.S.A., often have a casual attitude toward many of the gracious little ways of life. Abroad these ways are part of life; sometimes formalized; always important. Be courteous—and *mean* it.

Be tolerant: Of religion, social and economic custom.

Be informed: On history, politics, racial heritage, literature, cultural achievements.

Be friendly: To all you contact. Don't be a Sir Walter Raleigh—and save your cloak only for *queens*. Be friendly to *people*, not *position*.

Be business-like: That's what you are there for—business.

Be thorough: Finish the job.

Be a listner: Keep your ears and eyes open; you'll learn more. Don't talk *too much*. Samson killed a lot of Philistines with a jawbone of an ass. The jawbone of an ass is *still* a lethal weapon. Many friends, many business contracts have been killed by it.

Be healthy: Have a hobby.

Be sensible: Your wife is more important to your success than she thinks. The frustrations and worries of life abroad will weigh more on her than on you. She must be prepared for *devotion* of an extraordinary nature. The subject of family life, of social adjustments abroad, is a book in itself. Your wife did the housework back in the States, as most American women do. In foreign countries, she may have a cook, a laundress, a maid; maybe a nurse; perhaps a chauffeur and a gardner. That's part of the set-up. She must succeed in not letting these *luxuries* (to an American—commonplace to the people of the country) turn her head.

And don't let *anything* turn yours, either.

Be patient: This country you're in was doing things that "old fashioned" way when Daniel Boone was shooting his way West. And maybe it's not such an *"old fashioned"* way at that!

Be international: Don't "gang up" with your American friends all the time. Make friends within the country, among its people. Don't *clique* up at the "American Colony." In some places the "Colony" is just that—too *insulated.*

Be loyal: And give *credit* when and where it is due.

Be circumspect: Remember a fountain pen can be filled with poison as well as ink. Don't write boomerang letters back to your company, home town, or college paper.

Learn the language: Make the effort. We like to hear our foreign friends speak English. Their language will help you in hundreds of ways. *Your wife should learn it, too.* It will help her to cope with *many* problems.

We have records that teach some languages. The best way to learn to speak a language is by *sound.* Have a friend come in for breakfast regularly—and have him *speak* to you in the language—and then translate it into English. Everyday phrases—news of the day. In the office, have your secretary speak to you all morning in the language of the country. Make the effort. You'll make a big hit.

Be hopeful: Things will get you down, harass your family. Have faith—*and* work with *optimism* and intelligence.

Be a good American: This is a *constant* navigating beacon! Be a good American. North American, that is. You are, in a sense, representing the U.S.A. as well as RCA. To have a little *humility* is better than to "invent" everything—like the Russians.

Be polite: That's the last commandment as well as the first. Remember all the kind things *your family* taught you—and do them. The Spanish have this saying: "No quita lo cortés a lo valiente." Courtesy in no way detracts from valor. If you are ever in doubt as to what to do—do the *kind* thing.

Using these navigating beacons you can be, not a robot, but thoroughly an individual, developing your own personality, living a life of satisfaction. This is a pattern of *growth.*

Whether you are to remain in a country for a few weeks or a few years, remember that when you leave, the RCA distributor or the RCA company will benefit from the reputation you have made or will bear the burden of your conduct. You go, but your imprint—your reputation—will stay.

The goodwill that surrounds the name of RCA will manifest itself to you wherever you go. Put an RCA monogram in your buttonhole—and be careful. Your pride may do things to you.

Airline pilots and hostesses will tell you about RCA transmitters or portable radios they operate; a stranger will introduce himself to you as a theatre man—it will develop he has a big chain of cines in his country—RCA equipped. You will meet *wonderful people* in many professions and walks of life who know our recorded music, our radio or TV sets, our broadcasting equipment, our sound film recorders or reproducers, our electron microscopes, TV transmitters, our diversity receivers, our microwave and VHF radio relay systems —spanning their country, speeding their communications.

These are our customers—high on the list of our most *valuable resources.* Theirs will be a pride of ownership, a sense of belonging to a family with *dignity* and *meaning.*

Our company has the great good fortune to serve the *individual,* the *industry,* the *government.* We cross the lives of people and the lifelines of nations. Our products are instruments of culture and attainment; of social and economic distinction. As new nations emerge and old nations face new problems, we are helping them on *all fronts*—economic, cultural, ideological—with our products and services.

We have a fine name, certainly. And people everywhere expect the finest of us—of our *products* and our *men.* Doors will open to you because you represent RCA. Remember that when great courtesies are bestowed on you, as they will be. You represent a symbol of success. *You can make it greater.*

We cannot sit back and let our name alone carry us. We must go to all nations, study their needs, learn how to utilize their many great talents, find the best way to be of service.

The better you represent RCA, the more *honor* you bestow on it and on *yourself.*

Rear view and mirrored front view of RCA Personal radio receiver showing newly developed long-life "A" and "B" batteries in position. In foreground is a "B" battery with case opened to show stacks of alkaline cells.

Long-Life Batteries Give Greater Playing Capacity to Personal Radio Sets

MORE than a million dollars and three years of engineering research preceded the development of the revolutionary new alkaline "B" radio battery now being marketed by the Tube Department of RCA Victor Division. The new battery is nearly 25 per cent smaller than present comparable types, yet offers double "personal radio" playing capacity for the modern radio set designed around it.

The 67½-volt "B" battery, specifically designed for use in personal portable radios, is the first radio dry battery to utilize the alkaline-cell principle which heretofore had been applied successfully only to wet-type, non-portable batteries.

The alkaline principle makes possible a more efficient utilization of the cell's active materials. Accordingly, it is possible to reduce the size of both cell and battery.

The "crown type" cell employed in the new battery is a compact, self-contained unit which delivers more useful energy per unit of volume than do conventional types of cells. The cell resembles two shallow soda bottle caps placed near together, and measures only 0.9 inch in diameter and 0.23 inch high.

Sandwiched between the two "bottle caps," within a protective plastic ring, are the positive electrode can, the positive and negative electrodes, and the electrolyte pad. One cap serves as the positive terminal; the other, the negative.

To take full advantage of the new alkaline battery's longer playing life, the conventional 1½-volt "A" battery was redesigned to make possible balanced-life operation with the new "B" battery in a "personal" portable. RCA's new "A" battery is approximately twice the length of the popular "sealed-in-steel" type, but has a life capacity nearly four times greater. In a

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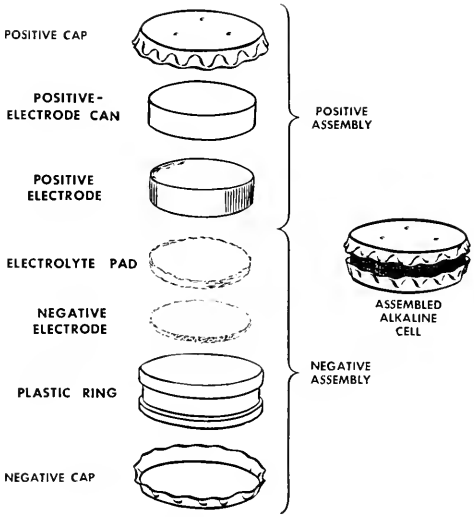


Sketches showing elements of RCA's long-life alkaline cells which provide double playing capacity for radio receivers designed around them.

Robert E. Sherwood

Thomas W. Phipps

NBC Signs Two Noted Playwrights To Lift Quality of TV Programs

Robert E. Sherwood, Pulitzer Prize Winner, and Thomas W. Phipps, Film and Magazine Writer, Commissioned to Create One-Hour Dramas for Network.

By Charles C. Barry

Vice President in Charge of Programs
National Broadcasting Co., Inc.

As radio did a quarter century or more ago and the movies before that, television looked to its sister forms of entertainment to provide it with talent to fill its program schedules.

The stars of radio, movies and stage became the stars of television. Bob Hope came over from movies and radio; Dennis Day brought his talents, developed by radio, to the new medium; Jimmy Durante transformed his energetic sketches of radio, stage and night clubs to the requirements of television.

At the same time, television brought in the relatively new and untried artists and developed them as stars. Thus came Sid Caesar, Burr Tillstrom, Wally Cox and a host of others who found their artistic stature in the new medium. This process continues constantly; artists playing bit parts today are tomorrow's stars.

We have found that this same twofold growth would be applicable in other creative aspects of programming for television. Contracts negotiated recently by the National Broadcasting Company with Robert E. Sherwood, Pulitzer Prize winner, and Thomas W. Phipps, dramatist, demonstrating how this is so in the vastly important but often underestimated field of writing.

NBC contracted with Mr. Sherwood for him to write nine original one-hour plays over a five-year period. The distinguished playwright and author, winner of three Pulitzer prizes for drama and one for biography was accorded complete freedom and independence in the selection of his subject matter and treatment of his story.

In announcing the successful negotiations for Mr. Sherwood's services on the air, NBC's president expressed his pride in welcoming to the network's creative staff one of America's most successful and honored writers. "It is a significant milestone in the progress of television," he said, "when a man of Mr. Sherwood's stature in the theatre and in contemporary writing brings his talents to us. This is another of NBC's steps for continually elevating the quality of American radio and television. It is my hope this will have a constructive influence in attracting other prominent authors to these fields."

It is our concept at NBC to intrigue as many of the great minds of other mediums of entertainment as

(Continued on page 30)

Maedel Elected Head of RCA Institutes

Election of George F. Maedel as President of RCA Institutes, Inc., was announced on March 2 by Brig. General David Sarnoff, Chairman of the Board of Radio Corporation of America. Mr. Maedel, Vice President and General Superintendent of RCA's technical school since 1948, succeeds Major General George L. Van Deusen, (USA, Ret.), who retired on March 1. General Van Deusen, Commandant of the Eastern Signal Corps Training Center during World War II, served as head of the Institutes since October, 1947.

Mr. Maedel joined RCA Institutes in 1933 as the first instructor of the Mathematics Department. He was transferred to the Radio Frequency Department in 1936 and four years later was appointed Chief Instructor. In 1944, Mr. Maedel became Assistant Superintendent and in 1947 was appointed the Superintendent of the Institutes. During the following year, he was elected Vice President and General Superintendent.

A native of Brooklyn, N. Y., Mr. Maedel attended Columbia University where he received an A.B. degree in 1924 and an E.E. degree in 1926. He is a licensed professional engineer in New York State and is the author of two text books on mathematics which are in use at RCA Institutes.

George F. Maedel

Since 1950 Mr. Maedel has served two terms as President of the New York State Association of Private Vocational Schools. He was Vice President of the Association from 1945, when it was formed, until his election as President. Prior to joining RCA Institutes, he was associated with the New York Telephone Company as a Traffic Engineer and served as an instructor in mathematics at the evening classes of Pratt Institute in Brooklyn.

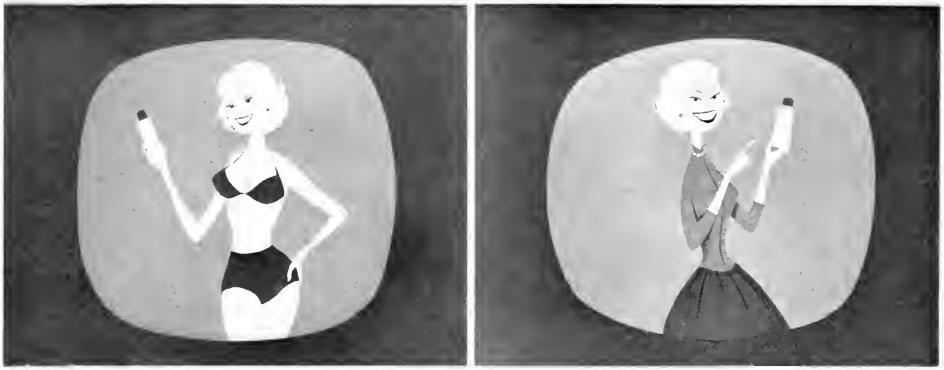
New Blast-Proof Microphone

A new highly sensitive and directive microphone that is smaller and less obtrusive than existing designs and for that reason well suited to the needs of television, radio and film studios was described before the recent I. R. E. Convention, in a paper prepared by Dr. Harry F. Olson, John Preston and John C. Bleazey of the David Sarnoff Research Center of Princeton, N. J.

The new device is called a uniaxial microphone because it is most sensitive to sounds arriving along the axis of the instrument, the RCA engineers explained.

In addition to its improved directional characteristics, this microphone, the engineers stated, incorporates a blast-proof vibrating system capable of withstanding sound shocks from guns, pistols and small explosions.

Architect's drowing of new facade to be constructed on the Bloomington, Ill., plant of RCA Victor Division. Production lines will occupy the first floor; offices obove.



This bathing suit saleslady was far less effective than her conservatively clad sister, selling the same product.

What is YOUR *Taste in TV Commercials?*

NBC Launches Project to Study Effectiveness of Program Advertising for Benefit of Sponsors

To the average American who watches television, the commercials are accepted as part of the program. Those which depict bright little cartoon characters performing household tasks with ease and abandon evoke chuckles of appreciation. The more prosaic types capture attention in direct ratio to their informative nature.

It is these very commercials which have provided the financial backing that has put American TV so far in the forefront of video throughout the world. These sales messages from the advertisers sponsoring TV programs have been proved to be among the most potent methods of selling products to the American public.

As such they occupy the time and attention of vast numbers of highly skilled people in the advertising field. A sizable industry is devoted to the production of commercials alone. There are literally hundreds of people of diverse talents engaged in making the finished products that appear on the home TV screen for anywhere from 10 seconds to a full minute. And each of these people is vitally concerned in making sure that the commercial which the public sees will sell the product.

These commercials, professionally done, and inserted into a popular TV show, should ensure the advertiser a large sales return. Yet it has become apparent in the past several years that such is not always the case. John K. Herbert, vice president in Charge of Networks for the National Broadcasting Company, recently stated:

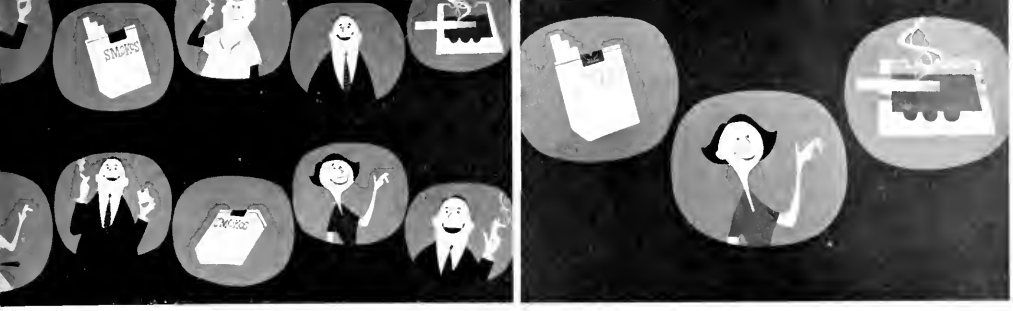
"Our research into sales effectiveness shows wide difference in what television advertisers are getting for their money. We found, for example, that two advertisers were reaching the same number of people at about the same cost. Yet one advertiser was getting eight times as many extra customers as his competitor.

"We at NBC have been concentrating on building great shows. Obviously, that's the most important job we can do for advertisers. However, it appears that, in many cases, improving the commercial may actually produce tremendous sales returns."

Testing Service Inaugurated

With this in mind, NBC authorized a research project by the Schwerin Research Corporation to determine "How to Increase the Effectiveness of Television Commercials." The results of that survey have been made public, and on the strength of those findings, NBC has announced an unprecedented commercial testing service for all its advertisers.

Mr. Herbert in announcing the results of the study



When 10 scenes followed one another rapidly during a commercial, the effect on the viewer was only one third that of the simplified presentation at the right.

and the plans for the testing service, explained:

"NBC's publication of the report and its new service are both designed to help advertisers win even greater returns from their television campaigns. These unique contributions underline our belief that the network has a continuing responsibility to the users of the medium."

The new NBC Commercial Testing Service is available to all network advertisers on a non-profit, cost basis. NBC is making its studios available at specified times for the rehearsal and shooting of rough commercials. These films, unlike the product seen on the air, need not meet finished production standards. Simple sets, a minimum of props and performers, and limited camera work can serve the purpose. The primary objective is merely to determine the relative superiority of various techniques, so that the commercial which will eventually appear on the air will stand a greater chance of selling more goods.

After these rough commercials are made, they are shown to test audiences by the Schwerin Corporation, to determine how well the sales points get across to the public. This audience reaction method is the same as that used in conducting the initial survey mentioned above.

The conclusions of that study, "How to Increase the Effectiveness of Television Commercials," were based on audience reactions to approximately 2,000 different TV commercials for several hundred different nationally-advertised products. The purpose was to discover what sales points in each commercial were best remembered and why they were remembered. Immediately after seeing programs in which the commercials had been inserted, viewers were asked to write down the brand name of the product advertised and everything about it they remembered having seen or heard in the commercial. At a later point, they were asked whether they believed certain key claims made in the commercial.

The information thus gained was analyzed and refined into five basic principles—signposts to more effective TV commercials. Stated simply, they are:

1. Correlate the spoken claim with the visual action
2. Demonstrate the product
3. Keep the commercial simple
4. Use the proper "presenter" for the product
5. Keep the setting authentic

The importance of Point One was emphasized in comparing audience reaction to two similar commercials. In commercial "A" the announcer stood beside

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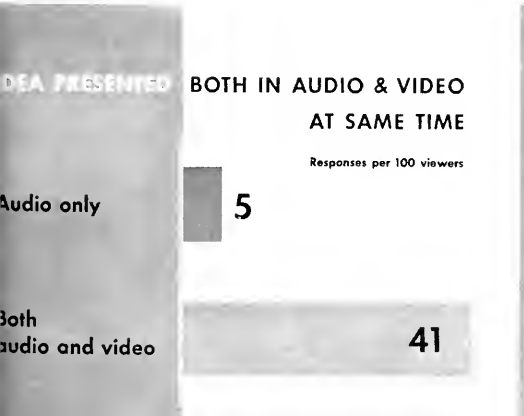
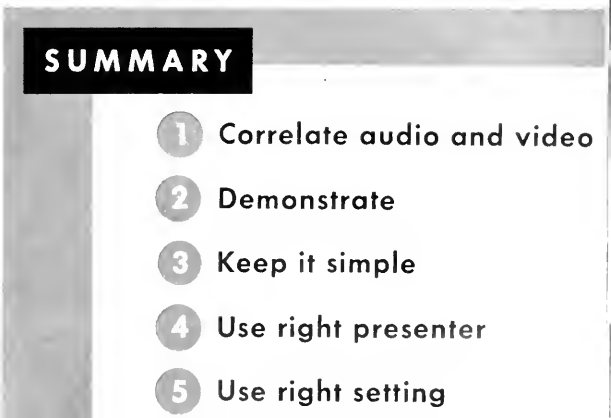




NBC Signs Two Playwrights for TV Programs

(Continued from page 26)

possible. We know that a playwright such as Mr. Sherwood who has given so much to the theatre and to the motion pictures can do the same for television. The audience he can reach by this electronic means is so much more vast than any visual system heretofore available to him. It would be a great loss to that audience if a man of his calibre did not lend his talents to their enjoyment and intellectual stimulation. When a man like Mr. Sherwood joins us, we know we have reached an artistic maturity which deserves the talents of the best that can be borrowed from the other, older show-business mediums.

It would be shortsighted, however, if we relied alone on our ability to lure the proven talent of other mediums to television. For a time this might suffice, but in the end artistic atrophy would set in and we would find ourselves flapping helplessly on the muddy bottom of a drying pool. We must grow from within, and grow quickly and vigorously, for the other entertainment forms are dwarfed by the vastness and the hunger for creative ideas that characterize television.

Essentially a Product of Television

An indication of our recognition of this vital truth as it relates to writers is contained in the arrangements worked out with Mr. Phipps. Although he previously had established a considerable reputation with his work for leading magazines and for motion pictures, he is essentially a product of television. He came to it with his plays several years ago when television's audience was small by comparison and the rewards of writers were on a like scale. Soon his original one-hour dramas were being seen regularly on the "Robert Montgomery Presents" and "Television Playhouse" programs and he came to be identified as one of television's most prolific and successful authors. We recognized that stature and asked Mr. Phipps to sign a contract calling for him to write twelve original hour-long dramas for network use within the space of a year. His plays will continue to be seen on the programs which already have shown his work, but now they will have the added significance of being evidence of our intention to give ever greater recognition to writers in television.

It is perhaps unfortunate that writers cannot be developed like television tubes. In the scientific end of our business, the inventors and technicians can work in their laboratories until they are sure they have the fully matured mechanisms for transmitting the action and the words of the television stage. Their frustrations are known only to themselves until they are at last ready with a new, perfected wonder of science.

Not so with writers. Their work must be exposed to public view and then the verdict is rendered for them by the viewers. A producer can think he has something good, a cast can learn the lines and the movements of the play and deliver them with great spirit, but they can never be sure, never take for granted the public's acceptance and approval of what they are offering. A writer must do his work in the crucible of public gaze.

We are happy, then, to be able to underwrite the efforts of a writer such as Mr. Phipps — and to look for others who have grown up with the medium — in order to assure our own future. For this is the age of television, and in the final analysis television must have its own artistic and scientific technicians, discovered within the medium, given the chance to develop their skills, and encouraged to make this new art form something of which we can be proud.

Long-Life Batteries

(Continued from page 25)

"personal" receiver, two of these batteries will balance the life of the new alkaline "B" battery.

RCA Victor engineers have improved the design of personal portable radios, so that models such as the 2B400, employing the balanced-life combination of one alkaline "B" and two redesigned "A" batteries, will play up to ten times longer without battery change than was heretofore possible with small portable receivers.

The physical shape of the "crown type" cell makes for simplicity and compactness in constructing the multiple-cell stacks around which batteries are built. The stacks are held in place in a paper tube. The metal outside shell is crimped over a hard fiber insulator which, in turn, puts pressure on the cell stacks. A small jumper strip makes the connection between the stacks.

The number of cell stacks that go into a battery depend upon its electrical requirements. In the RCA alkaline "B" battery, two stacks of these exclusive "crown type" cells are combined to provide the correct voltage output.

After manufacture of the individual cells, each cell is placed in storage for a short time to allow it to become stabilized and to expose any potentially weak cells. After storage, each cell is rested, and acceptable ones are assembled into batteries which, in turn, are tested and aged for several days. Following this aging period, the completed batteries are again tested.

Electronics' Next Era

(Continued from page 13)

partment of the Army to provide complete stock control at one of their large bases. Large insurance companies and utilities are making analyses of the cost savings which may be obtained by electronizing some of their clerical operations.

We can expect, however, that the greatest change in our way of life will result from the tool which the electronic computer gives us to extend our mental power.

I will illustrate this first with a rather simple, straight-forward example.

Computer for Weather Prediction

At the Institute for Advanced Study in Princeton, N. J., a computer using several thousand vacuum tubes has been built for the express purpose of giving us improved weather prediction. The physical laws underlying the flow of weather are, we think, reasonably well known. The problem of assembling the data required to accurately compute the weather in advance and making the computations is, however, so stupendous that, using ordinary computer methods, the weather would be long past before the calculations could be made. In addition, we must be able to check the laws we assume hold against the actual performance in order to increase the accuracy of our predictions. This requires many trial computations, each one of which would be terrifically involved.

The electronic weather computer solves both problems for us. (1) It enables us to make the difficult calculations we could not make otherwise, and (2) it permits us to make sufficient checks of performance against hypothesis to enable us to develop the hypothesis which gives the correct results.

As a concluding item, I will try to illustrate more completely what I mean by using another example.

Let us suppose that we want a machine to predict continuously the future price of some farm commodity. Such a machine might be useful to some government agency whose function it would be to stabilize the price of the commodity. We can assume that the price at some future date is completely predictable with sufficient knowledge of the factors which determine price and the laws governing the interactions between them. Among other variables which must be introduced are certainly the supply of the commodity, factors which determine future supply, such as weather, planting, labor market, etc., the present and projected demand, including government operations, and other more subtle factors which determine price, such as the economic condition and mass psychology of buyers and sellers and the reaction of price changes on them, and last but not least, the eventual effect of the existence of the machine, which is doing the price predicting, on the price of the commodity. I assume that the laws governing the interactions of the factors which are introduced will not be too well known when the machine is put in operation and that some rather wild guesses as to their characteristics will at first have to be made.

However, with any given input the computation will be made in a matter of seconds so that an enormous number of hypotheses can be introduced in a reasonable time, and the several predictions can be compared with the actual price to determine with fair rapidity which hypothesis gives the most accurate result. The electronic computer thus makes possible the same interplay between theory and experiment which has been so successful in determining the laws of natural science. In due course we would expect to develop a number of general mathematical laws which could be built on as the method is extended to more complicated problems in economics. You will note that the example I have chosen is a particularly simple one in that the correct experimental result is expressed by a single number — namely, the actual price at a particular time.

Problems are Similar

The analogy between the economic problem which has just been discussed and the weather-prediction problem is strikingly close. In both cases we must assemble at considerable expense and effort large amounts of data to put into the computation. In both cases the relations between the various data which have been gathered are complicated, and involved mathematical calculations are required in order to solve the problem. In both cases, given sufficiently accurate primary data and knowing the laws which govern the phenomena, the desired result is certainly predictable and it is easy to compare the predicted result against the actual happening. The two problems differ in that the physical laws underlying the phenomena in the weather-prediction problem are reasonably well known while the laws underlying human behavior are still to be ascertained.

If an electronic computer using vacuum tubes can solve the weather-prediction problem, it is not unreasonable to hope that the vastly more erudite machine using the new products of our solid-state research will be able to solve the more complicated problems of the social sciences.

What is YOUR *Taste in TV Commercials?*

(Continued from page 29)

the product, a household appliance, and spoke of a special feature. Only five out of every 100 viewers remembered that feature. In commercial "B" the same announcer, standing beside the same product, told the same story and pointed to the special feature as he spoke of it. Out of every 100 viewers, 41 of them recalled the feature in this commercial, proof of the impact of having picture and sound tell the same story simultaneously.

The efficacy of product demonstration was proven in reactions to commercials wherein a kitchen cleanser was actually shown in use; in another where a model washed her hair with a shampoo which produced more suds than that used by another model, and in still a third where a side of meat was shown being trimmed away to get down to the choicest portion, which went into a package. In all cases, these demonstrations evoked greater remembrance among viewers than commercials which did not demonstrate.

Simplicity as a virtue in commercials was illustrated in a comparison of two cigarette commercials. The first had all the elements of a major production. Within a period of 60 seconds, it introduced no less than 10 scenes. First an announcer praised the product, then the product was shown, next an athlete gave a testimonial, a second announcer appeared, the product was shown in use, another testimonial was given, etc. This expensive commercial drew only 13 responses from 100 viewers. Simplification to three basic elements—a picture of the product with an unseen announcer's voice, a testimonial by a housewife, and a final closeup of the product—won remembrance from 32 out of 100 viewers.

The use of a proper "presenter" was shown when a pretty girl made the same product speech, fully clothed, in one version and wearing a pin-up type of costume in another. The revelation of her physical charms proved such a distracting element in the latter that only 2 out of 100 viewers remembered the product. In more conservative attire, she won the attention of 13 out of 100 viewers for the product.

The examples cited here are but a few of the thousands which bore out these five basic tenets of constructing an effective television commercial, one that will sell goods. The entire survey, and the new NBC Commercial Testing Service which it fostered are further evidence of the painstaking effort devoted by the network toward giving its customers, the advertisers, fullest value for the money invested in NBC programs.

Sarnoff Honored by I.R.E.

(Continued from page 5)

century will make those of our generation pale into insignificance. Our great hope for continued advance stems from the fact that the sum total of our knowledge of science and nature is but a drop in the ocean of knowledge that spreads to the far distant shores of the future.

"All of you, as engineers, have a right to take special pride in the fact that America, supremely the land of Liberty, is also supremely the land of science. This is no accident, my friends, but a matter of cause and effect. Freedom is the oxygen without which science cannot breathe. At their best, at their most creative, science and engineering are attributes of liberty—noble expressions of man's God-given right to investigate and explore the universe without fear of social or political or religious reprisals.

"Without freedom there can be no genuine research, which is the uninhibited pursuit of truth no matter where it may lead. In the final analysis science is a search for the truth about the natural laws governing the universe. The task of engineering is to translate those findings into products and services to enrich man's life. The role of radio engineers in this dynamic enterprise has been great. It is destined to be even greater."

Teleprompter Aids Orator

(Continued from page 17)

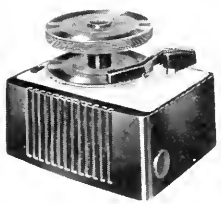
four units to keep the individual within reading range of his script. All machines are electronically synchronized so that each brings into view the same portion of the script at the same time.

The RCA Service Company also has available a Teleprompter concealed within a speaker's rostrum. This unit includes warning lights which flash when the speaker is ten, five, three minutes and one minute from the end of his address. Two clocks mounted on the rostrum indicate the time of day and the minutes of speaking time which have elapsed. With these aids, a speaker is able accurately to judge the speed of his delivery.

The RCA Service Plan for public speakers is highly flexible and can be tailor-made for different requirements. The Teleprompter permits a person to relax and to devote all his attention toward getting the subject across to an audience. It eliminates the tedious chore of memorizing speeches, avoids omitting important points and reduces rehearsal time to a minimum. The Teleprompter can make anyone a better speaker.

Developed by RCA Victor, the new "45 Extended Play" record gives music lovers more music for less money plus a perfect medium for playing shorter classical works and multiple popular selections.

Twice as much music on the same size record



Compact RCA Victor "45" player—first system where record and player were designed for one another. With RCA Victor "45 EP's," it plays up to 16 minutes per record, and the "breaks" come only where the composer planned them.

Another RCA achievement in electronics:

A challenging question was asked RCA engineers and scientists in 1951. How can we increase the playing time of a 7-inch "45" record, *without using a larger disc?*

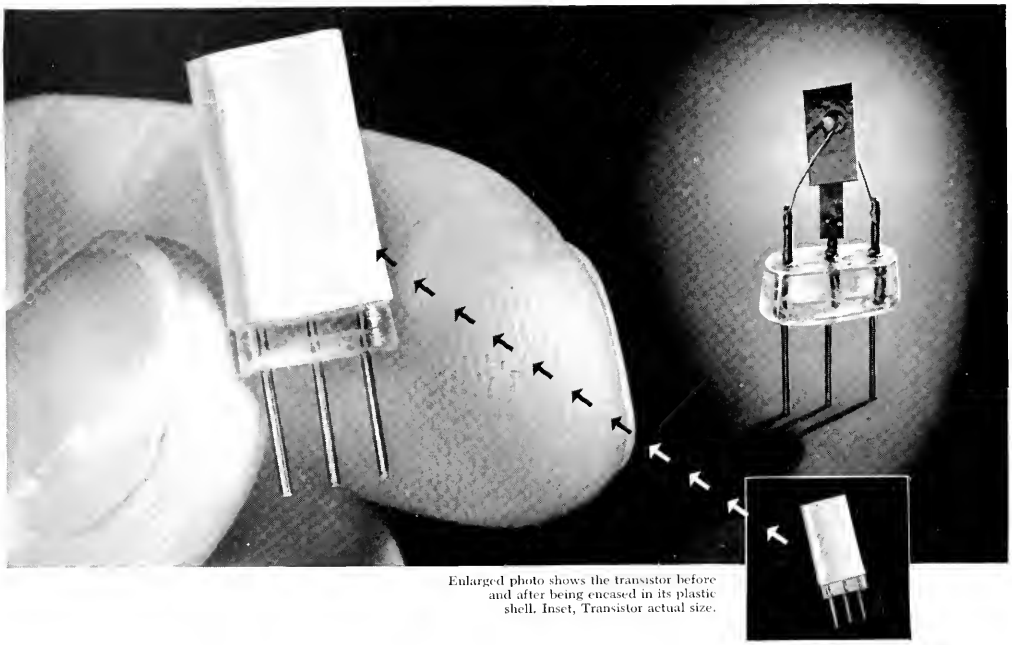
Sixteen months of research gave the answer, "45 EP"—Extended Play. Public response confirmed this as *the most important achievement in the new recording speeds.* More than 2 million RCA Victor "45 EP" records were bought in the first four months of their existence!

Research leadership—your guide to better value: the ability of RCA Victor to solve the problem of more music on a "45 Extended Play" record accents the importance of research *to you.* Whether you plan to buy television, radio or any other electronic instrument, research leadership adds more value to all products and services trademarked RCA or RCA Victor.

Secret of "45 Extended Play" is RCA Victor's discovery of a new way to cut a master disc with an electrically heated stylus. Grooves are closer. Sound quality is cleaner, clearer, more alive.

RCA® RADIO CORPORATION OF AMERICA

World leader in radio—first in television



Enlarged photo shows the transistor before and after being encased in its plastic shell. Inset, Transistor actual size.

Increasingly you hear of a new electronic device—*the transistor.* Because of growing interest, RCA—a pioneer in transistor development for practical use in electronics—answers some basic questions:

Q: *What is a transistor?*

A: The transistor consists of a particle of the metal germanium imbedded in a plastic shell about the size of a kernel of corn. It controls electrons in solids in much the same way that the electron tube handles electrons in a vacuum. But transistors are not interchangeable with tubes in the sense that a tube can be removed from a radio or television set and a transistor substituted. New circuits as well as new components are needed.

Q: *What is germanium?*

A: Germanium is a metal midway between gold and platinum in cost, but a penny or two will buy the amount needed for one transistor. Germanium is one of the basic elements found in coal and certain ores. When painstakingly prepared, it has unusual electrical characteristics which enable a transistor to detect, amplify and oscillate as does an electron tube.

Q: *What are the advantages of transistors in electronic instruments?*

A: They have no heated filament, require no warm-up, and use little power. They are rugged, shock-resistant and unaffected by dampness. They have long life. These qualities offer great opportunities for the miniaturization, simplification, and refinement of many types of electronic equipment.

Q: *What is the present status of transistors?*

A: There are a number of types, most still in development. RCA has demonstrated to 200 electronics firms—plus Armed Forces representatives—how transistors could be used in many different applications.

Q: *How widely will the transistor be used in the future?*

A: To indicate the range of future applications, RCA scientists have demonstrated *experimental* transistorized amplifiers, phonographs, radio receivers (AM, FM, and automobile), tiny transmitters, electronic computers and a number of television circuits. Because of its physical characteristics, the transistors qualify for use in lightweight, portable instruments.

* * *

RCA scientists, research men and engineers, aided by increased laboratory facilities, have intensified their work in the field of transistors. The multiplicity of new applications in both military and commercial fields is being studied. Already the transistor gives evidence that it will greatly extend the base of the electronics art into many new fields of science, commerce and industry. Such pioneering assures finer performance from any product or service trademarked RCA and RCA Victor.

RADIO CORPORATION OF AMERICA

World leader in radio—first in television

®

JULY 1953

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

A NEW HOPE FOR HOUSEWIVES

The daylight hours brighten when Bob Hope calls on the nation's housewives each weekday with his brand new radio show. Sparkling humor is the keynote but the *new Hope* also comments on matters of timely interest and interviews famous guests. Then, too, announcer Bill Goodwin joins Bob in running repartee that's sure to bring an apron full of chuckles.

Jell-O Desserts present
The Bob Hope Daytime Radio Show
Monday thru Friday on your nearest NBC station.*
It's home-made for the housewife.

*Hope hasn't forsaken nighttime radio or television. Hear him Wednesday nights on NBC radio and watch for his full hour television show.

National Broadcasting Company

a service of Radio Corporation of America

VOLUME 12 NUMBER 3

Radio Age

ARCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

JULY 1953

COVER

Tests by RCA and NBC have shown that all colors, such as appear in this photograph of a TV studio scene, can be duplicated on the screens of compatible color receivers in American homes within range of present television stations.

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.

Radiomarine's new portable lifeboat radio is demonstrated by cadets of the U. S. Merchant Marine Academy, Kings Point, N. Y. Two cadets in the center are cranking the 60-pound emergency send-receive unit which is topped by a 15-foot antenna mast. (Story on page 18)

From an elevated seat on a dolly, on NBC cameraman focuses the calor TV camera on a Poris street scene in the studio.

RCA and NBC Petition FCC to Adopt Standards for Commercial Broadcasting of Compatible Color Television

RADIO Corporation of America and the National Broadcasting Company, on June 25, petitioned the Federal Communications Commission to adopt compatible technical standards permitting the commercial broadcasting of color television, it was announced by Brig. General David Sarnoff, Chairman of the Board of RCA.

The 697-page petition states that the color standards proposed by RCA and NBC are the signal specifications approved by the industry's National Television System Committee; that the RCA system which operates on these standards meets all criteria established by the FCC for a satisfactory color television system; and that, because of its compatibility, color programs broadcast on the RCA system can be received in black-and-white on the millions of sets now in use without any adjustments or additions.

"Our position as a pioneer imposes upon us the responsibility to do our best to bring about the early introduction and orderly development of compatible color television in the interests of the viewing public, our sponsors, and the independent stations affiliated with our network," General Sarnoff said. "RCA and NBC are prepared to invest as much as $15 million during color television's introductory year to establish this new service on a solid foundation. This would be in addition to the $25 million RCA will have spent by the end of 1953 in pioneering research and development of compatible color television."

When the FCC adopts the proposed color standards, the petition states, RCA and NBC will:

1. Expedite production of color receivers, tri-color tubes, and broadcasting and studio equipment for sale to the public, to television manufacturers and to broadcasters. (It is estimated that the first sets produced will sell for $800 to $1000, and when mass production is achieved prices will be substantially reduced.)

2. Commence broadcasting compatible color television programs which NBC will offer to commercial sponsors and its affiliated stations throughout the United States. (Already, 41 independent stations affiliated with NBC have agreed to a prompt start in broadcasting network color programs and others are planning to do the same.)

"RCA and NBC have the know-how to broadcast color programs, to build equipment for color broadcasting and to build sets that will receive these color programs," the petition asserts. "In addition, RCA and NBC have a nucleus of trained personnel ready to do the job."

General Sarnoff pointed out that in the development of any great new service to the American public, someone must always take the lead and incur the initial capital risk. "For example," he said, "RCA and NBC risked $50 million in developing and introducing black-and-white television before getting a cent in return. We are now spending $40 million in creating this new industry of color television. This is an expenditure that must precede the achievement of mass production in manufacturing and substantial broadcasting of color programs.

"The next task is to translate the achievements of our scientists and engineers into color programs on the air and color sets in the nation's homes. This calls for a broad-scale effort by the entire radio-television industry."

General Sarnoff said there are approximately 210 set manufacturers and 70 tube manufacturers in the radio-television industry, and approximately 190 television stations now on the air. "It is my great hope," he said, "that all of them will participate in the effort to take the color television 'baby' out of the cradle and teach it to walk.

RCA Inventions Available to Entire Industry

"RCA is following the same policy in introducing color as it did in black-and-white television, making its inventions available to the entire industry. In addition, we will manufacture and sell component parts, including the tri-color tube, to competing manufacturers and will make and sell broadcasting equipment to any station, regardless of whether or not it is affiliated with NBC.

"The radio-television industry can avail itself of the scientific inventions and technical 'know-how' that are the fruits of RCA's color television investment, without incurring any of the major capital risks. This means that it is economically practical for other members of this highly competitive industry to get into the color television field quickly.

"I am confident that those members of the industry, who help to advance color television in its early stages, will be proud of the part they play in the development of this new service. Once black-and-white television was off to a good start, some of those who feared and opposed it the most, soon became television's most enthusiastic supporters. We can expect the same thing to happen in the case of color television."

General Sarnoff said that the standards proposed to the FCC were sufficiently high to leave ample room for future developments. "Like the tracks of a railroad," he continued, "these standards provide color television with a gauge for a high-quality right-of-way. Like railroad cars, color television receivers can be changed and improved in the future, and still operate on the same standards or tracks.

"Color television is a major step forward in the science and art of seeing by radio. It will be revolutionary in its effect upon communications. Color greatly enhances the beauty and attractiveness of objects and scenes. It gives more information and increases our powers of memory and identification. It is a powerful aid to advertising. It is a new dimension that will in-

Color cameras, microphone boom and spot-lights are set up for a color TV program in RCA-NBC's Colonial Theatre, New York.

Color TV control console at Colonial Theatre.

crease the public's enjoyment of news events, entertainment and education."

Pilot Production of Color Sets Possible by Spring of 1954

Dr. C. B. Jolliffe, Vice President and Technical Director of RCA, estimated, in a statement included in the RCA petition, that if the FCC approves the proposed new standards by the end of the Summer of 1953, a pilot production of color receivers can start during the Spring of 1954.

In addition, Dr. Jolliffe said, to facilitate the introduction of commercial color television broadcasting, RCA's initial plans are to produce appropriate broadcast equipment on a custom basis. "This will enable broadcasters," he stated, "to proceed with color television early in 1954."

RCA System is Compatible

The RCA color system is compatible with the present black-and-white television, the petition continues, and programs broadcast using the RCA system can be received in natural color on color receivers and in high definition black-and-white on the more than 24,000,000 black-and-white receivers already in the hands of the American public without changing them or adding to them in any way.

The petition states the belief that the present field sequential color television standards based upon an incompatible color television system are "sterile and that their continuance is not in the public interest."

It is pointed out in the petition that the black-and-white sets now in use, "representing an investment of billions of dollars, would be 'blind' to incompatible color broadcasts." The petition also points out that RCA and NBC know of no one who plans to manufacture or broadcast incompatible color television.

Regarding the proposed new standards for compatible color television, the petition states that they are "technical signal specifications approved February 2, 1953, by outstanding engineers and scientists of the radio and television industry, including members of Petitioners' staffs, through the National Television System Committee. Petitioner knows of no responsible engineer or scientist in the radio and television field who proposes adoption of any other color standards."

For testing the RCA color television system and the proposed new standards, RCA and NBC offered to "make their laboratory, studios, transmitter, test equipment and other facilities freely available" to the FCC and members of its staff.

RCA System Meets FCC Criteria

The petition states that extensive field tests, including thousands of hours of color transmissions, and public reaction studies show that the RCA system satisfied all the criteria previously specified (June 11, 1951) for color television by the FCC. These criteria include color

fidelity, picture definition and brightness, simplicity of operation in broadcasting and receiving equipment, costs, freedom from interference, and networking.

Price of Color Receivers

Dr. Jolliffe said that the introductory retail price of the first RCA color television receivers will be between $800 and $1000. The picture size of the first color television receivers will be equal to a 14-inch black-and-white tube.

For comparison, Dr. Jolliffe pointed out that the retail price of a 12-inch black-and-white television set introduced in 1939, was approximately $560. However, he said, taking into account the change in price levels —based on the Bureau of Labor Statistics Price Index— this 1939 price would be approximately $1,050 in terms of 1953 dollars.

Price Reductions Foreseen

"A major item in the price of a color television receiver is the tri-color kinescope," he continued. "The price and size history of black-and-white kinescopes will be followed in color kinescopes. Prices will be reduced and sizes and quality increased as quantity production is attained by manufacturers of kinescopes.

"If standards for commercial broadcasting of compatible color television are adopted by the Commission thus enabling compatible color receivers to be manufactured on a mass production basis, experience and competition will inevitably result in bringing about substantial reductions in the price of color receivers."

Dr. Jolliffe said that the cost of station apparatus for the RCA color television system successfully meets the FCC criterion that it should not be "so high as unduly to restrict the class of persons who can afford to operate a television station."

"A television station does not need to equip color studios in order to broadcast network color programs," Dr. Jolliffe said. "The station can take color programs from the network by making relatively minor expenditures for equipment and standard stock items, plus in most cases certain additional sums for test equipment. The station operator may expand his operations by adding a color slide camera, color film equipment and color cameras if he desires to provide programs from local sources. The amount and total cost of such equipment will depend on the kind and extent of local color program material the broadcast station owner elects to provide.

"The present prices are preliminary estimates based on existing conditions, present equipment designs and limited production. Provided other conditions remain the same, it is anticipated that substantial price reductions will be made when commercial product designs are finalized and the production of color equipment increases."

Tri-color TV kinescopes are inspected during o pilot-productian run at RCA's tube plant, Lancaster, Pennsylvania.

RCA's Manufacturing Plans

Dr. Jolliffe said that RCA has established a pilot plant for the production of RCA tri-color kinescopes within its tube plant at Lancaster, Pennsylvania. Within a few months, he continued, this pilot operation can attain a production rate of 2,000 tubes per month.

"In response to demand for more tri-color kinescopes than can be produced in the pilot production unit," he pointed out, "operations can be expanded into existing black-and-white kinescope production facilities, with suitable modification of such facilities and the addition of the specialized items needed for tri-color kinescope production.

"Factory space for producing RCA color television receivers is available and necessary test equipment has been determined. Manufacturing personnel has examined the engineering samples of model RCA color television receivers and are agreed that no unusual manufacturing problems are involved.

"While a substantially increased number of component parts are required for a color television receiver as compared with a black-and-white receiver, and circuits require a greater degree of testing and adjustment, manufacturing techniques will be basically the same as for black-and-white television receivers."

Dr. Jolliffe said that the proposed technical signal specifications make provision for future improvements in equipment at both transmitter and receiver without requiring a change in standards or obsoleting receivers in the public's hands.

NBC Color Telecasting Plans and Policies

The National Broadcasting Company's color television programming plans and policies are outlined in the petition. Highlights of these plans and policies are:

The first immediate proposal of NBC consists of starting "an introductory year," in the course of which all the engineering and programming groups of NBC will have a chance to get direct experience in color-casting, it was said, because they will produce their present black-and-white television shows in color premieres.

The petition stated:

"We have now worked out a rough schedule of color-casts from the Colonial Theatre in New York, and 3H in our Radio City studios, which are the two present color-equipped studios of the National Brodcasting Company . . . We expect to average two shows a week from the Colonial, and the two shows will average an hour together. 3H will be reserved for continued technical experiment.

"We will schedule the color premieres, out of the Colonial Theatre, on a rotational basis of all our black-and-white attractions, so that each show is seen in color at least once, in a specially-devised color show, which will still be great in black and white, but we hope superb in color. We will include the NBC opera in English, Toscanini, Great Conversations, and other occasional as well as regular shows.

Facade of Colonial Theatre, New York, originating point of the majority of color TV programs broadcast experimentally by RCA and NBC.

"When the great shows and the regular shows of NBC are offered in their color premieres at the average rate of two a week from the Colonial, the advertiser will offer his advertising in color with the show. In the case of multiple sponsors, we hope to offer all advertisers the same opportunity.

"Local events and exhibits and celebrations can all be covered in color. When important enough, we would hope to use our remote equipment to bring the scene on a special event pick-up basis."

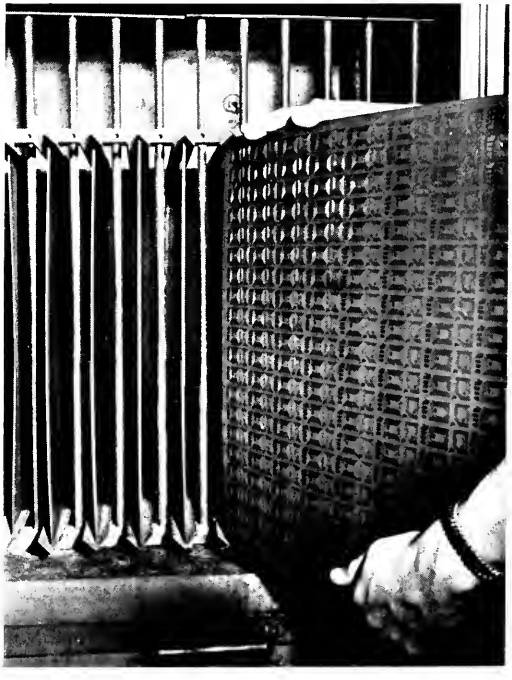
The petition points up the fact, now that a practical

(Continued on page 31)

A copper-clad sheet of plastic, an which electronic circuits will be printed by photography, is highly polished before the light-sensitive emulsion is applied.

This glass negative will be used to produce an unlimited number of accurate replicas in an automatic photo-printing machine.

In this heat tank, the sensitized copper-clad plastic sheet is dried rapidly under a bank of infra-red lamps and over a row of gas burners.



Here, the sheet of printed circuits, with all unwanted areas etched away by an acid bath, goes into a bake oven, as one of the final production steps.

Radio-TV Coils Made by Printing

Photo-etching Process Developed by RCA Victor Permits Mass Production of Identical Components from a Photographic Negative.

RADIOS, TV receivers, and communications equipment that can be made more compact and efficient were envisioned with the announcement that printed-circuit electronic inductors, mass-produced for general use by the Tube Department of the RCA Victor Division, are now generally available. In such components, printed circuitry replaces conventional wire windings with coils that are etched on flat surfaces.

These revolutionary components, presently limited to six types of intermediate frequency (IF) transformers, induction coils, and wave traps, are produced by a special process which makes possible virtually limitless production of identical electronic circuits from a single photographic negative.

Conventional inductors depend upon coils of hand-wound or machine-wound copper wire to provide the desired inductance values. With the printed circuit method, the coils of copper wire are eliminated. Instead, inductances are provided by flat inductors having rectangular windings which are photographically printed on plastic strips on which a layer of copper has been deposited.

A complete printed circuit i.f. transformer and its shield (in hands) are compared with older type components (on table) to show comparative sizes.

The production of a printed-circuit component begins with a photograph of the pattern of the required circuit. A contact print of the negative is then made on a copper-clad plastic strip which has been coated with a light-sensitive material. Following this operation, the strip is developed and placed in an etching solution. The unexposed parts of the copper are eaten away, leaving an accurate, sharply defined reproduction of the desired copper circuit. After the strip has undergone additional processing, it is inserted in a metal case or shield.

Uniformity Always Maintained

So precise that it will faithfully reproduce a line width of copper as narrow as one-hundredth of an inch, the process assures the uniformity of any quantity of "copy" circuits produced by the master circuit on the photographic plate.

The photographic printing of electronic circuits presages unprecedented accuracy in the production and assembly of components and provides precision control of such vital factors as the coefficient of coupling. Further, the printed-circuit technique points the way to more economical and streamlined production of components, makes possible circuit arrangements impossible under conventional wire-winding techniques, indicates appreciable simplification in component design, and facilitates rapid and inexpensive circuit changes since only a new negative is required.

Printed-circuit components themselves, by nature of their radical design and high uniformity, make possible simplification of equipment design, reduction in the number of required parts, and a simplification of equipment servicing and alignment.

Simplification of servicing and alignment are illustrated by the new RCA components, which are housed within tiny metal shield cans measuring only seven-eighths of an inch square and two-and-one-quarter-inches high.

The new components are intermediate-frequency types designed for television sets utilizing intercarrier-sound systems and incorporating picture IF and sound IF carriers of 45.75 and 41.25 m.c., respectively.

Viewers Get First Scenes of Coronation from NBC Television

Eight Months of Planning for Royal Pageant Made it Possible for Network to Establish New Records of Leadership in Radio and TV

LONG range planning — the kind of planning that anticipates all conceivable setbacks and disappointments achieved new records for NBC on June 2 when the network provided American TV viewers with the most complete coverage of the Coronation of Queen Elizabeth.

As a result of this painstaking thoroughness in preparation:

¶ NBC-TV flashed the first still pictures of the Coronation ceremonies only nine minutes after they were taken in London.

¶ The network presented, at 4:14 p.m., the first actual motion pictures of the Coronation seen in this country.

¶ NBC-TV telecast more hours of Coronation Day activities than any other network.

¶ NBC Coronation coverage reached more people, on both radio and TV, than did the coverage of any other network according to a survery conducted by Audience Research Bureau. This coverage, on both media, was sponsored by General Motors.

The network had planned to score a beat of several hours over other television networks by flying Coronation films back to this country in an English Electric Canberra jet bomber belonging to the Venezuelan Government. The plane had been delivered by its manufacturer to Blackbushe Airport, near London, where NBC had set up an elaborate installation to kinescope the British Broadcasting Corporation telecast. NBC assumed the expense of ferrying the jet across the Atlantic in return for the transport of the films.

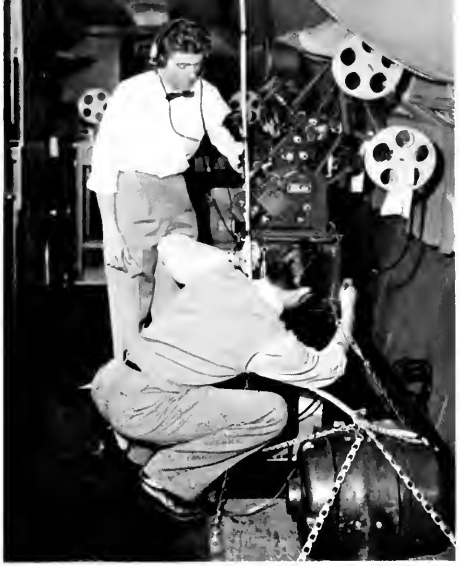
Piloted by Capt. J. W. Hackett, who on May 12 had set an unofficial trans-Atlantic record in a similar aircraft, the jet took off at 6:24 a.m., EDT., but two hours out over the Atlantic was forced to turn back because of a defective fuel connection.

BBC, the only television organization permitted to film the ancient rites in Westminster Abbey also offered kinescopes of its coverage to Canadian and American networks, the films to be flown over in three Royal Air Force Canberra jet bombers.

NBC hired a souped-up P-51 racing plane, piloted

Right: These American-type microwave receivers, supported on a speciolly built tower near Blackbushe, were used to pick up TV signals from the BBC station in London. The signals were then fed to kinescope recorders.

Film recording and editing equipment installed at the Blackbushe Airport outside London for the rapid processing of Coronation films before their shipment to the United States by fast plane.



NBC film technicians, working in an airborne laboratory, edit Coronation films while the Pan American Clipper was flying from London to Boston.

by Stanley Reaver of the Paul Mantz flying organization, to stand by at Goose Bay, Labrador, to pick up the first films to arrive there and shuttle them down to Boston's Logan Airport, where they could be put on the 67-station network waiting for them.

Also waiting at Goose Bay was a Canadian Royal Air Force jet, which had been assigned to speed the films 800 miles to Montreal for presentation by the Canadian Broadcasting Corporation. When it became apparent to NBC officials at Logan Airport that the CBC jet would reach Montreal before the P-51 could reach Boston, 900 miles distant, Charles C. Barry, NBC vice president in charge of programs, and William R. McAndrew, manager of news and special events, decided to take the program from the CBC line rather than wait for the shuttle plane from Labrador. By following this procedure, NBC made it possible for its 67 affiliates to transmit the first Coronation films to be seen in America. The time was 4:14 p.m., EDT, a clear beat of 10 minutes over NBC's principal network rival.

Although the decision to tap into CBC's facilities was made at the last minute, arrangements for such a contingency had been completed between CBC and NBC last winter. Had the secret NBC jet, known as the *Albion Arrow,* completed its flight with the first films, CBC would have been able to draw its programs from that telecast.

As McAndrew pointed out: "Our objective all the time was to get the story on TV ahead of all others. We didn't care whether we did it with the *Albion Arrow,* or by way of the RAF to Goose Bay, the RCAF to Montreal, by electronic means through the CBC, or any other way."

NBC was the only full network prepared to take the Canadian Broadcasting Corporation transmission when that organization put the films on the air. The sequences were carried until 6 p.m. EDT.

NBC-TV's later Coronation program, from 10:30 p.m., to midnight, EDT., originated from Logan Airport. Films made in London by NBC camera crews were flown over non-stop in a Pan American Super-Six Clipper, in which film editing equipment had been installed so that a completely edited, polished program could be presented upon landing. The Clipper landed at Logan at 8:47 p.m. EDT., establishing a new London-Boston record (12 hours, 35 minutes) for propeller-driven aircraft. Riding the plane were commentators Henry Cassidy and Merrill Mueller, the first eye-witnesses of the Coronation events to return to this country.

Final Coronation films — those of the pool and NBC's own — arrived at Logan Airport at 10:00 p.m. EDT., in a converted A-26 attack bomber owned by Cities Service Petroleum, Inc. The A-26 had picked up these films from another RAF jet at Goose Bay. These films, which included those made of the procession following the actual Coronation, were integrated into the 10:30-to-midnight program. In addition to the live commentary of Cassidy and Mueller, Sir Ralph Richardson, the distinguished British actor, appeared in a filmed commentary on the "Liber Regalis," the ancient book used in the solemn ceremony.

Small Air Bubble Wrecks Plans

The abbreviated flight by Captain Hackett in NBC's secret jet, the *Albion Arrow,* was a story in itself. It took only a small air bubble to shatter the plans which had been months in the making. Hackett, a former RAF flier now employed by Silver City Airways, Ltd., left Blackbushe Airport near London at 6:24 a.m. EDT., and was averaging 570 miles per hour. Once his wing tank was emptied of fuel, he discovered that the feed from a supplementary tank was jammed. He dived his plane straight down from 40,000 to 20,000 feet, trying to remedy the trouble. Then he stood the plane on its tail and shook the stick to the point where the jets almost "flamed out." Nothing worked. Without his full load of fuel, he knew that he could never make it to Gander, Newfoundland, so he turned back.

Coronation Day coverage on NBC-TV began at 5:30 a.m. EDT., on the news and special events program, "Today." Dramatic, almost simultaneous, still pictures of the event were transmitted across the Atlantic to the

Charles H. Colledge of NBC's Public Affairs Department inspects the transmitting unit of a Mufax transmitting unit from which still pictures were sent direct to New York by transatlantic radio.

Below: Sylvester L. Weaver, Jr., Vice Chairman of the NBC Board (left) and Dave Garroway, of the "Today" program, with a Mufax receiver installed in Radio City.

"Today" newsroom set, where they were reproduced on a recently developed facsimile receiver, called Mufax.

At 5:35 a.m. EDT., just nine minutes after Queen Elizabeth had entered the state coach for her trip to Westminster Abbey, the picture was on American television screens. In all, the Mufax machine received a total of 86 pictures. Gibson Parker, British radio and TV personality, was at Muirhead, the transmission point in England, and was in direct radio telephone contact with "Today's" commentators, Garroway and Frank Blair. Parker commented on the pictures while they were appearing on American television screens.

The signals which supplied Mufax equipment were transmitted over transatlantic circuits of RCA Communications, Inc. Preparations for handling this part of the Coronation coverage began last November when RCA Communications engineers started their tests to determine the method that would provide the fastest service and the best quality of pictures. RCA Communications circuits also were used to bring the BBC commentary from London to the radio networks of this country.

But not all the credit for comprehensive coverage could go to TV. NBC radio was present alongside the younger medium at every high spot of the London activities. Beginning at 5:15 a.m., and continuing in periods until 11 p.m., the radio network was on the air for a total of 5½ hours with on-the-spot descriptions of the pageantry, solemn ceremony and exultation. In addition NBC radio's regular news shows carried extensive Coronation coverage.

Heard on the NBC radio Coronation shows were commentators Henry Cassidy, Merrill Mueller, George Hicks, Frank Bourgholtzer, John Farrell, Morgan Beatty, Ed Newman, Ray Henle, Bill Sprague and Leon Pearson, and John Snagge, dean of BBC commentators.

NBC's Coronation coverage was supervised by Davidson Taylor, network director of public affairs. William R. McAndrew manager of news and special events, was TV producer at the American end. Romney Wheeler, London bureau manager, acted as TV producer in England. Charles Colledge and George McElrath supervised the operational aspects.

An NBC television camera at Logan Airport, Boston, awaits plane bringing Coronation films from Goose Bay, Labrador.

Radio-TV Broadcasters Honor Sarnoff

Chairman of RCA-NBC in Keynote Address at NARTB Convention said Television Should Be No Place for Get-Rich-Quick Wallingfords—New Scientific Developments in the Offing

TELEVISION should be no place for "get-rich-quick Wallingfords more interested in what they can take than what they can give," said Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America, in the keynote address at the National Association of Radio and Television Broadcasters Convention, in Los Angeles on April 29.

General Sarnoff, who also is Chairman of the Board of the National Broadcasting Company, received the First Annual Keynoter Award of the NARTB, which cited him as a pioneer in broadcasting "whose vision, industry, leadership and faith are essential components of the free American system of broadcasting . . . for his good citizenship in the quiet hours and in the hours of strife . . . for the steadfastness which has marked his achievements in modern times . . . and because he has shared his great dream of communications with the millions whom we serve."

Brig. General David Sarnoff (right) receives Keynoter Award of National Association of Radio-Television Broadcasters from Harold E. Fellows, NARTB President.

Highlights of General Sarnoff's Address

Among the highlights of General Sarnoff's address were:

(1) A thousand television stations will be in operation within a few years. Television networks will reach into all parts of the country, providing a national program service that will make present schedules seem primitive.

(2) There is no doubt that operations in UHF (ultra high frequencies) will fill a place of growing significance in television.

(3) Hopes the day is not far off when compatible color television will be authorized for commercial broadcasting. This will make television more exciting, more dramatic and more enjoyable.

(4) Television can solve its economic problems without a "cash box" in the home.

(5) Television can learn much from the motion picture world, but there is also a good deal it must learn to forget.

(6) Radio broadcasting, far from being "doomed" within three years, as forecast by prophets of 1949, still renders a vital national service after four years have passed; over-all time sales have increased and fundamental changes are under way.

(7) New scientific advances in radio, television and electronics are in the offing. These include:

Transistors, which promise to become the master key to new progress in radio and television as a device making possible instruments of smaller size, greater versatility and longer life.

Electronic tape recorders for television program storage, with greater advantages of economy and convenience.

Closed-circuit TV techniques and devices which will provide visual intercommunications systems for industry, science and education.

An electronic "voting system" using home television receivers with a button which when pushed will register "yes" or "no" at the TV station. This may lead to a national push-button poll of public opinion automatically tabulated by electronic computers.

Convoy of 5th Radio Relay Squadron halts for a rest while an forced drive from Fontainebleau to aid storm-harassed Netherlanders.

Microwaves Aid Flood-Ravaged Holland

5th Radio Relay Squadron of Allied Air Forces Rushes RCA Transmitters Across France to Key Cities in Storm-Harassed Netherlands.

By William R. Dean

Engineer,
RCA Service Co., Inc.

On February 5, 1953, the Communications Group at Allied Air Forces of Central Europe received an urgent request to come to the aid of the flood ravaged areas of The Netherlands. In that country a combination of unusually high tides and ocean gales, smashing with little warning at dikes and jetties, had backed the waters of the rivers upstream and over the banks onto the farms and cities of the low lands. With normal life paralyzed, hundreds dead and thousands in acute danger, the 5th Radio Relay Squadron, stationed at Fontainebleau, fifteen miles to the south of Paris, was selected to provide the desired aid.

A convoy was dispatched on February 7. They took with them two RCA Type CW-20A microwave terminal stations and one repeater station. Also included in the convoy were supporting vehicles carrying supplies and replacement parts. After a difficult 500-mile trip over rough, icy roads, made longer by many detours due to the floods, the men and their equipment arrived in Rotterdam on February 8. Despite the obstacles they encountered, they averaged 20 m.p.h. on the trip.

In Rotterdam the group reported to the local telephone center for further instructions. Major Wesley E. Rankin, Commanding Officer of the Squadron, who had gone on ahead of the convoy to coordinate the project, was ready to deploy the equipment immediately.

It had been decided to employ the microwave equipment to supplement a badly damaged telephone cable between Rotterdam and Middelharnis, main distribution points of the Netherlands Telephone System. Middelharnis, located on the island of Goeree-Overflakke, about 60 miles from Rotterdam was one of the hardest hit places in Holland and communications with that city, to handle flood control and flood relief, was essential.

Convoy Brought Own Power Plants

One GI crew, under WOjg Albert D. Creel, was dispatched immediately for Goeree-Overflakke to procure a site near Middelharnis. They settled on the nearby town of Dirksland, location of a local telephone exchange where connections could be made into Middelharnis. The equipment was installed near the telephone office. Motor driven power units which had been brought from Fontainebleau, supplied the power.

The men assigned to erect the tower arrived at Dirksland on February 10 and completed their job on the same day. Meanwhile, the town of Barendrecht had been selected as the site of the other radio communications terminal. Barendrecht, 5 miles from Rotterdam, is the location of another telephone exchange. The second tower and transmitter-receiver were installed there on February 9.

Prospects Doubtful at First

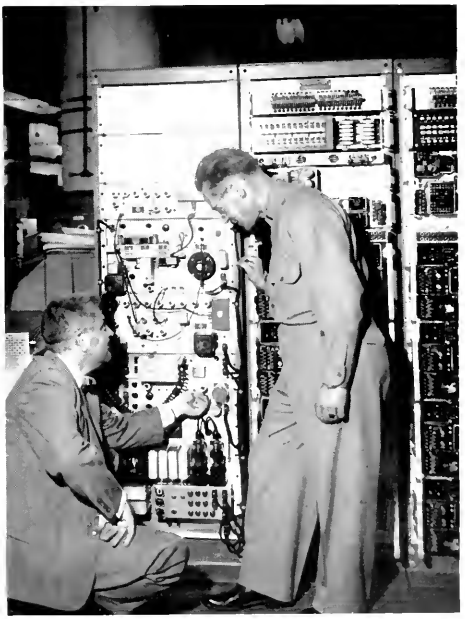
Installation at both ends had been completed by the evening of the 10th. Lacking adequate maps, it was impossible to determine the exact bearings or distance between terminals so the decision to use or not to use the repeater station had to be postponed temporarily. The distance that had to be spanned was approximately 22 miles, two-thirds of which was flooded, giving no satisfactory spot for a repeater tower. Because of the limited height of the 60-foot towers and the lack of natural elevations, little hope was held out for dependable communications under this arrangement.

On the 11th and 12th, attempts to establish contact between the two terminals were unsuccessful. Summoned from Fontainebleau, I arrived late on the night of the 12th with accurate maps of the vicinity. With their aid the antennas were reoriented, and contact between terminals was established at noon on the 13th. The signals were of sufficient strength to enable Captain Charles C. Culley, the officer in charge, to decide that the repeater would not be needed.

Even though the radio relay equipment was not intended to operate into the particular type switchboard used at Middelharnis this minor difficulty was quickly solved. A step-down transformer was located and used to reduce the 115-volt supply voltage to that needed to operate the switchboard drops. Communications from Middelharnis to Rotterdam was checked out on the 14th of February. Twelve voice channels of the 24 available over the microwave system were placed in use.

These radio circuits continued in operation until March 2 when the telephone officials informed Captain Culley that the cable damage had been repaired. There was no further need for the microwave equipment. The Dutch Telephone Company and the Signal Corps expressed thanks and congratulations for a job well done.

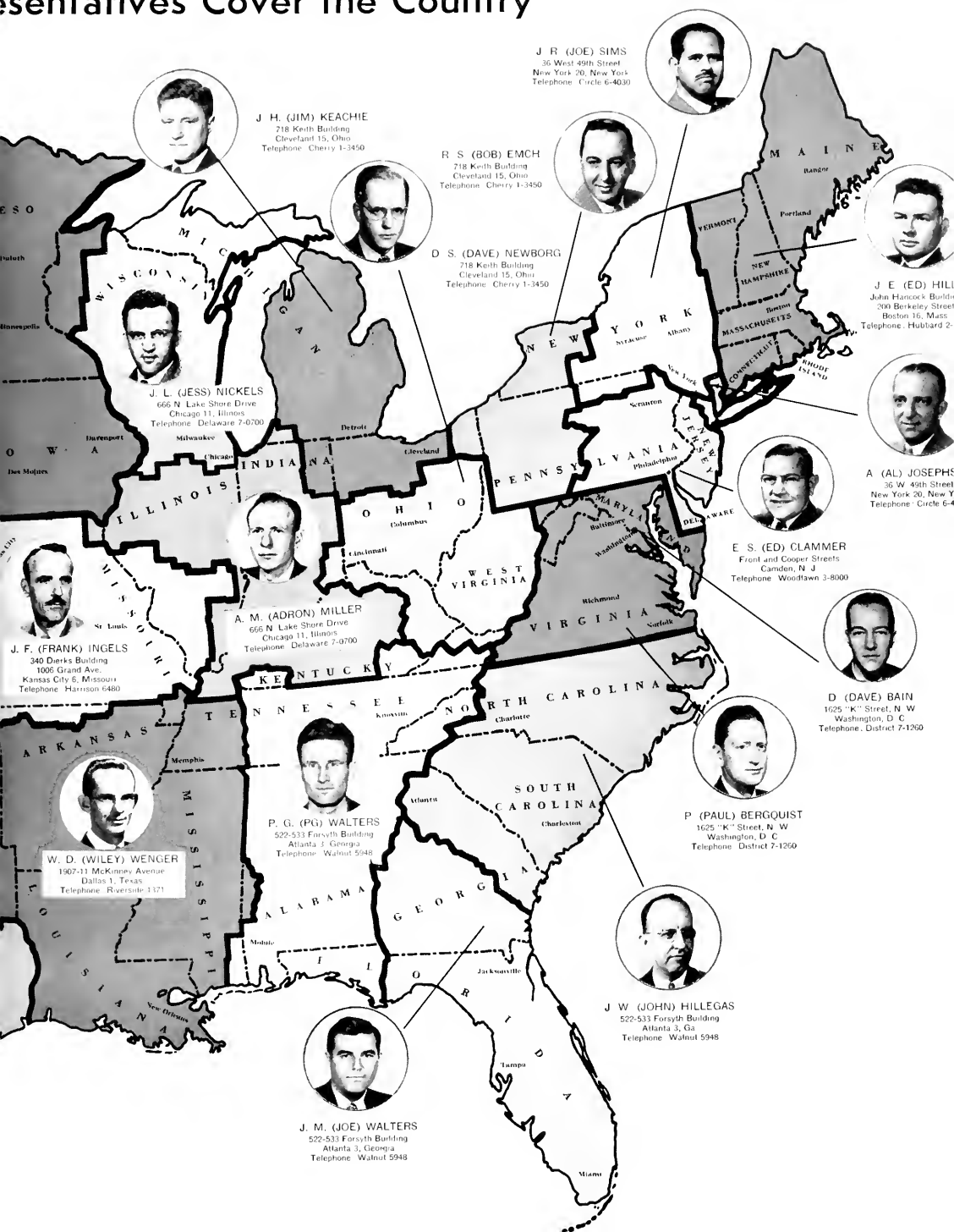
G.I.'s erect emergency microwave tower near Rotterdam to supply communications over Holland's flooded areas.



RCA microwave transmitters like the one above replaced ruptured phone lines after European floods.

RCA Victor Broadcast Station R

esentatives Cover the Country



Safety at Sea Advanced by New
Portable Lifeboat Radio

By Irving F. Byrnes

Vice President in Charge of Engineering, Radiomarine Corporation of America

BROADLY defined, a modern lifeboat radio set is a completely self-contained radiotelegraph station which, in an emergency, can be transferred from a stricken vessel into a lifeboat, to serve there as a means of contact with land, other ships or rescuing parties. In the newest Radiomarine version, the set comprises a metal container, less than two cubic feet in volume, in which are nested a two-frequency transmitter and receiver, an automatic keyer, a hand generator for power supply and all necessary material for an antenna system.

The weight of the complete set is under 60 pounds and it is built to withstand a 20-foot drop into the sea from a ship's deck. Naturally, it is watertight and buoyant.

To operate the station, the container is first lashed to a thwart of the lifeboat and the antenna system assembled, after which the portable unit is ready to perform its lifesaving functions.

Several features are built into the Radiomarine equipment to make it possible for those unfamiliar with the telegraph code to operate it effectively. These features include automatic transmission of alarm signals and SOS signals on the distress frequency of 500 kc, followed by more SOS signals and a long dash on 8,364 kc. A period of about two minutes is required for this group of signals which are repeated over and over as long as the generator is being cranked. Besides automatic operation there are provisions for normal two-way communication whereby the radio receiver can be switched on for either frequency.

Power Supply Was One Problem

There were a number of interesting problems that required solution in designing this equipment. One of these is the hand generator used as the power supply. Here is a case where manpower, in the literal sense, is the basic source of energy. The first step is to convert this manpower into horsepower. Previous experience with the design of hand generators has shown that one-eighth of a horsepower is about the maximum that should be demanded. This is roughly equivalent to a force of nine pounds on each handle at a cranking speed of 65 revolutions per minute. One able-bodied man can withstand such a load for about four or five minutes. In most cases two men will crank simultaneously, one on each crank. This, of course, results in much less fatigue and a longer operating period.

Merchant Marine cadet shows how telegraph key is pressed to send appeals for aid manually, as others in lifeboat generate power by cranks on sides of radio unit.

The energy applied to the generator cranks is equal to about 90 watts. The generator delivers an output of 50 watts. The difference of 40 watts is consumed as losses in the generator itself and in the gearing, bearings and so forth. This may appear to be low efficiency, but it is typical for a small, carefully designed machine of this class.

The radio transmitter has only four tubes. The power delivered to the antenna is about two watts on 500 kc and five watts on 8,364 kc. Having two frequencies enables both short-distance and long-distance communication to be obtained.

An important part of the transmitter is the automatic keying mechanism, a motor driven device which opens and closes various switches. It might be called the mechanical "brain" of the transmitter. It has a "mem-

ory" of 120 seconds and, parrot-like, will repeat its message every two minutes as long as the hand generator is cranked. One complete group of signals may be described as follows: On 500 kc, the auto alarm signal is transmitted for 60 seconds. This comprises a series of a dozen four-second dashes, separated by spaces of one second duration. At the end of the alarm signal—and still on 500 kc—the SOS signal is transmitted three times within a period of fifteen seconds. The keying device, in less than one second, now switches the circuits to 8,364 kc. Three SOS signals are sent out on this frequency followed by a long dash lasting thirty seconds. Transmission then reverts to 500 kc, and the sequence is repeated.

Two-way communication with the lifeboat set requires, of course, that the radio receiver be switched into the circuits. For two-way service the receiver may be used for the 500 kc or the 8,364 kc bands. It is fixed-tuned for the band 492 to 508 kc and is also tunable from 8,250 to 8,750 kc. Novel circuits have been developed so that several functions are performed by only three conventional tubes.

Receivers Are Simple Instruments

For the 500 kc band the receiver is a simple two-stage radio-frequency amplifier followed by a germanium diode detector and a combined audio amplifier and beat frequency oscillator. For the eight megacycle band the receiver becomes a tunable superheterodyne with a 500 kc intermediate frequency amplifier.

One problem which is peculiar to a portable set for lifeboats is the antenna system. During World War II lifeboat antennas were supported by the sailing mast, by kites or by balloons. Such arrangements are generally not compatible with the concept of self-contained portability. The 1948 Safety Convention specified a self-supported antenna or one supported by the lifeboat mast. Since some of the newer lifeboats do not have masts, optional arrangements are desirable as an integral part of the radio equipment.

This early version of a Radiomarine lifeboat radio weighed 150 pounds and used a helium filled balloon to lift and support the antenna.

In the Radiomarine set, the basic radiator is a sectionalized aluminum rod which can be stowed inside the front cover of the unit. Although this rod is collapsible for stowage purposes, it is not telescopic. This rod is made up of eleven captivated sections, fastened to one another by internal flexible cables. Each section has a built-in socket which fits into its adjoining mate. The assembled height is 15 feet. Such a rod may be put together quickly without losing any of the parts.

The lower end of the rod plugs into a special insulated socket at the top of the lifeboat set. A 15-foot vertical antenna should be stayed in some manner to prevent excessive whipping in high winds, and also to increase its radiation efficiency. This is done by four pieces of flexible wire, each eight feet long, connected near the top of the rod and then stayed off through insulators and ropes to the sides of the lifeboat.

There are two other optional antenna arrangements for the types of lifeboats which have masts. A flexible wire can be rigged between the top of the aluminum rod and the mast. If the rod is lost or damaged, a single wire antenna can be run from the top of the set to the mast. Extra wire and insulators are stowed in the cover for these arrangements.

Insulators Made of Special Plastic

The material from which the insulators are made is a plastic with the formidable name of Tetrafluoroethylene. Its short name is Teflon, a Dupont trademark. This plastic is light, flexible and has extremely low moisture absorption and radio frequency losses.

A final word about the physical aspects of the equipment. The aluminum cabinet is reinforced internally to withstand the drop test. The front cover, held in place with spring latches has a watertight gasket. All front panel devices, since they are exposed to the weather during operation, have rubber seals. The sockets for the generator cranks appear to be open, but just inside they are sealed with a flexible metal bellows coupling. The set is painted with a color known as Munsell 7.5 Red, which some have called "shocking pink".

Radiomarine has developed and manufactured several types of lifeboat sets since 1936. This new equipment meets all requirements of the Safety of Life at Sea Convention as well as Rules and Regulations of the Federal Communications Commission for lifeboat portable radio sets.

Television Affiliates Reaffirm Complete Confidence in NBC

TELEVISION affiliates of the National Broadcasting Company adjourned their meeting on May 27 with unanimous adoption of a resolution reaffirming their confidence in the National Broadcasting Company and its continued leadership in the broadcasting industry.

A committee, headed by Walter J. Damm, vice president and general manager of WTMJ and WTMJ-TV, Milwaukee, and chairman of the affiliates' group, personally presented the resolution to Brig. Gen. David Sarnoff, chairman of the boards of NBC and RCA, in his office at NBC.

The text of the resolution:

"Be it resolved: That we, the television affiliates of the National Broadcasting Company, who today (May 26) at Princeton had the privilege of reviewing in detail with General Sarnoff the position of RCA and NBC in broadcasting and television hereby reaffirm our complete confidence in the National Broadcasting Company and heartily endorse its program as revealed to us by General Sarnoff.

"This confidence is predicated upon the unquestionable leadership displayed by RCA and NBC in radio and television over the past years and the steadfast belief that General Sarnoff's position with respect to color television and various other current and future developments in the broadcasting field are fully as sound and unerring as previous decisions and predictions which he has made including his prophecy of the assured future of television, pronounced at Atlantic City in 1947.

"The rapid approach of color television and RCA's tremendous strides in that area in our opinion more than justify our confidence in our future as NBC affiliates, and a careful analysis of the present and projected program and sales plans of NBC leaves us with the conviction that they cannot be successfully assailed by expedient competitive attack or propaganda.

"In this confidence we adjourn our meeting with unanimous approval and endorsement of the RCA-NBC program as outlined to us today."

In accepting the resolution, General Sarnoff told the affiliates' committee he accepted it as an expression of confidence in the NBC staff.

"They will be more encouraged by this," he said, "than by any personal words of praise from me."

The Man in the Glass

When you get what you want in your
struggle for self
And the world makes you king for a day,
Just go to a mirror and look at yourself,
And see what that man has to say.

For it isn't your father or mother or wife
Who judgment upon you must pass,
The fellow whose verdict counts most in your life
Is the one staring back from the glass.

You may be like Jack Horner and chisel a plum
And think you're a wonderful guy,
But the man in the glass says you're only a bum
If you can't look him straight in the eye.

He's the fellow to please—never mind all the rest,
For he's with you clear up to the end,
And you've passed your most dangerous,
difficult test
If the man in the glass is your friend.

You may fool the whole world down the
pathway of years
And get pats on the back as you pass,
But your final reward will be heartaches and tears
If you've cheated the man in the glass.

Anon.

Other members of the committee accompanying Damm were: Robert E. Dunville, president, Crosley Broadcasting Corp.; Robert D. Swezey, executive vice president and general manager, WDSU-TV, New Orleans, La. and Harold Hough, vice president and director, WBAP-TV, Fort Worth, Texas.

The full group of owners and operators of the television stations affiliated with NBC witnessed a demonstration of the RCA compatible color television system at the David Sarnoff Research Center in Princeton, N.J. NBC's plans for television program and sales development, including an expansion in morning programming and procedures for beginning color television broadcasting when compatible standards are authorized by the Federal Communications Commission, were presented to them by the top network officials. An informal address by General Sarnoff highlighted the meeting. At the completion of General Sarnoff's talk he received a standing ovation.

Before adjournment, 16 affiliates signed supplements to their NBC contracts enabling them to carry NBC color programs in their local communities when such service begins.

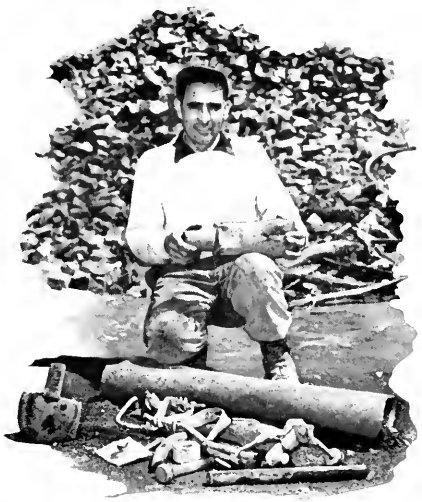
Electronic "Detective" Spots Metal Pieces in Ores and Rocks

STRAY pieces of metal that find their way onto the conveyors that carry rocks and ores from one operation to another at quarries and mines are a menace to the crushing machinery of those industrial plants. To spot these foreign substances, a new electronic metal detector has been developed by the Industrial Equipment Section of the RCA Victor Division. One of the earliest installations is now in operation at the Kingston Trap Rock Company in Kingston, N. J.

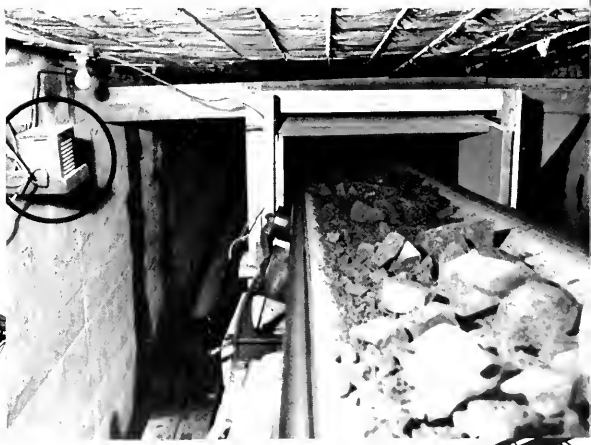
The detecting device is erected along the route of the conveyor belt between the point where huge chunks of the rock are given their first crushing and where they are re-crushed to the desired size. The detecting mechanism is enclosed in a water-proof frame which can be adjusted in size to accommodate the passage of conveyors of the capacities usually encountered in mining operations.

When in position and connected to a standard power source, the detector is influenced by the presence of any metal—magnetic or non-magnetic—passing through it. Small harmless pieces of metal do not affect the mechanism. But when the presence of "tramp" metal of dangerous size is detected, the metal detector automatically actuates a warning signal and shuts down the conveyor line until the potential trouble-maker has been removed.

The RCA metal detector will perform with conveyor speeds up to 600 feet a minute.



Workman displays some of the pieces of "tramp" metal which, if not spotted by RCA's metal detector, might have damaged rock crushing machinery.



Right: Electronic metal detector straddles conveyor carrying rocks from one crushing operation to the next. When metal pieces of dangerous size pass under detector, control (in circle) halts conveyor and sounds alarm.

Below: Loads of trop rock carried on these conveyors at Kingston (N. J.) Trap Rock Company are examined by metal detectors developed by RCA.

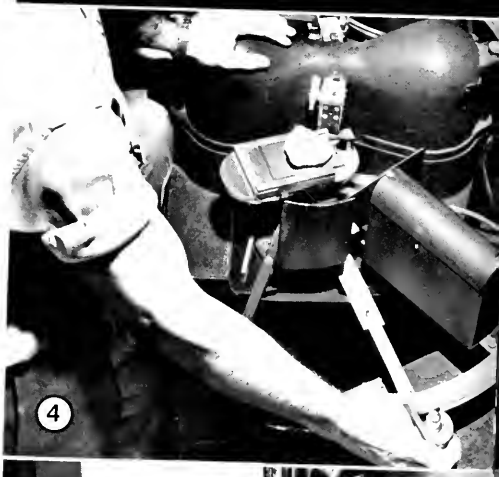
How Crystals of Quartz Are Fashioned into Electronic Controls

EVERY year, from the mountains and river beds of Brazil, shipments of natural crystalline quartz find their way to the United States where they are shaped and dimensioned to act as sentinels of all communications stations — radio, television, amateur, transatlantic and others. Without these crystals, the air would soon become a bedlam, for these thin wafers of quartz have a peculiar property of holding transmitting stations on their allotted frequencies. How the amazing wafers are fabricated from hexagonal prisms of quartz is told in the accompanying pictures, photographed in the Crystal Engineering Section of RCA Victor Division, Camden, N. J.

1—Specimen of Brazilian quartz from which come the crystal wafers that are used in the operation of millions of radio transmitters and receivers.

2—E. M. Washburn, Manager, Crystal Engineering, RCA Victor Division, operating an X-ray machine which determines the angle at which the quartz specimen should be sliced.

3—Here the sections of mother quartz are cemented on glass plates for precision orientation during the later sawing operation.



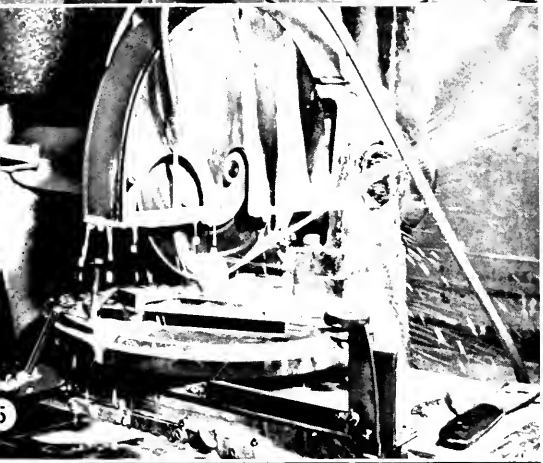
4—The correct sawing angle of the crystal, as determined by X-ray analysis, is assured by orientating the specimen on this machine.

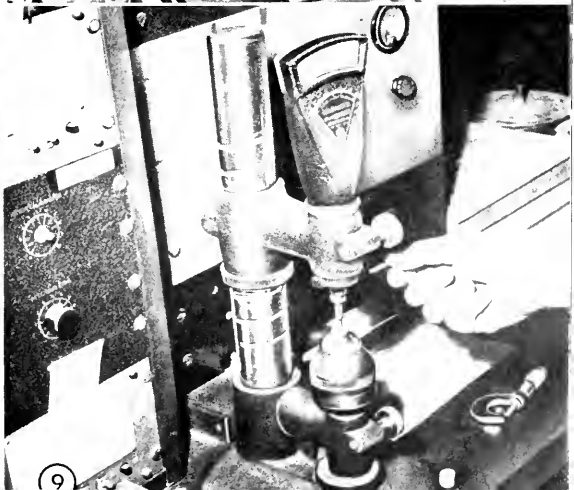
5—The next step is to place the glass-mounted crystal under a diamond edged saw. The saw table is tilted to slice the quartz along the desired plane.

6—Wafers are diced into segments by a smaller diamond edged wheel.

7, 8—After grinding a stack of segments to the proper diameter (see 8) they are brought to the desired thickness by a method called "lapping."

9—This precision gage will check the accuracy of the lapping process to one ten-thousandth of an inch. Finally, the frequency response of each crystal is compared to known standards over a wide temperature range.





Brig. General David Sarnoff, RCA Board Chairman, talks with stockholders after annual meeting of Corporation in New York on May 5.

RCA Set New Sales Record in First Quarter of Year, Stockholders are Told

Chairman of the Board at Annual Meeting Reveals Gain of 31 Per Cent in Net Earnings Compared to Same 1952 Period

OPERATIONS of the Radio Corporation of America for the first three months of 1953 resulted in the largest volume of business for any first quarter period in the history of the Corporation, Brig. General David Sarnoff, Chairman of the Board of RCA, announced May 5 at the 34th Annual Meeting of RCA Stockholders in a studio of the National Broadcasting Company in Radio City, New York.

General Sarnoff said first-quarter sales of RCA products and services amounted to $208,007,533. Profits, before Federal income taxes, amounted to $20,456,141. After providing $11,163,000 for these taxes, net earnings for the first quarter were $9,293,141, an increase of 31% over the same quarter last year.

After providing for preferred dividends, earnings per common share for the first quarter of 1953 were 61 cents, compared with 45 cents per share for the first quarter of 1952.

"This excellent record for the first quarter of this year," said General Sarnoff, "resulted from increased sales of television receivers and transmitters and government equipment, as well as the new business of home appliances, which the Corporation has added to its line of merchandise."

Government Orders

Of the total volume of business done by RCA in the first quarter of 1953, sales and services to the Government amounted to $37 million, or approximately 18%, compared with 13% of the first-quarter total volume last year, General Sarnoff reported, adding:

"The present backlog of our Government business exceeds last year's shipments. Our billings to the Government this year are expected to exceed last year's billings by a substantial amount."

Significant Developments

Other significant developments reported by General Sarnoff:

(1) Television, which represents the largest segment of RCA business, has continued expansion at a rapid pace. Demand for TV transmitters and studio equipment has increased, and the opening of each new station broadens the market for receivers. It is estimated that by mid-1956, television sets in American homes will total 38 million.

(2) Investment by RCA of $20 million in the development of color television has been justified by general acceptance of the RCA concept of an all-electronic, compatible system. RCA is ready to proceed with plans for commercial color television as soon as the Federal Communications Commission authorizes standards.

(3) New electronic products in the offing include a compact, push-button sound tape recorder and a tape recorder for television programs; the latter may revolutionize the television art and extend into the motion picture industry. Among other electronic developments are transistors, closed-circuit TV systems for industry, education and the home, microwave communications systems, and improved high fidelity record reproducing equipment.

(4) Introduction of a line of RCA room air-conditioners and room dehumidifiers in 1952 received acceptance that made it possible to sell all available models. Production is being expanded to meet 1953 demands.

(5) A new line of gas and electric ranges under the brand name of "RCA Estate" was introduced in January, 1953, with gratifying consumer response.

The Future

In looking to the future, General Sarnoff expressed the fervent hope that an end of hostilities in Korea may open the road to a new era of peace and prosperity. But he warned that "there is no call for illusions on this score."

"As long as one-third of the human race remains under totalitarian Soviet rule, the other two-thirds must remain alert and vigilant," he declared. "Only genuine strength, military and economic, can shield the free world against new aggressions. In these conditions, 'peace' will long continue to be a relative concept, hemmed in by political pressures.

"Even such a limited peace, however, should stimulate progress by releasing more of our country's talents and energies for the tasks of raising living standards. Ours is still a young nation, dynamic in its potential for growth. Economic maturity is a long way off."

General Sarnoff declared that the economy of this great country is not dependent upon war. He pointed out that the most vital and enduring economic expansion in American history has taken place in periods of peace.

"While our operations in electronics and communications are put into high gear during war or national emergency," he said, "we look forward to peace without misgivings. With the world at peace, our civilian economy and our trade with foreign nations would be increased and our commercial business would grow.

"In recent months, as Chairman of the Citizens Advisory Commission on Manpower Utilization in the Armed Services, and as a member of the Committee on Department of Defense Organization, I maintained that surplus fat can be taken off without injuring the muscles — in fact, the muscles are strengthened when the fat is removed. It is my firm belief that we must look forward to the production of wealth, not the production of waste. No economy can be sound or permanent that rests upon the violence of war instead of the security of peace. Peace is always more fundamentally profitable. The healthy growth of a nation and its industries, of its new enterprises and technology is more certain in peace than it is in war.

"War does, of course, in some instances, give added urgency to invention and engineering, as well as expansion of manufacturing facilities. Under the pressure of emergency, scientific advances in certain fields are accelerated. Peace, however, provides fuller opportunity to apply all advances on a broad scale for industrial, agricultural, educational, medical and civilian use.

"We need not develop robot planes and electronically controlled missiles only for purposes of destruction," he said. "There are many peacetime uses for such devices; for example, delivery of mail, packages and freight across world-wide distances.

"Therefore, let us hope that the day is not far distant when the industrial facilities of America can return to the type of planning that is basic to our social and economic progress.

"Meanwhile, in the light of present world conditions, we must continue to operate two great industrial production lines — one to maintain America's defensive strength, and the other to provide for the economic needs of the civilian population," said General Sarnoff. "Our manufacturing plants and communications facilities must

be 'at the ready' for all-out defense. RCA will continue its activities in scientific research and engineering, contributing all within its resources and facilities to help make America the strongest influence for peace and prosperity throughout the world."

Television

Since the "freeze" on television station construction was lifted a year ago, television expansion has continued at a rapid rate, he asserted, declaring:

"Demand for television transmitters and studio equipment has increased, and the opening of each new station broadens the market for receiving sets. Now, there are more than 23 million TV sets in the United States, an increase of 5 million since our meeting last year. TV stations now total 167 compared with 108 in May, 1952.

"During the past year, 28 UHF (ultra-high-frequency) stations began operation, and the performance of RCA Victor equipment has adequately proved the quality of UHF reception. Our present television sets are designed for high quality performance of either UHF or VHF (very-high-frequency). UHF is a vital factor in expansion of the television market.

"As television set owners, you are familiar with the phenomenal growth of broadcast television and how it has become an essential part of life in America. In addition to the millions of TV-equipped homes, thousands of rooms in leading hotels throughout the country also have TV receivers."

General Sarnoff called attention to television's expansion in the fields of news and education and cited advances in its cultural aspects through production of noted dramas and operas by the National Broadcasting Company, of which he is Chairman of the Board.

Reporting on progress that RCA has made in color television, he said that major improvements were made during the past year in the RCA compatible color system, the tri-color tube and in development of a tri-color camera tube, which promises to take the place of the three color tubes now used in the camera. He declared that RCA's investment of more than $20 million in the development of color TV has been justified by general acceptance of RCA's concept of an all-electronic compatible system.

Radio Broadcasting

Declaring that radio broadcasting is built upon a solid foundation for continuance of a vigorous national service that can coexist with television, General Sarnoff stated:

"Today, there are more than 115 million radio sets in the United States. This total includes 25 million automobile radios and millions of portable sets, all of which perform a service not reached by television.

"Forty-five million families in the United States have radios. For them, radio can provide more programs of broad selective appeal. National advertisers can use radio to reach massive audiences at low cost just as they use certain magazines to have their message read by large groups in specialized fields.

"In 1952, more than 10 million radio sets were produced by the industry as a whole. The trend in radio is to smaller and more compact sets. New and attractively designed portables together with clock-radios have increased in popularity. The use of transistors will further enhance the development of novel radios, and extend their usefulness through the development of truly pocket-size sets and light-weight portables which consume such small amounts of battery power that their life of service will be greatly lengthened."

Tape Recorders

Many new electronic developments are in the offing, General Sarnoff reported. He said that an RCA sound tape recorder is being readied for sale and will be introduced within the next few months. It is push-button operated and weighs only 23 pounds.

He stated that a television tape recorder under development at the RCA Laboratories in Princeton, N. J., may revolutionize the television art and is expected to extend to the motion picture industry as well. It will, to a great

Nearly 1,000 stockholders attend annual meeting in NBC's television studio 8-H, in Radio City.

extent, replace the use of film for television and thus reduce over-all costs.

Industrial Television

Only a fraction of the potential of industrial television has been tapped, he continued, asserting:

"It challenges the imagination to envisage the many uses of television, including the closed-circuit systems for use in industry, schools, department stores, theatres, hotels, banks and other institutions. Indeed, industrial television may surpass the growth of broadcast television which we are now witnessing. The development of compact, lightweight equipment, using RCA's small vidicon camera tube, will help to overcome the obstacle of high cost."

He said that the field of industrial electronics also has a great potential for expansion, and discussed the application of electronic devices and systems to business and industry through electronic computers, business machines, inspection devices and household appliances.

He declared that RCA is developing the potentialities in the field of solid-state electronics in which the transistor, a tiny device using a germanium crystal, is the master key to progress, just as the electron tube has been for almost 50 years. He said the transistor will greatly extend the usefulness of electronics.

Microwave Relays

Another promising field discussed by General Sarnoff was that of microwave and radio relays in which RCA has pioneered. He said RCA microwave systems have been installed by such diverse groups as oil and gas companies, utilities, city and state governments, and military organizations, as an effective means of modernizing communications. He reported that an RCA microwave system installed by the North Atlantic Treaty Organization in Europe had proved its effectiveness during the recent flood emergency in Holland. Shipment of similar equipment has been started for use in Formosa.

Foreign Business

In foreign markets, microwave and mobile radio, as well as television, are high on the list of RCA products in demand, said General Sarnoff, adding:

"Many countries are modernizing their communications by replacing wire lines with microwave and radio relay systems to aid their over-all economy. These countries include Canada, Israel, Burma, Indonesia, Pakistan and others.

"RCA has also sold a substantial number of television transmitters outside the United States, and more of these sales are in prospect in Asia, Latin America and Europe.

Japanese actress performs before an RCA television camera in studio of NHK, operated in Tokyo by the Broadcasting Corporation of Japan, one of the foreign installations that "open new markets for home television receivers."

These installations also open new markets for home television receivers.

"To meet the requirements of new markets abroad, RCA manufacturing and distributing facilities are being expanded in other countries. Enlarged plant capacity is being provided in Canada and new factories in Spain, Italy and Greece will be operating in 1953.

"At the end of 1952, the net assets in RCA's wholly-owned foreign subsidiaries located in seven countries totaled approximately $20 million based on exchange rates in use at the end of the year. This amount is less than 5 per cent of the Corporation's total assets. With this investment, RCA obtained a gross sales volume during 1952 of $44 million and net earnings, after taxes, of approximately $4 million.

"Because of exchange restrictions and other factors, however, less than $300,000 of net earnings was transferred last year to the parent Corporation in the form of dividends. Only this amount was included in the RCA consolidated statement of profits for 1952. The remainder of $3,700,000 was retained abroad and added to the working capital of our foreign subsidiary operations."

Microwave Radio Becomes More Important to Industries

MANY American industries, faced these days with the necessity of doing something to meet their expanding communications requirements, have discovered a relatively new and magic tool with which to solve the problem — microwave radio.

In the opinion of one of the pioneers in this field, Dr. C. B. Jolliffe, Vice President and Technical Director of the Radio Corporation of America, the fast-growing popularity of microwave radio stems from a combination of factors.

"Most important," he said, "is the ability of this medium to provide multiple-channel communications over long distances with greater reliability and at lower cost than has yet been accomplished by any other means.

"Practically invulnerable to storms, microwave radio circuits can carry such valuable services as television, teletype, telephone, facsimile, telemetering, traffic control information, and permit push-button supervisory control of unattended equipment at remote points. Industrial television can be incorporated to extend sight for purposes of vast importance to utility companies and other organizations having widely separated activities."

Dr. Jolliffe said that since World War II, when these tiny radio waves proved of immense value in military service, one major civilian enterprise after another has considered microwave radio for solution of its individual communications problem.

Installations of microwave radio relay systems now have been completed in such widely diversified fields as electrical utility operations, oil pipeline control, railroad communications and signaling, telephone and telegraph systems and state highway patrol, as well as special military applications here and abroad.

One of the microwave systems best known in America is that operated by the American Telephone and Telegraph Company, providing for the coast-to-coast transmission of television programs. This system which is replacing or supplementing coaxial cables, consists of strategically placed radio relay towers, some 25 to 50 miles apart, which "bounce" the signals from one to another across the country.

Pioneering in the development of microwave relay systems was begun by RCA scientists and engineers more than 25 years ago. This work has continued without interruption to open the way for the greatest possible use of the higher radio frequencies. Credit for much of the early work in harnessing microwaves for commercial use should go to Dr. H. H. Beverage, Vice President in Charge of Research and Development of RCA Communications, Inc.; and C. W. Hansell, of the RCA Laboratories Division.

This microwave antenna, located at a secluded operations base in Western Europe, is one of the links in an RCA radio network linking Allied air installations with Central Europe headquarters of the U. S. Air Force.

In the electronics industry, it is generally accepted that radio frequencies of about 1,000 megacycles and higher are in the microwave region of the spectrum. Being of such short wave length (12 inches or less), microwaves exhibit many characteristics similar to those of light, such as defraction, reflection and refraction.

These light-like characteristics become more and more pronounced in the higher and higher frequencies. Thus it is relatively simple to focus microwave signals

into narrow, powerful beams and project them over long distances. This is accomplished by the use of highly directive transmitting and receiving antennas which act like huge lenses on searchlights. High gain in signal power is effected at each relay station, making it possible to project information over a point-to-point relay system with very low initial power.

Development of new types of electron tubes, new antennas, transmitters and receiving equipment all of vastly different design, compared with conventional apparatus of the past, has constituted the outstanding contribution of RCA to this promising form of communications.

A single RCA microwave circuit now available commercially, affords as many facilities as a 24-line channel wire system. These 24 channels may be used for voice communication or for numerous control purposes. Each of the 24 channels may be subdivided into as many as 18 signal circuits which may be utilized for telemetering, remote operations, supervisory and load control, and each voice channel may be subdivided into at least eight teletype channels.

By means of microwave radio any function that can be converted into an electrical impulse, such as pressure, temperature, and engine speed, among others, can be transmitted. Equipment in operation at unattended points of operations may be started, stopped and regulated by means of microwaves.

Advantages of microwave radio are many. It functions reliably during all kinds of weather. Storms that tear down wire lines have little effect on microwave propagation. In wintery weather microwave has proved itself far less vulnerable to damage than wire lines because, as Dr. Jolliffe pointed out, "ice can't form on a radio beam." Microwave radio performs reliably during excesses of temperature, dust and sand storms.

Microwaves travel through the air, eliminating the need for pole lines, the necessity for land easements, and line maintenance. Rather than cutting a path through difficult terrain, it is only necessary to set up repeater stations at points indicated. Instead of purchasing a continuous right-of-way, it is only necessary to acquire repeater sites. Patrolling of the entire line is replaced by occasional visits to repeater sites.

Both initial investment and maintenance costs are usually less than that required for a wire line system offering comparable facilities. Audio quality is at least equal to and usually better than that offered by wire lines.

Outstanding performance has been accredited to microwave radio systems on two of America's superhighways. About a year ago, both the New Jersey and Pennsylvania Turnpike Commissions acquired RCA equipment to handle traffic control and facilitate police supervision of these important state thoroughfares. These systems carry voice and teletype messages over the entire length of each turnpike, providing instant contact between cruising patrol cars and central terminals.

A new chapter in communications for power companies opened this spring, when the Union Electric Company of Missouri began operation of an RCA microwave network providing the most dependable and flexible service in its experience. The installation is used to coordinate activities within the Union Electric system and neighboring utility communications.

This microwave network carries voice messages throughout the system. It functions with mobile radio

A portion of the 118-mile New Jersey Turnpike which is covered throughout its length by microwave radio systems developed by RCA.

Employee of Sunroy Oil Company checks information supplied him by microwave circuits extending throughout the company's pipe-line system.

units, as well as handling telemetering and load control data. It is designed to handle 24 simultaneous voice conversations between any two points on the circuit. By clearing just one of the voice channels, as many as 18 simultaneous telemetering or load control functions may be added.

Within Missouri, antenna towers and relay stations have been constructed at seven points, varying from 11 to 37.5 miles apart. Towers have also been erected at the Osage, Rivermines and Moberly terminal stations. The sign on top of the main office building at 12th and Locust Streets serves as the antenna tower for the St. Louis terminal.

The towers, ranging in height from 100 to 250 feet, are located on high points of ground so that the natural curvature of the earth and other high intervening structures, such as trees and building, will not impede the microwave "beam" which travels along a "line-of-sight" path.

Towers Will Withstand 100-Mile Gales

Despite their slender appearance, the towers are of rugged construction. They are designed to withstand a 100-mile-an-hour wind under severe icing conditions. Also, the towers are rigid so they do not twist in a high wind. The accuracy required of microwave broadcasting is like the accuracy of an expert marksman since the 6-foot parabola antenna must be hit dead center by a narrow radio beam 30 miles distant.

In Missouri, the network covers about 262 miles. From St. Louis, there are three separate beams in operation, all originating from the main office building. One leads to the Wood River Plant of the Illinois Power Company, connecting to its microwave system. The second leads to the Meramec Plant, now under construction south of St. Louis. The third has three branches: the first to the Moberly substation, connecting with Missouri Power & Light Company's communications system; the second to the Osage hydroelectric plant; and the third to the Rivermines substation.

Plans are being made to extend the microwave network from the Meramec Plant to the Joppa Steam Electric Station, which Electric Energy, Inc., is building across the Ohio River from the Atomic Energy Commission's new plant at Paducah, Ky. This circuit, measuring about 160 miles, will not only tie in the Joppa Plant, but will also interconnect with the Central Illinois Public Service Company microwave system. Central Illinois, in turn is tied into Illinois Power Company's communications and back to Union Electric through the Wood River circuit. Thus, there will be two microwave paths between the Union Electric and the Electric Energy installation.

For maximum dependability under adverse conditions this microwave network has a system of alarm mechanisms, standby equipment and emergency provisions. A small, unattended building, erected at the foot of each tower, contains all of the electrical equipment, photoelectric cells for turning tower lights on and off, and completely automatic, self-starting, gasoline-driven motor generator sets to take over the load in event of power failure.

With their gasoline supply in underground storage tanks adjoining the towers, the emergency generators are capable of running continuously for several days. When normal power returns, the emergency units automatically shut down.

At the three main terminals, alarm panels equipped with blinker lights flash the location of trouble anywhere in the system and indicate the cause of the trouble — such as power failure, tower light failure, equipment failure, etc. The electronic equipment at all locations is supported by duplicate transmitters and receivers. In the event normal equipment fails, the standby unit automatically goes into service.

Radio transmitters are installed at many of the microwave relay points and at the terminals. They have been so located to afford complete radio coverage on all major transmission lines linking Osage, Rivermines, Moberly and Joppa, also the local load areas around St. Louis, Osage, and Rivermines.

These stations, operating in conjunction with the microwave net, enable the mobile units to remain in contact with personnel throughout the system. The network is so arranged that each terminal may use its local radio facilities without interfering with a distant terminal. When necessary, however, any terminal may take command of the entire system through the microwave ties in order to contact distant trouble cars.

Service Unaffected by Elements

Another important user of RCA microwave radio is the Central Arizona Light and Power Company which has been operating a system since 1949 for general communications, telemetering and remote control. Despite temperatures as high as 140 degrees, severe lightning storms, and unusual exposure to sand, dust and insects, the equipment provides excellent continuity of service.

One microwave link of this system operates between the company's generating plant and a switching station, sixteen miles to the west. This link provides remote control and indication on circuit breakers, remote metering of voltage, current, power, and two-way voice communication.

RCA and NBC Petition FCC to Adopt Compatible Color TV Standards

(Continued from page 7)

compatible color television system has been developed technically, the next big step is to translate these scientific accomplishments into a regular color program service to the public.

"In black-and-white," the petition states, "the vast amounts of money spent in television development by the RCA-NBC scientific and technical groups was followed by a vast amount of money spent by the company to develop programming techniques and skills, to find the proper use of showmanship in this new medium. Our plan to repeat this formula in color will cost additional sums.

"With this in mind, during the introductory year NBC will set up procedures to give technical and program people from our affiliated stations, and our owned and operated stations, experience in color broadcasting and color problems.

"Under our plans, by the time the manufacturers have tooled up for mass distribution of color receivers, and a large audience watches our programming work, we will have learned the program technology just as our engineers have learned the proper use of their new tools. Meanwhile, the art of entertainment and the presentation of reality, in color, will have progressed far."

RCA-NBC Met Heavy Schedule of Color TV Tests During Past Year

In the months prior to the filing of the petition, RCA and NBC met a heavy schedule of color television field tests and broadcast demonstrations.

On April 14, members of the Committee on Interstate and Foreign Commerce of the House of Representatives witnessed RCA color television on receivers at the David Sarnoff Research Center, Princeton, N. J. A twenty-minute program, featuring a variety of entertainment, was broadcast over Channel 4 in New York City using experimental license KE2XJV. Three weeks earlier, RCA had told the Committee in Washington that RCA and NBC were ready to start color television broadcasting and recommended that the FCC immediately authorize commercial broadcasts of compatible color television signals.

The demonstration for the House Committee also included outdoor pickup of color television pictures with the NBC mobile color television unit. RCA Laboratories Division research men showed in operation experimental models of an improved color television projection receiver, a focus-mask tricolor receiving tube and a color camera that functions with one camera tube instead of the three in present-day equipment. The committee later inspected the Colonial Theater color television studio in New York.

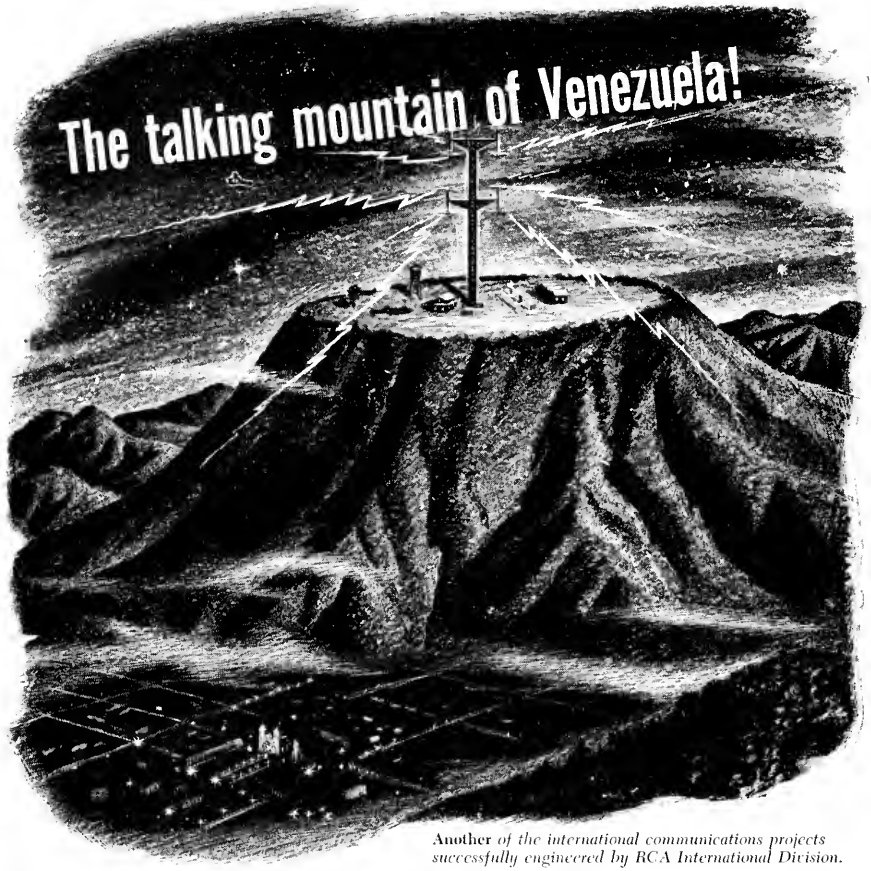
Similar demonstrations were held on April 16, for members of the NTSC; on May 19, for members of the FCC and staff; on May 21, for RCA licensees, and on May 26, for NBC network affiliates. On June 22, the Committee on Interstate and Foreign Commerce of the U. S. Senate witnessed a color program originating in the Colonial Theater and beamed to Washington over microwave facilities.

Sarnoff Receives Honorary Degrees

Two honorary degrees were conferred during June upon Brig. General David Sarnoff, Board Chairman of RCA, by educational institutions in New Jersey and Pennsylvania. On June 2, he received an honorary degree of Doctor of Laws from Fairleigh Dickinson College, Rutherford, N. J., and on June 13, he was the recipient of the honorary degree of Doctor of Engineering from Drexel Institute of Technology at Philadelphia.

"Fifty years from now our descendants will say that we were very slow in 1953," he told the Fairleigh Dickinson graduating class. "Their automobiles, locomotives and ships may be powered by atomic energy. Their systems of transportation will surpass in safety, speed and comfort anything we have today. Those who may wish to stay at home and see the world will be able to look around the globe by color television."

In his commencement address at Drexel Institute, General Sarnoff declared that America's strength and leadership must be maintained as the great outpost of freedom. Until society finds the wisdom to abolish war there is no alternative, he said, but to keep America strong enough to resist aggression. "The surest way to discourage an attack upon us," he continued, "is to be adequately prepared to meet it successfully . . . if it does come."



Another *of the international communications projects successfully engineered by RCA International Division.*

A modern industrial adventure . . . in which a mountain is moved, cities are built, and distances are annihilated through radio communication.

It's a mountain called "Cerro Bolivar." Separating it and its iron ore from Fairless Works in Morrisville, Pennsylvania, and other plants of United States Steel, are thousands of miles of open sea, jungle, grassy tablelands and rivers. The problems . . . to provide engineering, mining equipment, personnel, living quarters, transportation . . . and instant communication between all operational points.

Today the mountain "talks." A city is rising where the Caroni River joins the great Orinoco. A 90-mile railroad is pushing up the tablelands to the mine. Roads are being built. Dredges are deepening almost 200 miles of the Orinoco to open sea to float specially designed ore ships.

RCA radio knits the entire operation together through instant voice communication between all executive and operating units. The mountain "talks" to the dredges, ore vessels, automotive vehicles and railway, the crews in their floating quarters, survey parties and water taxis . . . a flexible system of continuous 2-way radio.

Co-ordination of high degree was required. Communications experts of RCA joined hands with Venezuelan officials; Orinoco Mining Company, subsidiary of U. S. Steel; with Bechtel International, Morrison-Knudsen, Cahagan Overseas Construction Company and McWilliams Dredging Overseas Corporation, The Paul Godley Company and other international engineering firms.

RCA products and services are available in all world markets open to trade, through RCA distributors and associated companies. The new book, "Communications, Key to Progress" tells the inspiring story of radio at work in many countries. Simply write to RCA International Division, 30 Rockefeller Plaza, N.Y., U.S.A.

World Leader in Radio
First in Recorded Music
First in Television

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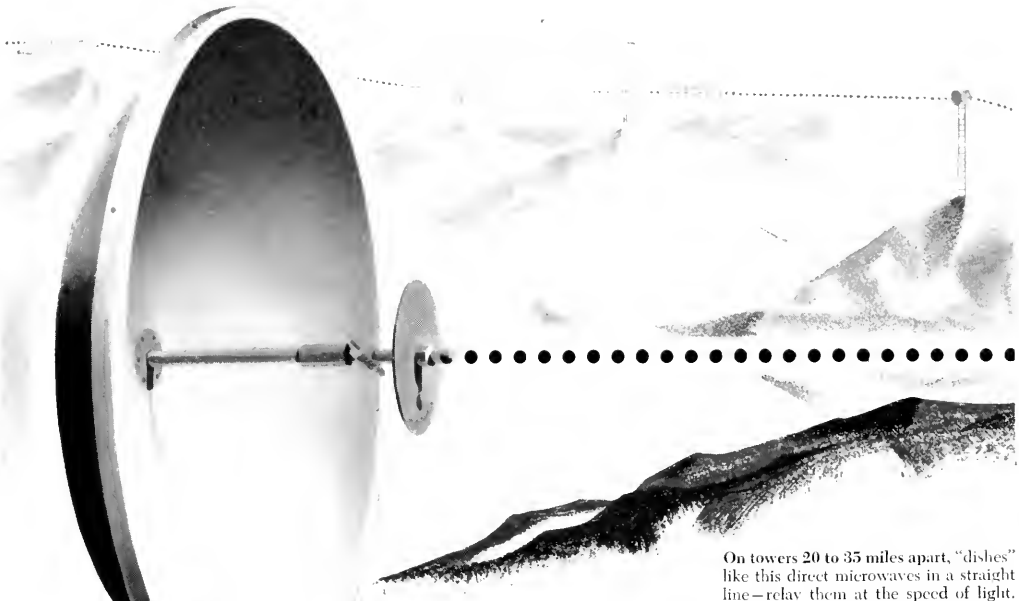


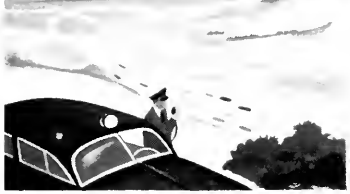
On towers **20 to 35 miles apart,** "dishes" like this direct microwaves in a straight line—relay them at the speed of light.

Out of this "dish" come service and safety

Like a *pole line in the sky,* the RCA microwave system gives industry, business, transportation and police, a new, more efficient means of communication.

Needing no wires, economical to install and maintain, RCA microwave is "weatherproof." Wind and rain almost never affect its performance while, obviously, ice *won't form on a radio beam* to put it out of action.

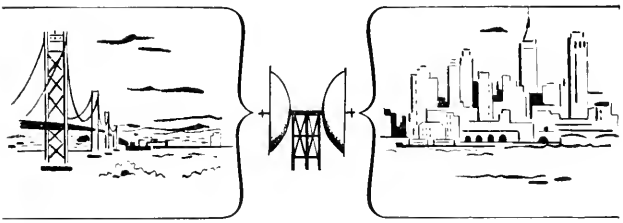
Useful wherever man must communicate with man, or control industrial operations, the increased efficiency of microwave is another example of RCA leadership in research and engineering. Such leadership gives you better value in any product or service of RCA and RCA Victor.



On new super-highways, RCA microwave and RCA mobile radio help control traffic flow, help police trap lawbreakers—just as *conservation officials* use it to catch poachers, or to warn against the danger of fire and flood.

RCA microwave helps *oil companies* move oil through pipelines, gives *power companies* better control of current, is used in *mining, lumbering,* and by the *fishing* industry.

TV NETWORKS THAT SPAN THE CONTINENT ARE MADE POSSIBLE BY MICROWAVE RADIO RELAY STATIONS



RCA®

RADIO CORPORATION OF AMERICA

World leader in radio—first in television

First home television camera, RCA's "TV Eye," connects to any TV set—lets you watch children in the nursery or at play.

RCA "TV Eye" gives schools a private TV network, takes talks and demonstrations to classrooms.

In a railroad yard, RCA vidicon camera lets employees check car numbers at long range.

RCA vidicon camera in a bank, lets tellers verify the signatures on checks by television.

New RCA TV camera an alert watchman for home, school, industry

Based on the vidicon tube, developed by RCA, a new instrument is on the way for homes, business, and schools—the RCA "TV Eye."

Light, compact, easy to use, "TV Eye" is a camera unit which can be connected to standard home receivers—makes any of the 23 million TV sets now in use a potential closed-circuit television system.

RCA's industrial version of the vidicon camera has already proved its place as an observer and guardian in science, industry, transportation, business—with new uses still being explored. Wherever distance or danger preclude a human observer's presence, the vidicon camera can take his place and stand watch.

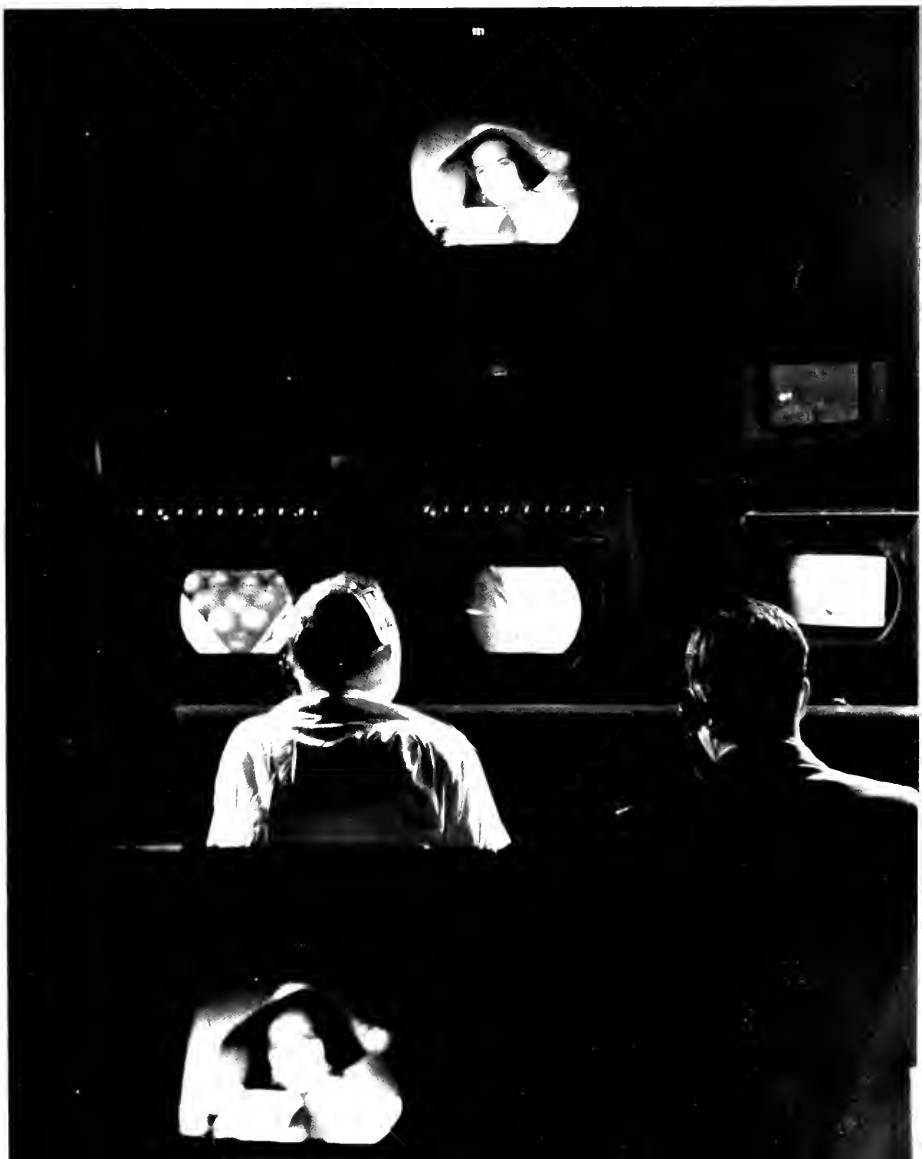
"TV Eye" plugs easily into standard TV sets. You just switch to the selected channel, and see everything that the camera sees.

® *RADIO CORPORATION OF AMERICA*

World leader in radio—first in television

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



OCTOBER
1953

LOR TELEVISION
dio Control Room

No speed limit ON THIS SKY HIGHWAY

RCA Microwave Radio Relay offers fast, all-weather route for two-way communication and control

For high-speed, multi-channel communication—for communication that knows no weather problems—RCA now offers industry a new miracle in practical form—RCA Microwave Radio Relay.

At any instant this new electronic development can handle up to 24 simultaneous messages—relaying a narrow UHF radio beam from tower to tower—over distances of several miles to several thousand miles. Without the vulnerability of wire lines—without the installation and maintenance problems of wire lines—RCA Microwave carries telephone, teletype, and telegraph messages, remote-control impulses, and meter readings at close to 100% continuity of service.

Because "RCA Microwave stays in service when you need it most," it is fast becoming the top communication tool of all types of right-of-way organizations. Pipeline companies, utilities, turnpikes, and government agencies consider it the most dependable way to conduct business over long distances.

Write for your copy of RCA's informative booklet, "INTRODUCTION TO MICROWAVE."

RCA

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT **CAMDEN, N.J.**

VOLUME 12 NUMBER 4

Radio Age

ARCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

OCTOBER 1953

COVER

Technicians in the control room at NBC's Colonial Theater in New York study color television images as they appear on an RCA tricolor picture tubes.

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.

EDWARD JULIAN NALLY was born on the eleventh of April, 1859, in Philadelphia. He came into the world, the son of Patrick and Mary (Cullen) Nally, at a time when Americans were being challenged to pioneer on all fronts of science, industry, commerce, and communications. Railroads and the telegraph appealed to the imagination of many a boy, and Edward Nally ventured forth on the new wire-line trails that were stringing westward across the country to spread the click of dots and dashes.

His career in communications began with the Western Union Telegraph Company in St. Louis, Missouri, on September 1, 1875, and from that day on messages and messengers were Edward J. Nally's great interest. As the copper wires of the telegraph were unreeled to parallel every mile of steel rails, so young Nally's duties increased and he continually persevered, climbing the ladder of communications. He was with the Western Union until 1890 when he took a new position as Assistant General Superintendent, Western Division, of the Postal Telegraph-Cable Company, in Chicago.

Edward Julian Nally

1859-1953

It was while he was with Postal, during the latter part of the 90's, that a young man named Marconi invented a new system of communication called "wireless." The majority of telegraphers scoffed it off as impractical; they said that even if invisible waves in the air could carry messages they were too ethereal to be dependable. Then, too, wireless lacked the privacy afforded by wires. Nevertheless, in 1901 the new-fangled "wireless" spanned the Atlantic and was heralded as a threat to both cable and telegraph. But the majority of communications "experts" continued to call it a fad and transoceanic "wireless" just a stunt—even if true!

Bold would be a telegrapher who would forsake the wires for wireless; but in 1913 Edward Julian Nally did just that. He resigned from the telegraph field to become vice-president, general manager and director of the Marconi Wireless Telegraph Company of America. Mr. Nally had faith in the future of wireless. And when he had faith in anything, or anybody it was abiding.

When, in 1919, the Marconi Company was acquired by the newly formed Radio Corporation of America for the purpose of giving the United States preeminence in communications independent of all foreign countries, Edward J. Nally was elected the first president and a director of RCA.

Paralleling his vibrant interest in the communications business, Mr. Nally's humanitarian influences radiated afar. Great was his sentiment for history and old-timers—the veterans in telegraphy and wireless—for whom he always had an everlasting thought of kindness. His smile, the twinkle in his eyes, his Irish wit, his pat on the back brought encouragement to everyone who came in contact with him. Never did he lose the common touch. And he had a God-given gift of expression through his pen, and his writings were often those of a poet.

He loved his family and cherished his friends. If ever there was a day in his life that was the brightest of all, it was June 10, 1897 when he and Lee Warren Redd were married in Lexington, Ky. That was a day of blessing for them both, for they lived 56 years of happiness together and found great pride in their two children, Mary Lee and Edward Julian, Jr., and in the four grandchildren. Happily he counted his great grandchildren, "Total to date, two girls and four boys!"

"Mister Nally," as everyone addressed him, had undisputed claim to the title "grand old man of wireless," for he had reached 94! He was a symbol of his time; a genuine American with the interests of his country at heart. Always a scholar who avidly read everything he could get his hands on, from the classics to scientific papers. A man of God, devout in religion, he applied its precepts to his everyday life.

Fatherly was his advice, and well it might be, for in the final quarter century of his life the younger men appeared to him as his "boys." To them he would say: "Son, don't be stampeded into making hasty decisions that require study and thought. Snap judgment is often dangerous. Never lose faith in yourself. Hope not too much, fear not at all."

Always quick to appreciate progress, he was equally alert to applaud the triumphs of youth. Only a few hours before his book of life was closed on September 22, 1953, he penned his admiration of a new booklet on the phonograph art: "Verily, it is the record of records!"

So too his epitaph, "Verily a record of records." For the name "Edward Julian Nally" will endure in the hearts of men in characters of living light kindled by kindly words and friendly deeds that live in memory beyond the reach of Time.

Sarnoff Sees Horizons of Service for Radio Being Widened by New Developments in Science

A NEW era of progress for the National Broadcasting Company's radio network was opened on September 17 in Chicago when network officials met with representatives of affiliated stations for a full scale review of new radio program development and sales plans.

The broadcasters, meeting at the Drake Hotel, were given a glimpse of new horizons for radio by Brig. General David Sarnoff, Chairman of the Boards of Radio Corporation of America and the National Broadcasting Company, who spoke of present developments in the RCA Laboratories that will lead to the manufacture and use of tiny personal pocket and wrist radios. Such technical developments as these miniature sets, he predicted, will create new radio audiences for the future. He outlined NBC's goals of leadership in radio and its plans for utilizing new opportunities offered by evolutionary changes within the industry.

Frank M. Folsom, president of RCA, and other RCA-NBC officials attended the company's first meeting with the newly organized NBC Radio Affiliates Committee.

General Sarnoff was presented to the group by Robert D. Swezey, executive vice-president and general manager of WDSU, New Orleans, La., and Chairman of the Affiliates Committee.

"Besides creating new program approaches to meet changing listening habits, we can also develop new audiences through scientific progress," said General Sarnoff. "For example, tiny radio sets—no bigger than a wallet, and ultimately a wristwatch—would advance the use of personal radios, and thereby greatly enlarge the total radio audience.

"Such miniature radio sets are not a fantasy. At our laboratories we are working on the use of transistors as one of the applications of electronics-in-solids. The prototype of the tiny personal radio is already in existence. The miniature radio will reach out to bring radio to everyone everywhere, opening up new types of personal entertainment and information services. Pocket and wrist radio sets will become standard equipment for millions of people. Far from being a victim, radio is a beneficiary of science and technical progress.

"I for one will not cast a vote of 'no confidence' in the future of radio," said General Sarnoff. "I am convinced that there is and that there will continue to be a large audience and substantial advertising revenue for a national radio service. This does not mean that the field is unlimited, or that everyone in it is sure to survive. I believe, however, that the field will remain large enough to support those networks which possess basic strength, a true sense of their obligations to the public, and a capacity to adapt themselves to the new facts of life."

"I do nor see the picture in radio as one of unrelieved gloom. Neither do I look upon it with the bubbling optimism that has characterized some public statements on the subject—as if resolute cheerfulness would solve all problems. Instead, I recognize that basic changes have taken place and are continuing to take place, and that they disturb the old patterns of this medium. Those changes have created new problems for radio, some of them real with menace, others exaggerated by unjustified jitters.

"Bur these new problems also point to new directions that radio must follow. If these directions are opened up without too much delay and are developed boldly, radio stations can continue to operate at a substantial profit, and a profitable network operation is also possible."

General Sarnoff pointed out that the number of radio sets in use is constantly increasing and radio listening is more widely dispersed throughout the home and outside the home. He called attention to the fact that in the first 34 weeks of 1953 more than 8,488,000 radio sets were sold in the United States, as compared with 6,519,000 during the same period in 1952—an increase of almost two million radios in the past year.

"For the past several years," he said, "more and more radio sets have been bought. They are going into bedrooms, kitchens, playrooms and bathrooms. They take the form of automobile radios and portable sets. Family listening is giving way to individual listening.

"In the first half of this year, the output of automobile sets almost equalled the full year's production of automobile radios in 1952. Sales of clock-radios are now higher than they were last year, and since 1947 almost half of all the radio sets sold were automobile sets, portables and clock-radios."

In calling attention to this vast new audience for radio, General Sarnoff decried the emphasis on program ratings, pointing out that the rating system leaves out of reckoning over 5,000,000 homes with three sets or more. It ignores listening to 5,000,000 sets in public places, millions of portable sets and more than 26,000,000 automobile sets. "In short," he said, "radio is judged on rat-

ings that have lost touch with the realities of the medium."

Ratings not only fail to measure the true size of the radio audiences, General Sarnoff said, but they do not even undertake to indicate the quality and influence of the medium, and concentration on this limited quantitative standard has led to a failure to recognize radio's real values.

As examples of evils resulting from this situation, General Sarnoff cited the "nostalgic" tendency to devalue radio by comparing the size of its audience today with what it was in the past, instead of comparing radio with other media available today, in terms of their relative cost and effectiveness. He also called attention to the preoccupation with top-rated programs and the failure to give adequate recognition to the composition and influence of audiences to particular programs.

"Ratings, today, simply do not reflect the real audience," he continued. "They are certainly not conclusive on the essence of the matter, which is the ratio between listening and sales. We have found cases where competing advertisers were getting about the same ratings, but where one of the programs produced many more customers than the other. And we have also found cases where competing advertisers were getting about the same sales effectiveness from their programs, although one had a much lower rating than the other!"

As evidence of NBC's real leadership of the industry General Sarnoff referred to its establishment of the first radio network, creation of great public service programs, development of black-and-white television, pioneering in UHF and developing and fighting for the adoption of compatible color television, all with earnest support from the RCA. Such achievements in leadership are practical evidence of NBC's basic strength and adaptability which will enable it to realize the potentials of radio's future. With the cooperation of its affiliates, NBC will lead the way with new paths for further development of network radio, offering a wider diversity of programs and advertising opportunities, he said.

The importance of maintaining strong and solvent radio networks was stressed by General Sarnoff. Apart from their direct values to affiliated stations and the public stature they give broadcasting as a whole, the national network services are essential to the maintenance of democracy and security, he pointed out.

"Local services are important to the community," continued General Sarnoff. "But does anyone think that

FOUR OF THE MANY STAR-STUDDED PROGRAMS THAT W

Lawrence Tibbett
in "The Golden Voices"
Sundays at 3:30 p.m. EST.

Fibber McGee and Molly
Mondays through Fridays
10:00 p.m. EST

radio could have become such a basic part of American life if it had been restricted to these local services? Does anyone believe that broadcasting would retain its stature with the public if network services were not maintained?

"It was easy access to nationally known performers, to great orchestras and great drama, to the products of nationwide and worldwide news organizations — in sum, to the network offerings — that made broadcasting indispensable to people throughout our land. Americans became dependent on broadcasting because network services brought them instantly the great events and issues and personalities of the day and the hour.

"Our national democracy is geared to immediate and direct availability of a national audience," he said. "This is dramatically obvious in a Presidential election campaign and in wartime, but it holds true at all times. One of the central problems in this age of peril is that of continuous contact between our citizenry and its Government. Only broadcasting can alert the entire nation instantaneously and simultaneously in time of danger. Subtract the nationwide network system, and these all-important factors for democracy and security are lost.

"Under the circumstances, would Government have any alternative but to step in and provide its own national service? If free enterprise should fail in this aspect of broadcasting, it will be endangered in all other aspects. Let there be no illusions on that score. The very existence of the industry on a competitive free-enterprise basis would be jeopardized.

"And let us reflect also on the role networks play in the economics of all station operations. Because one independent station in a community is thriving on 'music and news', some folks assume that all stations could do likewise. They forget that such a station siphons off the major portion of a highly specialized audience. In most communities, such a specialized audience is not large enough to support more than one or two radio stations.

"Strong and solvent networks," General Sarnoff declared, "are essential to healthy station operation. As in any industry in time of transition, we can look for the survival of the fittest. But in an industry like ours, which rests on 'public interest, convenience, and necessity', the tests of fitness are highly exacting. They certainly do not include policies of expediency, flash performance, talent piracy, or the kind of practices which focus on today and ignore tomorrow. The real tests of fitness of a radio network's capacity for leadership are its far-sighted concern for the well-being of the industry as a whole, its deep

GHLIGHT NBC'S NEW FALL SERIES OF RADIO FEATURES

Senator Ford
in "Can You Top This?"
Mondays through Fridays
10:15 p.m. EST.

Hume Cronyn and Jessica Tandy
in "The Marriage"
Sundays at 7:30 p.m. EST.

Statement on Behalf of NBC Radio Affiliates

We were unanimous in our enthusiastic reception of the overall plans and proposals presented to us today by the NBC executives for the revitalization of the NBC Radio Network and the strengthening of the medium.

The NBC radio affiliates endorse the new program concepts which show originality and basic soundness and which, coupled with the promotional supports and fresh, aggressive sales approaches which were outlined to us, give excellent promise of success.

This effort on the part of NBC is to our minds the most significant and constructive forward step which has been taken in the network broadcasting business in many years.

We were most favorably impressed with General Sarnoff's frank and cogent analysis of the present radio broadcasting picture and his penetrating views with respect to the future of radio.

It is our intention to continue the NBC Radio Affiliates Committee as a permanent organization with the present subcommittee continuing to function as an active liaison between the full committee and the network representatives.

It is our sincere belief that today's meeting constitutes an important milestone in the history of the NBC Radio Network.

We are confident that the approach taken in that meeting will aid materially in insuring the continuing effectiveness of the network as a vital public service and advertising facility.

The NBC radio affiliates have today pledged themselves to make every reasonable cooperative effort with the network officials to keep NBC in the number one position in American radio.

For the NBC Radio Affiliates Committee:

September 17, 1953
Chicago, Illinois

NBC's Radio Affiliates issued this statement following outlines of the network's new programming plans by General Sarnoff and other NBC executives.

roots in the field of public service, and its record for fair play in relation both to its associates and the industry at large.

"Those who have built for the future, who have laid a program and sales base of permanent value, will have the staying power. Those who operate for temporary expediency, no matter how flamboyantly, will be conquered by problems for which further expediency will hold no solutions.

"I underscore these points because it seems to me desirable at the present crossroads of our industry's history to underline the difference between a responsible leadership that builds permanent values for itself, its associates and the entire industry, and a claimed leadership that rests on opportunism and concentrates on the short-term private gain, regardless of consequences to the future of the business.

"Broadcasting is not a finished art or industry and it will never be static," concluded General Sarnoff. "Nor is the promise of the future limited to television. It extends to all applications of the electronics art, and it certainly extends to radio. The transistor development is only one of the possibilities for radio. Scientific invention can also be matched by imagination and creation in programming, in selling, in operating more economically, and in finding ways for networks and affiliates to progress on a basis that will be profitable and satisfactory to both."

NBC, General Sarnoff told the affiliates, is in business

for the long range opportunities, concerned with creating permanent values for its employees, for its affiliates, for the RCA, and for the nation.

Prior to General Sarnoff's address William H. Fineshriber, Jr., vice president in charge of the NBC radio network, said that NBC's new and separate radio organization is going forward with imagination and intelligence in revitalizing the network's radio program structure and meeting present-day needs of advertisers.

Fineshriber pointed out that the NBC radio network now offers a great variety of fresh, new half-hour programs for advertisers who buy on that basis, a number of new program forms which can be bought in small units by smaller advertisers, and a variety of shared sponsorship opportunities for advertisers who want to spread their radio advertising over different periods or supplement their other network operations.

Shared participation sponsorships will be available in a strip pattern, 15 minutes, five days a week or in two solid hours of daytime programs on Saturday and Sunday. The strip programs will be "Fibber McGee and Molly", 10 to 10:15 PM, "It Pays to be Married", 5:45-6 PM, and "Second Chance", 11:45-12 PM — all Monday through Friday. Advertisers will be asked to buy a minimum of three participations, each consisting of one commercial announcement, but they can distribute these commercial messages in any of the programs. A similar participation format has been established for "The Big Preview", Saturdays, 11 AM to 1:00 PM, beginning October 3 and highlighting all the new record releases of the week, and "Week-End", Sundays 2:00 to 4:00 PM, radio's new Sunday newspaper beginning October 4.

"We are thinking ahead to our long range future in radio," Fineshriber said, "because we expect to be in radio for as long ahead as anyone can see. And we are building for leadership — the sort of leadership that is founded on a solid base and can weather any storm.

"Radio provides certain services which no other medium can provide as well and it meets needs which no other medium can meet in the same way. If we build on these values, if we put network radio to work at the things it can do best, we will always hold enough audience to support a national service. And if we and our affiliates accommodate our network sales patterns to meet new advertising needs, we will build the revenue needed to keep the business solvent and to make it profitable for networks as well as for the stations.

"With the new radio organization, the new programming and renewed concentration on our radio problems, we are ready to go. Our purpose is to win and to hold for NBC first position in public attention, in audience, in advertising values and in sales. We expect to prove by deeds — and not just by words — the continuing vitality of network radio. And the new values we are now building are not for short term demonstration purposes but for the permanent future."

Ted Cott, operating vice-president of the radio network, announced the details of NBC's massive frontal attack in radio programming. The 28 new program series which begin the week of October 4 constitute the greatest single mass programming operation in the history of the industry, he pointed out, and demonstrate NBC's basic decision to meet today's programming needs with courage and imagination rather than by cautious, timid or tentative experimentation.

Block or mood programming has given each night of the radio week on NBC a flavor and individual character of its own, Cott explained. "Vertical mood programming of this kind in blocks means better and stronger audience reaction by engaging the attentions of the public who can settle down to mood rather than smorgasbord," he pointed out. Sunday night will feature drama; Monday, music; Tuesday, mystery and adventure; Wednesday, comedy; Thursday, comedy and audience participation; Friday, all comedy; Saturday, a "prestige" block from 6:30-8:00 PM and "hillbilly" programs after 8:00 PM.

Middle West Press Views RCA Compatible Color TV

Compatible color television was viewed for the first time by the Middle West press when the National Broadcasting Company held a special showing of the RCA compatible color system in Chicago on September 22.

The program, a variety show, starring Nanette Fabray and the "Hit Parade" dancers, was viewed in the Drake Hotel over a closed circuit from NBC's Colonial Theatre in New York, world's first fully equipped studio for compatible color. It was not broadcast.

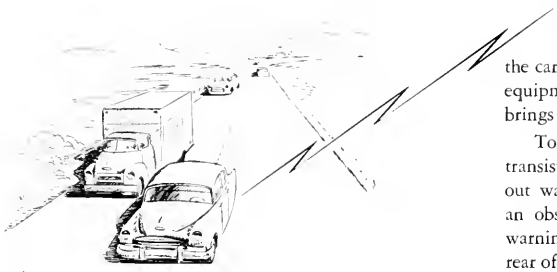
The press demonstration followed private showings at the annual meeting of the Association of National Advertisers.

The performance was viewed over developmental Radio Corporation of America color receivers, which have the same shape and dimensions as standard black-and-white console models.

Compatibility of the system was demonstrated through black-and-white receivers placed beside the color sets. The black-and-white images resuting from the colorcast had high-definition quality.

Sylvester L. Weaver, vice chairman of the NBC Board, in charge of TV network programs, and O. B. Hanson, vice president and chief engineer of NBC, were interviewed following the showing and related the network's preparations for colorcasting, and its plans for the future, contingent on FCC approval of standards.

An Automobile that Controls Itself by Electronics



AN exploration of how electronics can be put to work to reduce highway disasters and to relieve drivers of tiresome tasks on modern superhighways has been initiated by Dr. V. K. Zworykin, pioneer relevision and electronic scientist of the Radio Corporation of America.

Recent electronic advances, such as the tiny, power-thrifty transistor, indicate that electronic aids to many automobile driving problems are approaching the realm of practical application, according to Dr. Zworykin. Although the day of completely automatic control of automobiles is far off, Dr. Zworykin said, certain electronic devices to assist drivers in such matters as bad weather steering and collision prevention are nearer at hand.

To study the basic problems of automatic driving, Dr. Zworykin and assistants at the David Sarnoff Research Center of RCA, in Princeton, N. J., have equipped a model five-foot car with electronic equipment. This laboratory car, which is powered by a storage battery, can:

1. Steer itself along a prescribed route.
2. Stop itself when approaching a metal obstruction.
3. Turn out of its original lane into a second lane as if to pass another car moving at a slower speed.

Model Car Guided by Wire

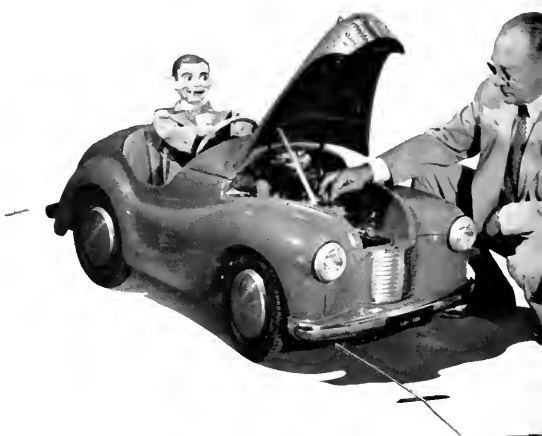
In the laboratory set-up, the model car is guided by a wire which represents a cable that would be laid in the roadbed of a superhighway. The wire sets up a magnetic field of a certain frequency which is picked up by the two coils, one on each side of the car. If one coil receives more of the signal than the other it means the car is no longer centered over the wire and electronic equipment controlling the steering wheel immediately brings the car back "on course."

To prevent a collision with an obstruction, simple transistor circuits associated with the guidance wire send out warning signals (of another frequency) whenever an obstruction passes or is stalled over them. These warning circuits, in effect, produce a "radio tail" at the rear of any sizable metal obstruction on the route. When equipment in the model car receives the warning signal, the brakes are automatically applied and the car comes to a halt.

To simulate two lanes in the same direction, Dr. Zworykin has parallel guidance wires with a diagonal wire connecting them. When the model car senses the radio tail of an obstruction in the inner lane, its electronic equipment shunts it along the diagonal into the outer lane so as to pass the obstruction.

A system of warning circuits in the roadbed to produce a "radio tail" when an automobile passes over would be quite impractical with electron tubes, Dr. Zworykin pointed out. Such circuits would be needed approximately every 20 feet and the electrical power to operate the tubes would be enormous, he said. But when transistors are available in large quantity at low cost, he said, such circuits become feasible because power consumption would be only one millionth of that required by tubes.

Dr. V. K. Zworykin makes an adjustment on his electronically controlled model automobile.



In experiments with the model car, Dr. Zworykin has been assisted by L. E. Flory and W. S. Pike, RCA research engineers.

Discussing the trend toward modern highways on which driving is becoming both simple and tiresome, Dr. Zworykin said that "the time has arrived for consideration of automatic driving techniques which may relieve the driver of his routine duties whenever his car enters an express highway system.

"Even now," he said, "with power steering, control devices are used to guide the car in preference to direct steering. Similarly, with power braking, the driver supplies a control signal rather than the physical force required to slow or stop the car. The automatic headlight dimmer is another device to take over a routine function of the driver.

"The number of such devices may be expected to increase and it is not too early to examine ultimate objectives of driving simplification. Long-range advance planning appears essential in this field in view of the large number of parties vitally concerned. Successful development depends on the cooperation of governmental authorities, the highway builder, the car manufacturer and the safety engineer for the benefit of the individual driver and the public at large.

Basic Requirements of Automatic System

"The basic requirements of an automatic driving system harmonize with trends in modern highway construction," Dr. Zworykin continued. "The requirements are that the roads have at least two lanes in each direction and that crossings and left turns across traffic be eliminated by cloverleafs and similar systems. With these conditions satisfied, the stage is set for a gradual introduction of measures to reduce traffic risks and simplify driving procedures.

"The changes should necessitate neither sudden abandonment of established driving habits nor wholesale installation of new equipment on roads and vehicles. This means: (1) The driver must retain the freedom of choice of speed, within prescribed limits, and of choice of either manual or automatic control. (2) Automatic control systems must be restricted, initially at least, to high-speed long-distance road systems subject to special regulation, such as turnpikes and thruways. (3) Vehicles equipped with automatic driving devices must be able to benefit in mixed traffic, consisting of equipped and unequipped vehicles.

"It is clear that car owners and purchasers will not bear the added cost of the control equipment unless it proves useful under current conditions, namely with the vast majority of cars under purely manual control. At the same time it would be both politically and economically impractical to restrict traffic on high-speed road systems to equipped cars.

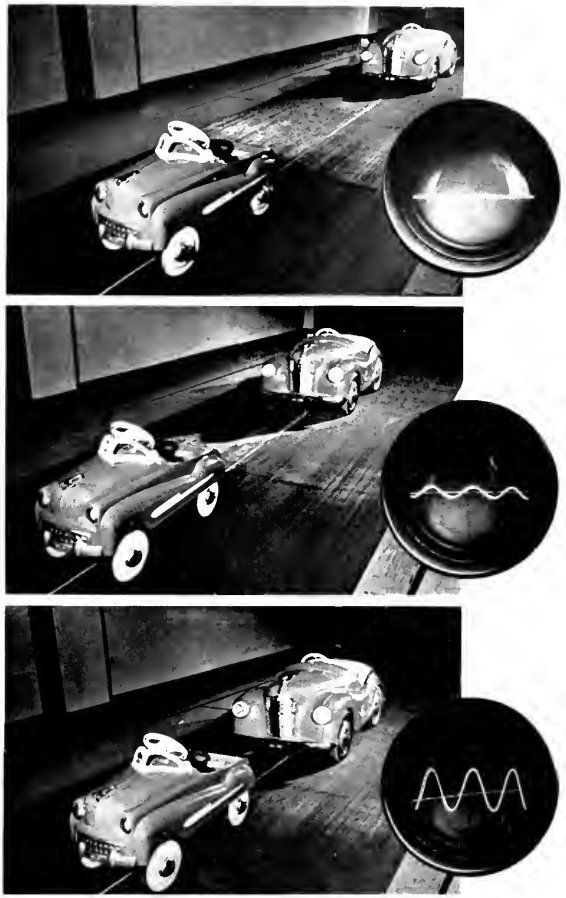


Photo by Carvello for Collier's

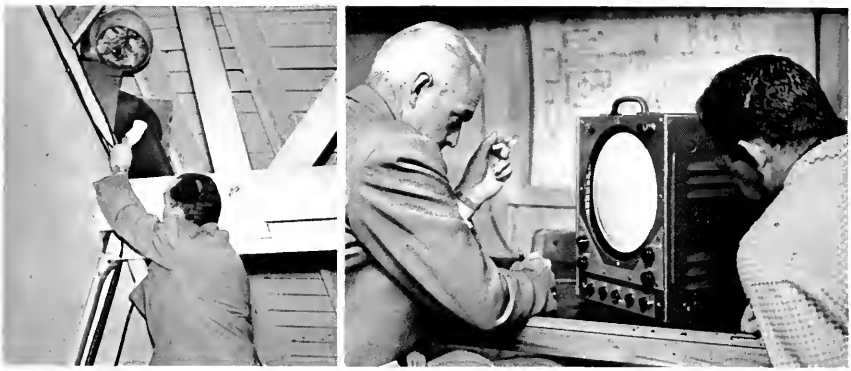
Electronically controlled model car receives a warning signal from the roadbed cable as it nears the leading car. Oscilloscope patterns at the right show the increasing strength of the signal at three positions of the rear vehicle.

"As a first step, equipment should be provided to enable the driver to keep his vehicle centered on the traffic lane under conditions of fog and poor visibility in general. This may be accomplished by a cable, buried in the concrete, carrying moderate-frequency alternating currents (of the order of 100 kilocycles) and a pair of magnetic pickups mounted on the car. The difference in the signals derived from the two pickups may be used

(Continued on page 24)

Industrial TV Turns Detective

Vidicon Camera Unit Spots Thieves at Work and Makes Possible Quick Recovery of Valuable Radio Equipment



Technician inspects industrial TV camera hidden in air vent over warehouse loading platform to "spy" on thieves who robbed a West Coast RCA plant of radio tubes. At right: detectives watch screen which revealed culprits at work and led to their arrest.

INDUSTRIAL television turned detective recently and solved a case by giving police an eye-witness view of thieves at work.

The locale was a stockroom of an RCA television service branch in Hollywood. Inventories had disclosed that television equipment was being stolen on a substantial scale—some $38,000 worth (covered by insurance) was missing on the initial check.

Officials on the spot, recalling the success of RCA industrial television equipment in functioning as an "eye" in locations too dangerous or inconvenient for human observers, decided to try the device as an electronic witness to the crime. Summoning the police, they concealed the camera unit among the rafters of the stockroom with the lens focused on the loading platform. The rest of the unit—the TV receiver and viewing screen—was placed in a second-floor room some distance away.

Daily for two weeks, the TV "eye" was trained on the loading platform as police watched at the receiver. The camera recorded the routine activities at the platform—but it also recorded the suspicious actions of one clerk, who casually placed a number of boxes of TV tubes on the loading platform during the lunch hour on Tuesdays and Thursdays when few other people were around. At apparently pre-arranged intervals, a pick-up truck would back into the driveway, the boxes would be put aboard with the help of the suspect, and the truck would pull away—all before the gaze of the camera and the interested watchers at the TV screen.

Once the facts had been made clear by the TV unit, the trap was set. The police at the receiver waited until the truck took off with another load of tubes. As they moved in to arrest the clerk, a police car trailed the truck to its destination and seized the driver and two alleged confederates.

The hero of this story is an industrial TV unit which already has been put to scores of uses—patrolling, guarding, transmitting fingerprints and signatures, checking numbers of freight cars, supervising operations of machinery at a distance, riding rockets, and generally fitting itself handily into locations where direct view is required and the human eye cannot go.

Its efficiency in these operations, and in its newly-acquired detective role, stems from the compactness of the camera and the fidelity with which it transmits what it sees. The RCA Vidicon tube, heart of the system, is only six inches long and an inch in diameter. The camera that is built around the tube is no larger than a 16-mm movie camera and is easy to handle.

The unit is completed by a connecting cable and a compact control monitor with a ten-inch viewing screen. Other receivers can be attached to the monitor if required, and the controls allow the camera focus to be controlled from the receiving end.

New Microwave Relay to Carry Radiograms to and from RCA's Long Island Stations

A MICROWAVE control system capable of handling all signals between RCA's Central Radio Office in New York and the company's overseas transmitting and receiving stations on Long Island is expected to go into operation within the next few months. This radio control system, operating on ultra-high frequencies, eventually will replace almost all wire lines presently linking the same points under lease from the New York Telephone Company.

The map gives an indication of the path of the new system. Signals from the Central Office will go out from transmitters on the roof of the City Bank Farmers Trust Building in downtown Manhattan. At a point some distance out on Long Island, transmitting and receiving equipment, housed atop a tall antenna tower, will relay the signals to and from Riverhead and Rocky Point. This relay station is situated approximately half way between the two extremes of the system.

Microwave relays are not new to RCA operations. As early as 1934, the company operated VHF channels between New York City and Philadelphia.

To some extent this present system is unique. It operates in such a way that all signals are transmitted simultaneously over duplicate facilities to assure uninterrupted service. By sub-dividing a radio channel the same signal can be transmitted on different frequencies over duplicate transmitters and receivers working independently of each other. Thus if the equipment on one channel should fail the signal will still get through.

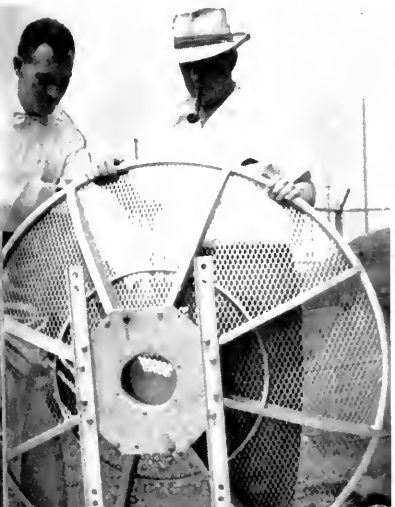
This duplication of facilities is important. Continuous public service twenty-four hours of every day and experience has shown that no single piece of equipment can withstand this constant strain.

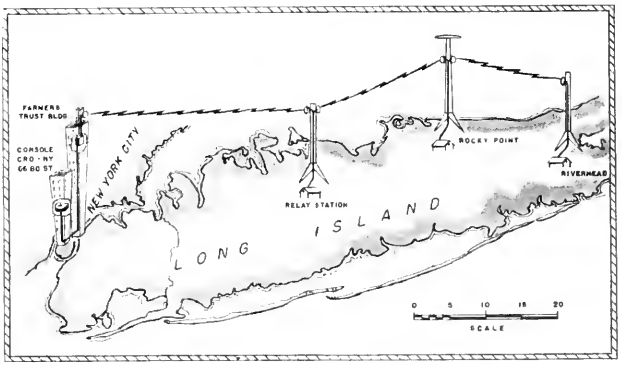
In designing this system RCA engineers placed reliable public service above everything else. All equipment is designed to operate automatically and to signal at either end of the system in the event of emergencies such as power failure, high temperatures due to fire, etc. The automatic signalling will also warn of equipment failure, including even a black-out of the flashing beacon on top of the tower.

The microwave equipment used in this system is the RCA Victor Type CW-20 consisting of 12 three-watt transmitters and 12 receivers. It operates on unusually short antenna elements. Compared to the average TV antenna, which is approximately 24-inches long, this system uses a three-inch antenna element backed up by parabolic reflectors measuring 4 to 10 feet in diameter.

The system will operate in the 2000 megacycle band by authority of the Federal Communications Commission. This part of the spectrum has been assigned for similar radio control system such as those in service along pipe line routes and along the New Jersey and Pennsylvania turnpikes. Signals operating in this frequency band are less subject to fading due to rain and

(Continued on page 23)





Left: RCA engineers Williamson and Sadler inspect one of the microwave parabolic antennas used in the Riverhead-to-New York relay system.

This electronic memory device NEVER FORGETS

In a Few Millionths of a Second it Accepts, Holds and Releases any Part of 10,000 Units of Information

By Joseph L. Blotner
RCA Laboratories Division, Princeton, N. J.

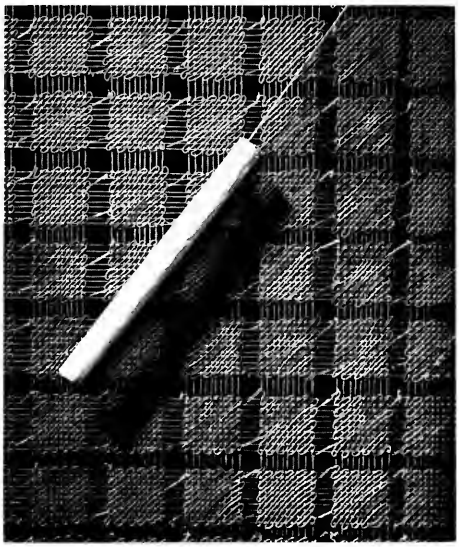
In the short time since World War II, the electronic computer has grown from infancy to a healthy adolescence. Its next step to full-fledged adulthood will be helped along by one of the research projects under way at the David Sarnoff Research Center of RCA at Princeton, N. J.

The need during the war for fast, accurate fire control equipment and radar networks pointed clearly to electronic tools as the solution. Targets sped too fast for the old mechanical fire directing computers, just as the acoustical air-raid warning system was unable to cope with the new tactics of air warfare.

The computers which resulted from this war-spurred development took two basic forms called, respectively, the *analog* and the *digital*. In the analog system, voltage or current is varied to represent different quantities in the complicated equations to be solved. In the digital system, all the information is converted into numbers rather than varying voltage or current. The numbers are coded in terms of "on-off" signals. In the binary code, numbers take the form of a sum of powers of two. In the decimal code, numbers take the form of a sum of powers of ten. The code is chosen by balancing efficiency and versatility against practicality.

With the end of the war, research recognized the great value of these instruments. They could relieve scientists of long, wearying computations. In some cases, they could be used as a sort of crystal ball, to find out whether or not equipment would work even before it was built. Progress in their development was rapid and a fairly standard computer design soon took shape.

The Input, perhaps in the form of a teletypewriter and tape, puts information into the Memory. The Control executes orders stored in the Memory. Next, the Control actuates the Arithmetic Unit to perform the calculation, and then transfers the result to the Memory. Finally, the Control transfers the result to the Output.



Minute size of the Myriabit elements is emphasized here by the cigaret which spans more than three groups of wires and cores comprising 300 units of information.

It was soon obvious that the range and value of the computer depended largely upon its memory. The memory could be made very large, but if it was, it took too long to get information into and out of it. If this access to the memory's information was speeded up, it meant a sacrifice in capacity. To evolve a large memory unit with speed of operation was the problem which Dr. Jan A. Rajchman and his colleagues at the Research Center set out to solve.

It is possible to construct memories of various types. They can be tele-typewriter perforated paper tape, modern magnetic tape, or a rotating magnetic drum. In all of these types, unwanted information, often a lot of it, has to be passed over to get to the desired information. To eliminate this delay, Rajchman and his group developed a selective electrostatic storage tube which gave immediate access to any specific storage element without traversing many others. This was the first practical random access high speed memory.

The tube contains 256 tiny metal eyelets called storage elements. These elements are kept at a positive or negative potential to represent the information to be stored. The information is held prisoner in the eyelets by constant electron bombardment, which keeps the negatively charged eyelets negative. A mechanism depending upon secondary emission, keeps the positively charged eyelets positive. On one side of the eyelets are rows of parallel wires, one row vertical and the other horizontal. The wires thus form a window around each eyelet. The electron bombardment can be stopped at all but one selected window by applying negative signals to appropriate groups of wires.

How Information is Inserted

To put information into this element after it has thus been selected, an electrical signal is fed to all the eyelets. But only the selected eyelet is receiving current at that instant, hence it is the only one that can register the information. The current is then immediately restored to all the other elements so that they will retain the information they had.

To read information out from a specific eyelet, it is again selected. If it is at a positive potential, some of the current directed to it will go through the tiny hole in its center and strike an output electrode, showing that the eyelet is positive. If the eyelet is at the negative potential, the electrons do not pass through the hole because the eyelet acts like the grid of a radio tube and effectively cuts off the current. This absence of current shows that the eyelet is negative.

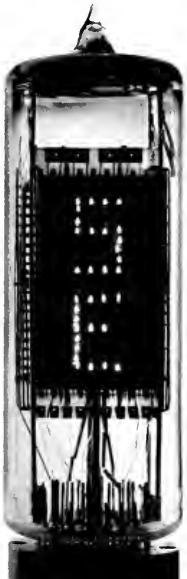
This 256-element tube was put into production and used successfully in several computers. Even so, Rajchman and his group realized that it was only an intermediate step in the development of the ideal, high-speed electronic memory. The tube was limited in storing capacity and relatively expensive.

Rajchman and his co-workers went on to develop the Myriabit Magnetic Core Matrix Memory. Myriabit is a descriptive term made up of the Greek word "Myria" meaning "ten thousand" and "bit" which means, in computer language, one unit of information. The heart of this advanced form of memory is two sets of a hundred wires each, one set running at right angles to the other. At every point where two wires meet, they run through the center of a magnetic core. The wires are spaced into groups of ten, so that the cores are separated into one hundred groups of a hundred each.

The thin, tiny cores, about the size and shape of a typewritten letter "o", are made of a special ferromagnetic material. A current flowing through two of the wires will switch the polarity of the core at their intersection. Whether the polarity is positive or negative depends upon the direction of the current. A core is affected only when it receives a signal from both wires running through it. Current in one wire is not enough. By establishing the core's polarity, the current fills it with as much information as it can take.

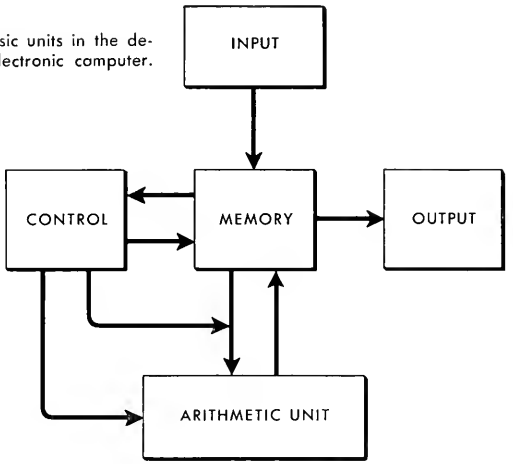
Device Holds Information for Years

Information is taken from the memory in much the same way. If the currents, when they reach the core, trip it from positive to negative, or vice versa, this change sends a signal through a wire running through all the



Selective electrostatic-type storage tube with capacity of 256 units.

Typical relation of basic units in the design of a standard electronic computer.



Dr. Jan A. Rajchman holds one of his Myriabit Magnetic Core Matrix Memory units which is capable of retaining 10,000 bits of information until needed.

cores. If there is no reversal, there is no signal. But whichever happens, the contents of the core are thus known. If a reversal of polarity does take place in this process, associated circuits immediately return the core to its former state, so that no information is lost or changed. The cores never wear out, and they are able to hold the information for years.

The Myriabit Memory represents a tremendous advance over tubes and the other devices that went before it. The present capacity is 10,000 units of information but the prospect is for millions of units. Speed of input and access is a few millionths of a second. Its simplicity and economy of space are outstanding, particularly when compared to the relatively huge vacuum tubes.

Some Possible Applications

Impressive as the Myriabit Memory is by itself, it is most striking as a functional part of a working computer. The jobs a computer may be asked to do fall roughly into three types: scientific computation, bookkeeping, and control.

In the first group are problems like this: A scientist wants to test a theory for gross weather prediction—weather for the whole United States, for instance. He goes to last week's weather maps and turns the data from each weather station into numbers. These numbers, representing readings on precipitation, pressure, temperature, and wind direction and velocity, are fed into the computer's memory. The theory is turned into formulas and thence into arithmetical operations which are also put into the memory. The control unit is then programmed to make the arithmetic unit process the weather data from the memory in accordance with the theory. After this is done, the control transfers the result to the memory and then to the output. The scientist takes the result and compares it with the weather that actually occurred to verify or disprove his theory. In this way, the electronic computer quickly and efficiently solves what would have been a tremendously complex problem for one man using ordinary computing methods.

Computer Able to Solve Flight Problems

The computer is equally able to attack problems of supersonic flight. A scientist in that field might be faced with this problem: What kind of turbulence should be expected at various sections of an experimental wing at varying speeds, altitudes, temperatures, and attitudes of flight? To get the answer, he puts all the variables into the memory, adds the known laws or theories that govern, and programs the control to solve the problem. The result may tell him that an aircraft with this wing will stay together and fly at supersonic speeds. On the other hand, it may tell him that it should go no farther than the drawing board.

When the computer has a bookkeeping function, its job may be, for instance, computing gas and electric bills. The solutions to the previous problems depended heavily on the computer's manipulation function. In this case, it is the storage function which is more important; the arithmetic part is elementary. For each new bill to be correct, the computer is required to remember these facts: the previous meter reading, the current reading, the current rate being charged, the type of customer, the date of billing and whether or not the last bill was paid.

A similar job for the computer exists in the insurance business. A computer would remember what the premium rate was, when it was due, and whether or not the policy had been converted. It would authorize the sending of overdue warnings, and the payment of dividends and claims.

A good example of the control function is in the making of nylon. Qualities desired in the final product —elasticity, wearability, washability, etc.—are complex functions of how the ingredients and processes in the production are varied. Since mass production is a continuous process, the production factors must be continuously related to the desired qualities. This process involves fairly complex computation, now performed by a staff of human operators. An automatic computer could be introduced here, almost as a straight substitute.

Some problems combine the bookkeeping and control functions. Take, for instance, a large Army supply depot.

(Continued on page 24)

High-Fidelity Phonographs and Recording Techniques Developed by RCA

HIGH fidelity sound reproduction, until recently the province of the music-loving hobbyist, made its debut as a new RCA development for the mass market in a public demonstration held on October 8 at the RCA Exhibition Hall in New York.

Before an audience of reporters and music critics, officials of the RCA Victor Division and scientists of the David Sarnoff Research Center surveyed the progress of recording and phonograph development over the past fifty years and predicted a future in which high fidelity equipment will be a standard feature of the American home.

Against this background was demonstrated the new high fidelity line of "Victrola" phonographs in the popular price field and the new RCA Victor series of intermatched components for home assembly of more elaborate high fidelity systems. The ready-made units, designed for the mass market, included a table model instrument priced at $139.95 and a console priced at $275 with a companion speaker at $89.50. The series of components, comprising various combinations of record players, tuners, amplifiers, speakers and enclosures, permits the assembly of systems costing up to $1,000.

Henry G. Baker, Vice President in Charge of the RCA Victor Home Instrument Department, expressed the RCA conviction that public interest in high fidelity sound reproduction is far more than a passing fad.

Demand May Triple Sales in '54

"It gives every evidence of being a logical progression in the development of more mature musical tastes by the American people," he told guests at the demonstration. "And it coincides with the perfection of new sound reproduction equipment that makes it possible for the industry to provide the quality of home musical listening that the public wants and is ready for."

Mr. Baker described the growing interest in high fidelity as both an opportunity and a challenge to the entire industry. Depending upon the willingness of the industry to respond to the challenge, public demand may boost this year's estimated sales of $70,000,000 worth of high fidelity components to a total of between $200,000,000 and $300,000,000 in 1954, he said.

George Marek, Director of Artists and Repertoire for the RCA Victor Record Department, credited public interest in high fidelity with "far-reaching" impact on repertoire and predicted that volume production of high fidelity records and phonographs will open new fields for classical music recording. The higher standards of musical enjoyment that can result from the expansion of high fidelity listening holds out the prospect that record sales may increase from the present $225,000,000 annual volume to more than $300,000,000 within the next five years, he said.

A Glimpse of the Future

The steady progress of sound reproduction from the earliest type of phonograph portrayed in the RCA Victor trademark, to the new high fidelity home instruments was outlined to the guests by Dr. H. F. Olson, Director of the Acoustics Laboratory at the David Sarnoff Research Center. Dr. Olson is the designer of the famed duo-cone speaker, which is used for the first time as a home instrument in the largest of the new RCA high fidelity units.

After referring to past development of faithful sound reproduction, in an effort to improve motion picture sound and radio broadcasting, Dr. Olson presented a glimpse of the future with the first public audition of a new recording and production system involving an improved variation of the binaural technique. The system achieves its dramatic and lifelike effect through dual sound-track recording and the use of double amplifiers, sound pickups and loudspeakers for reproduction. Although the system is not yet ready for the home, Mr. Baker pointed out that it indicates the great progress being made in the developmental stage.

The demonstration also marked the first public playing of multiple-track recordings by any major record company, with a presentation of the experimental RCA Victor recording of the "Roumanian Rhapsody" performed by an orchestra under the direction of Leopold Stokowski.

The high fidelity phonographs, which are being introduced through RCA dealers throughout the nation, are capable of handling records of all three speeds and are equipped with an interchangeable "slip-on" spindle for 45-rpm records. Both models contain Olson-designed speakers — an 8-inch in the table model and a 12-inch in the console — and both are capable of driving external speakers.

Radio Frequencies Measured to Order

Precise Instruments Developed by RCA for its Measuring Laboratories on Both Coasts Instantly Detect Transmitters that Stray from their Allotted Channels

More than a million radio stations of all kinds on land, sea, and in the air, have been authorized by the FCC. Each one of these stations is licensed to operate on one or more specific frequencies from which the operators may not deviate without facing severe penalties. If a station, as in broadcasting for instance, should stray a very small amount from its proper channel, its signals would clash with those on the adjoining channel. If this situation were allowed to exist generally, complete chaos would follow. The result could lead to a complete breakdown of the country's radio communications.

RCA foresaw the need for strict policing of the air waves soon after the company was founded in 1919. At first the measuring service was conducted only for RCA's own transoceanic circuits, but in 1931 its highly precise monitoring service was made generally available on a commercial basis. Monitoring facilities were established at Point Reyes, California, and Riverhead, N. Y.

The first users of the service were the broadcasters. With monitors operating on both coasts, service could be provided for any radio station in the country. Then, as additional types of radio usage were developed, facilities were expanded to cover the widening frequency spectrum. Today, RCA's Frequency Measuring Service can make measurement for transmitters within the range of 13 kilocycles to 500 megacycles. Included in this range are aircraft and police radio, maritime transmissions, FM and television broadcasters, to mention only a few. Measurements can be made for foreign stations as easily and as accurately as for domestic transmitters.

Wide Variety of Antennas Required

In order to render accurate measurements throughout all bands in the useful spectrum, a wide variety of antennas is required. These range from Beverage Wave Antennas, seven to nine miles long, serving the very-low-frequency classification, to small, directional ultra-high-frequency dipoles.

Television and FM stations are currently measured by RCA at distances up to 500 miles, depending upon antenna heights, intervening terrain and transmitter power. With activity in this type of broadcasting increasing, every effort is being made to extend the service range by providing the maximum practical height of receiving antennas on both coasts, together with extreme sensitivity of the associated tuner units.

On the remainder of the spectrum in use, however, RCA frequency measuring stations provide essentially worldwide coverage.

The equipment at RCA's Frequency Measuring Laboratories has been designed for measuring operations of the highest attainable precision. In line with this advance, modern crystal controlled equipment long ago supplanted the original temperature controlled wavemeters of the Twenties.

After the signal to be checked has been selected from the air through proper antenna facilities, it is tuned in on a highly sensitive receiver. Provision is made for comparing the frequency being measured with the exacting frequencies of harmonic generators, which are controlled by the output of a 100 kilocycle primary standard. This primary standard is carefully regulated with respect to temperature, air pressure and humidity. To prevent possible service failure, two identical standards are maintained, each completely housed in a separate container.

Standards are Checked Daily with Observatory

The standards are checked daily against time signals from the Naval Observatory, which maintain an accuracy of better than four parts in ten million.

To the uninitiated, it might seem a formidable task to select a signal in a part of the spectrum where many stations are operating, sometimes on the same frequency, as in the upper portion of the broadcast band. Actually, this problem is not a difficult one. So selective are the instruments at the two Measuring Stations and so effective are the special antennas that, normally, the signal to be tested can be easily singled out from all others. When this is not possible, arrangements are made for the station to transmit a constant tone after it has signed off programs for the night. The tone permits the engineers at Riverhead or Point Reyes to pin-point and check the station's frequency even though other broadcasters using approximately the same frequency, are still on the air.

Considering these items of equipment, aided by the experience and skill of the laboratory personnel, RCA's Frequency Measuring stations can be described as being among the world's most completely equipped and accurate installations available for its types of commercial service.

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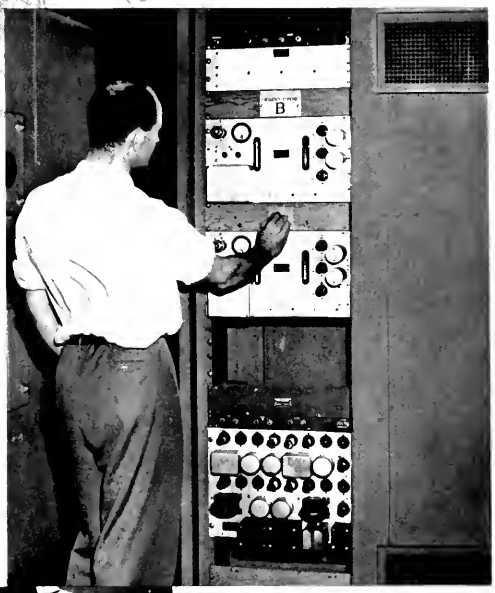
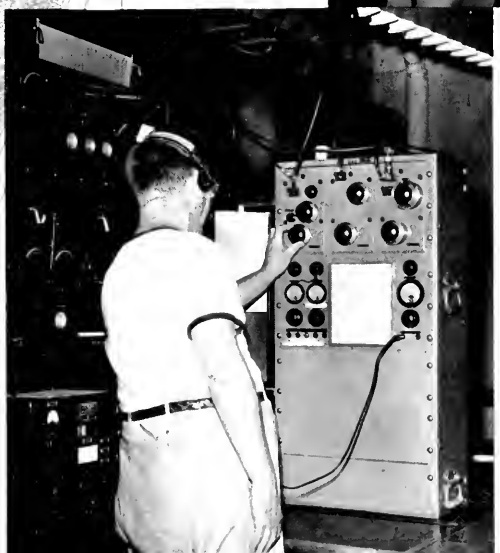


Station Engineer Jahn M. Etter adjusts a crystal controlled frequency standard to which the frequencies of transmitters under test are compared.



F. G. Echeverria operates one of the highly accurate receivers at the RCA Frequency Measuring Laboratory, Riverhead, N. Y.

You've Got to be a Diplomat

To Film Washington News for NBC-TV

By Robert Abernathy

General Assignment Reporter, WNBW-TV
National Broadcasting Co.,
Washington, D. C.

ONE of the touchiest jobs NBC's Washington Bureau has to do is to cover the news of the Capital on film. It's not enough for the cameramen and soundmen to know their trades technically—they've also got to be rare combinations of athlete, artist, and, most of all, diplomat.

From time to time Washington gets its share of good spot news like train wrecks and moonshine raids and, once, an assassination attempt on President Truman. The film crews get their share of drama, too, like the time one of the cameramen was thrown twice into a Cuban jail. But most of the time the big news in Washington is what somebody says or thinks—statements, opinions, arguments.

And this is where the diplomacy comes in. How do you tell the President he'd look a lot better if he'd comb his hair? How do you tell a United States Senator that the statement he's prepared is just plain too long, and he'd better cut it to one minute? How do you convince a wary new Cabinet member that he should explain his ideas for the cameras so the nation's TV audience can get to know him?

Somehow, through excellent contacts and Old World tact, NBC's Washington camera crews get their stories. Usually, they get them as they want them, with hair combed and statements cut.

Eight Years to Develop Techniques

Bringing the personalities and ideas of Washington into millions of television homes, through film, is a technique NBC has been perfecting for over eight years. The Washington film crews shoot for the Camel News Caravan, TODAY, the syndicated Daily News Service, New York's 11th Hour News, and Washington's Richard Harkness. Brad Kress and John Langenegger cover the Capitol. Al Simonson and John Hofen cover the White House. Irving Heitzner takes the rest.

Each morning in the NBC newsroom, Central News-

Soundman John Langenegger and cameraman Brad Kress of NBC's Washington news staff prepare for a film pickup at the Capitol. Two-way radiophone keeps the truck in constant communication with the network newsroom.

desk Manager Art Barriault and Camera Assignment Editor Bill Corrigan survey the stories that seem most important for the day and contact the crews. There's an important arrival at the National Airport, and Irving Heitzner is on his way to get 100 feet of silent footage. There's a hearing on the Hill that may get hot. Brad Kress and John Langenegger set up to record whatever happens. A key Washington figure visits the President. Simonson and Hofen are waiting for him when he comes out.

As the day's Washington news breaks, it's up to Barriault and Corrigan to dispatch the crews so that the top stories are covered—without exception. Sometimes the crews have to make mad dashes across town to be on hand for the next news conference. But they make it. A big help in speedy coverage is the NBC station wagon, equipped with radio-telephone for contact at all times.

Once the film is shot, it's picked up by NBC's motor-

cycle courier, Jim Curtis. He threads his way through Washington's crowded streets to the lab where the film is processed, or to the airport where it's shipped direct to New York. Always, Curtis has to move in a hurry. In 1949, Senator Tom Connolly announced at seven o'clock one evening that the first appropriation for Western Europe had just been passed to implement the North Atlantic Treaty. Brad Kress shot the statement and handed the film to Curtis. Jim ran for his motorcycle and headed for the lab, three miles away. The film was processed and edited and handed to Jim again. This time he took it to the studios, five miles from the lab. The film was on Camel Caravan that night, fifty minutes after it had been shot. Such feats, incredible at the time, have become standard practice.

David Brinkley supervises the editing of all Washington film for the Camel program. After conferring with the Caravan staff in New York, Brinkley edits the day's top stories, writes a script to back them up, and goes on the air with the report at 7:45 (EST). Jean Montgomery helps Brinkley with the contact work necessary to set up the special features for which the Caravan is famous.

Through the years of TV news film development, NBC's Washington Bureau has pioneered in the business of making the expression of political opinions interesting to watch. It has been a cooperative effort—TV has adapted to politics, and politics has adapted to TV.

The problem, of course, is mainly one of equipment. You could tape-record a Congressional hearing with relatively little paraphernalia and interference. But to cover it for TV, is another matter. Cameras and the necessary lights take up a lot of room. Committee chairmen in the Congress have understandably hesitated to permit film crews to cover their hearings because of the creation of what some of them call the "circus atmosphere." But, gradually, the Chairmen have become more tolerant as they have learned to know the crews and, equally important, the effectiveness of TV coverage.

Jim Curtis, of the NBC courier staff, passes the Lincoln Memorial on his way to the airport with a shipment of film intended for television.

Jean Montgomery, Art Barriault and Bill Corrigan of NBC's capital newsroom look over possible news events that should be covered by camera crews.

Once when Senator Hoey was conducting hearings involving the famous "five-percenters," NBC's Capitol Hill cameraman asked him if he could shoot the proceedings. "Yes," said the Senator, "so long as I don't know you're doing it." The cameraman opened up his lens and filmed the hearing without lights. It's not a recommended photographic technique, but it worked, and it showed the Senator and his colleagues how NBC could adapt to their wishes.

Some rules stand inviolate. There has never been film coverage of a debate in the House or Senate, nor has there been sound-on-film coverage of a Presidential news conference. But the political leaders do adapt to television. Many times a Member of Congress will agree to express himself on an issue for the camera and when he does so, the statement turns out to be several minutes long and somewhat repetitious. The cameraman quietly points out that the take would be much more effective

if it were shorter—and also, if cut, would stand a better chance of being used. The Member of Congress usually sees the light.

NBC has pioneered in shooting statements in several takes, changing the camera angle and distance during a statement, to make the story more interesting to watch. NBC was first to use a hand camera so a story could be shot anywhere. And NBC was first with the idea of getting film interviews in interesting locales.

Radio Unit Tours Soviet Embassy

Vice-President Nixon and David Brinkley discussed the problems of the new administration while riding in a government Cadillac. It was filmed for Camel that night. NBC crews have gone into the Senate Dining Room, the Senate Barber Shop, and a Senate elevator to get stories. They filmed one conversation between Senators Humphrey and Morse while the Senators rode horses on Morse's Maryland farm. NBC was first to take the nation's television audience on a tour of the highly-restricted Russian embassy.

But the work is not all statements and how to make them interesting to the eye. Sometimes there is news of a more tangible nature. One morning last March the NBC cameramen were on their way to work when a bulletin went out over the radio that something had happened at Union Station. To a man, each cameraman went over to see what was up. The result was the best footage shot by anyone on the now famous wreck of the Boston train, the "Federal Express," that had lost its brakes.

NBC cameraman Al Simonson discusses camera technique with President Eisenhower's press secretary, James C. Hagerty.

NBC's White House cameraman was on duty a few years ago when he heard shots from the street outside. He picked up his Auricon portable sound camera and ran out to see what had happened. The resulting pictures, on NBC that day, told a vivid story of the assassination attempt on President Truman in front of Blair House.

Brad Kress and John Hofen recall with much enjoyment the time they tramped through the Virginia hills with a posse of Federal revenue agents. While Kress shot, the revenue men ambushed, and destroyed, one of the most productive moonshine stills found in recent years. The only problem was that the dynamite used to destroy the vats blew their contents sky high. For what seemed like an eternity, it rained fermented mash. Kress and Hofen spent days trying to get their equipment clean again, and had some difficulty convincing their colleagues that the scent they bore came from an external source.

Cameraman is Jailed Twice

And then there was the time Kress was thrown into jail, twice, by a Cuban dictator. Brad was in Key West with President Truman when Julian Goodman, Washington's Manager of News and Special Events, called him up at two o'clock one morning. Could Brad get over to Cuba right away? There had been an insurrection and Juan Batista had taken over the government. Kress and John Langenegger contacted a Cuban airline near Key West. No luck. People could get out of Cuba, but nobody could get in. The NBC team climbed aboard anyway and brazened their way into Havana. They shot some silent footage of the Palace and then went out to a nearby fort where Batista was entrenched. In sound-on-film they recorded the strong-man's proclamation that he was now dictator of Cuba. But then there was the problem of getting the film back to the States. John Langenegger, under pretext of being no longer needed, tucked the film in his shirt and boarded a plane for Miami. Kress was so jubilant he got on the phone and called Julian Goodman in Washington to report the feat. Twenty minutes later he was picked up by the Cuban police and thrown into jail. What Kress didn't know was that all telephone lines were tapped.

But no sooner had Kress talked his way out of jail than he was picked up again, this time by the Army. Brad was back in his old cell before he could convince the militaristi that he had just been released, and was no criminal. By this time Langenegger had bluffed his

way back to town and the pair again went out to Batista's fort. They shot the first interview, in English, with the new dictator. Langenegger flew out with the film, and this time Kress didn't call Washington to report.

NBC's Capital film crews don't often get locked up, but their problems are many, just the same.

Al Simonson and John Hofen, who cover the White House, sometimes get word only a few hours before the President takes off on a sudden trip. But they make the plane, and follow Mr. Eisenhower wherever he goes. These trips take their toll on the crews, as well as on the speech-maker. During the 1952 Presidential campaign, Simonson and Hofen spent most of their time on the Truman train. Sometimes there were a dozen whistle-stops a day, each with its rush to set up equipment, shoot the speech, and then get self and camera back on the train before it started again. When President Eisenhower flew to Minneapolis and Mount Rushmore in June, Simonson and Hofen made the usual last-minute dashes to catch the next plane. But on this trip there was time out for ceremony. Along with the President, the NBC crew was initiated into the Sioux Indian Singing Tribe of the Wahoo. Al Simonson is now "Bad Wound" and John Hofen is "Chief Ghost Bear."

Excitement with the President

Once, with the President, there was suspense and excitement that came too close to home for Hofen. He and Simonson were at Augusta, Georgia, with Mr. Eisenhower, making arrangements to return to Washington the next day. John had just received word from his wife, who was visiting in Charleston, that she and their three-year-old daughter were returning to Washington that night on the Atlantic Coast Line *Champion*. He was awakened at one in the morning by a call from New York. The *Champion* had jumped track at Dillon, South Carolina and he and Simonson should start moving immediately to cover the tragedy on film.

The rest of the night, the two drove from Augusta. They arrived at dawn to shoot their story and, for John, to search the wreckage. Finally they found a railroad official. This train, he said, was the coach section of the *Champion*. John's family, with Pullman tickets, had passed through in the advance section just fifteen minutes ahead of this one. They were safe, by that time, in Washington.

"That was a long night," says Hofen.

In addition to the trips, another problem is caused by Washington's complex local government. In order to move freely about town for his pickups of film during the 1948 inauguration, Jim Curtis, NBC's courier, had to have seventeen different passes. He pinned one on top of another and then folded them all up with a little tab holding them together, pinned to his blouse. At one intersection a policeman stopped him and said he couldn't cross, didn't have the right pass. Jim unbuttoned the tab, deadpan, and let all seventeen credentials cascade to his knees.

"Take your pick," said Curtis. He crossed the street.

Some Officials Need Persuasion

NBC's Washington TV film men have to know their trades and be able to move fast, but mostly their success depends on their diplomacy. Sometimes government officials, new to their offices, are reluctant to make statements when they're in the news. It's up to the crews and Assignment Editor Corrigan to persuade them that what they have to say *is* important, and that the nation should be able to see them say it.

And it takes a good deal of the same commodity to convince the President, when outdoors, that he'd really look a lot better on film if he'd take off his hat and let people see his face. Shadows over the eyes do not help.

What would Washington be like if the TV film men could have their say? Art Barriault sums it up for all of them.

"The millennium will come when every Senator and Cabinet officer can clarify the most complicated of political issues in a well-rounded, colorful, one-minute statement."

The millennium isn't here, but NBC's diplomats with tripods are bringing it closer.

New York Graduate Engineer Wins David Sarnoff Scholarship

Harold S. Rothman, 21, of 960 Grand Concourse, Bronx, N. Y., has been awarded the David Sarnoff Fellowship at the New York University College of Engineering for 1953-54.

The fellowship was established in 1952 by the Radio Corporation of America in honor of Brig. General David Sarnoff, Chairman of the Board of RCA. Providing an annual grant of $2,700 for predoctoral study, the award is part of a program to assist in the education of scientific personnel for leadership in the growing electronics industry.

Mr. Rothman was the applicant among a class of 175 graduating engineers who, in the opinion of the Scholarships Committtee and the RCA Education Committee, had the necessary high qualifications for the award.

With the aid of the Fellowship, Mr. Rothman will pursue studies in the microwave field, a subject of specialization in which he became interested during his undergraduate course in electrical engineering. His career plans center on design and development in the microwave field.

Technical Details of RCA Basic Color Receiver Made Available to Competing Set Manufacturers

In a move believed to have few precedents in competitive industry, the Radio Corporation of America has turned over to engineers representing virtually all television set manufacturers full details of design and performance of RCA's basic color television receiver.

This important technical information on the RCA color set was presented to 250 representatives of the television industry at a color television symposium arranged by RCA at the Waldorf-Astoria in New York, on October 7. It was in line with the Corporation's policy of making available to RCA licensees its inventions and technical "know-how" in compatible color television, as it did in black-and-white television six years ago.

The color receiver described to RCA's competitors is the latest field-tested design from which will be evolved the production design for color sets to be built and marketed under the RCA Victor trade-mark, according to Ewen C. Anderson, Vice President in Charge of the Commercial Department.

Mr. Anderson, who presided at the symposium, presented a program in which the industry group received full details on special color receiver components, tubes, and circuitry, as well as testing equipment.

Latest technical information was provided on the RCA tri-color tube, heart of home color television receivers. Attendants at the meeting likewise were briefed on the progress of color broadcast station equipment, programming and networking plans of the National Broadcasting Company, steps by the RCA Service Company to help prepare the industry to meet color television servicing problems, and efforts of the RCA Industry Service Laboratory to aid the industry over technical hurdles.

No NTSC Color Television System

Commenting on information made available on RCA's basic color television receiver, Mr. Anderson declared:

"In supplying you with such information, I would call your attention to the fact that we are making no representations concerning inventions of others, if any.

"In this connection, you have heard much of a so-called NTSC color system. We do not know of any NTSC color system. NTSC, which is comprised of scientists and engineers of virtually the entire television industry, has unanimously agreed on certain signal specifications and recommended them to the Federal Communications Commission as standards for color TV broadcasting. If the FCC adopts these standards they will become FCC standards, just as the NTSC standards for black-and-white TV became the FCC standards under which we operate today.

Representatives of 250 television set manufacturers attend a symposium on color TV receivers arranged by RCA at the Waldorf-Astoria Hotel in New York on October 7.

"We call the apparatus we use — as distinguished from the signal specifications — the RCA compatible color system. The RCA color system operates on the standards recommended by the NTSC, and we participated in the development of these standards and joined in recommending that the FCC adopt them. We have no doubt that American ingenuity will from time to time devise new and improved apparatus which will also operate on these same standards."

Although the first color-receiver production line is still several months away, Mr. Anderson said, it is within RCA's announced schedule of six to nine months after FCC approval of compatible standards. "And we

hope to beat that promise," he declared, continuing:

"As you are well aware, in March of 1950, RCA promised to make available to its domestic receiver licensees complete manufacturing information on the first RCA color receiver when the receiver is placed in commercial production. This information is to include complete manufacturing drawings, bill of material, sources of supply, and inspection of our production setup. RCA will keep that promise. It will invite its licensees to the RCA plant before the commercial release of a color receiver.

"I know that you probably want as much information as is available at the earliest possible time in order to meet your respective schedules for getting color receivers to the public. Therefore, it appeared desirable to hold this meeting now — well in advance of our planned production information program — in order that you may have available color receiver information you might not already possess."

The engineering position in which the industry finds itself today is the result of many years of hard work in getting a compatible color television system which can be started in an economically sound manner, asserted Mr. Anderson, adding:

"We in RCA take pride in our part in this endeavor. Our achievements in color represent hundreds of man-years of work by outstanding electronic engineers, and tens of millions of dollars of investment. We feel that the time and money already spent, and the large amount that will be spent in placing this new service before the public represent a sound investment in insurance, covering the future success of this industry.

"We strongly believe in the economic and social importance of a compatible system of color television, and we believe that this new service to the public will enable the electronics industry to repeat the success story of black-and-white television."

Mr. Anderson pointed out that as precedent for the October 7 meeting on the RCA color television receiver, RCA held a symposium on its tri-color tube in July of this year for licensed tube manufacturers. This, he said, was done as soon as the design was completed on a type for early production, thus providing the tube industry with advanced information shortening the time required to get a satisfactory design of color receiver into production.

Regarding a color television picture tube recently announced by another company, Mr. Anderson said:

"RCA has read with some interest that another company — a company which, by the way, went all out for incompatible color and said that compatible color was impractical — has finally come around to adopting RCA's type of color tube with three guns, and using a shadow mask with all the holes. As we read the information released by that company the only difference is that the phosphor dots are on the rear of the face plate instead of on a separate plate directly behind the face plate.

"Following RCA's lead in adopting a 15-inch glass envelope, this tube is also enclosed in a 15-inch glass bulb and uses the principle of a face plate sealed in with metal rings. As this tube uses the basic principles of the RCA tri-color tube it should — if it functions satisfactorily — work in the all-electronic compatible color receiver developed by RCA."

Color-TV "Kit" For Manufacturers

During the symposium, an offer was extended by the RCA Victor Division to supply television set manufacturers with a limited quantity of developmental kits, containing specially designed tubes and parts required for the RCA compatible color receiver.

Although each of more than twenty tubes and components in the kits is in a developmental stage, they are being offered at this early date to enable the industry to initiate experimental design and production programs for color sets. The contents represent the most advanced results of RCA's developmental work on electronic components for its basic color receiver.

Among items in the kits are a complete developmental RCA tri-color picture tube, specially designed receiver tubes, developmental transformers, coils and other associated necessities of a color receiver. With each kit is complete technical and application information.

New Microwave Relay

(Continued from page 11)

snow storms and other atmospheric conditions than the higher frequencies.

RCA engineers underscore the importance of this new microwave control system by pointing out the following advantages and improvements to be expected as a result of the installation:

1—It is hoped that within a few years the system will pay for itself and result in a saving of many thousands of dollars a year in control line rentals.

2—Records kept on former microwave systems show that fewer signal failures occur over a year than with low quality control lines. This reliability factor is extremely important to RCA operations.

3—Throughout the design of the system heavy antenna support structures, modern antenna design and fireproof building construction have been utilized to guard against possible damage from the elements.

Auto Controls Itself by Electronics

(Continued from page 9)

either to indicate the off-course position of the vehicle on the dashboard or applied directly to the steering mechanism so as to maintain the car in the center of the lane. Feedpoints for the cable may be provided at intervals along the highway.

Driver Retains Control of Speed

"In this system the driver not only would retain complete control of the car speed, but, in addition, could switch at will from manual to automatic steering. The automatic setting could be linked to an external indication on the car to inform road supervisors and other drivers of the fact that the car is under automatic control.

"The second step in the evolution of the automatic driving system, the prevention of collisions, is a natural extension of the guidance equipment.

"The essential feature of one proposed collision prevention system is the transfer of energy from a high-frequency power cable, to a series of tiny oscillators or transmitters along the lane. The transfer of energy is controlled by the passage of a car and a long time constant circuit or 'memory' causes the transmitter to function for a time after the car has passed. The oscillations are transmitted backward along a high-attenuation cable and sensed by pickup coils on the following cars. Thus every car, whether equipped with automatic driving devices or not, would be followed by a 'flying tail' of warning signals. Their amplitude would increase as the car slowed down and become a maximum for a stalled car. Conversely, the sensing system of the following cars would be coupled with the car speed indication in such fashion that the warning signal would increase with their speed.

"In a completely automatic system this warning 'tail' could be used to switch a car from one lane to another at specified cross-over points. In this case, the sequence of events as a car approaches another vehicle which is either stalled or moving at a lower speed is: As the signal picked up from the 'flying tail' of the preceding vehicle reaches a certain level, the guidance setting would be shifted to the left lane. Then, the car would pass over to the left lane at the next cross-over point and pass the slower vehicle unless:

a. The turn-off is blocked by signals from a nearby vehicle which is already in the left lane, or
b. The slower vehicle impedes further progress even before the turn-off point is reached.

"In the second instance the signal from the 'flying tail' would continue to increase in intensity; its indication to the driver may be either auditory or visual—in the form of a sound of rising amplitude or a flashing light of increasing frequency, warning him to decelerate or apply the brakes. As an alternative, the signal, from a certain level on, may reduce the fuel intake and, at a still higher level, actuate the power brakes.

"Full automatization of the driving process can be envisaged as the final stage of the development. In addition to the installation of guidance and collision prevention equipment on the roads and in the vehicles, this would involve automatic inspection of the vehicle equipment and a continuous recording of traffic conditions at the gate stations. Indications of the position and velocities of the vehicles along the road section between successive stations would aid supervising personnel in the problem of traffic distribution.

"Freight transport along the highways presents one of the most challenging applications of full automatization. The establishment of a network of truck routes, separate from a highway system designed for passenger vehicles only, has been discussed repeatedly.

"With full automatization, it offers the possibility of driverless freight transport over long distances, with route terminals taking the form of marshalling yards. Here, small dispatching crews would send out the loaded trucks to their distant destinations and assign incoming vehicles to drivers for local delivery of the consignment. Assuming a cruising speed of 30 miles per hour, a separation between vehicles of 100 feet, and an average truck load of 5 tons, a one-lane route could handle nearly 200,000 tons a day. This large shipping capacity provided with minimum manpower requirements would do much to alleviate present bottlenecks in the delivery of consumers' goods and industrial raw materials."

Electronic Memory Device

(Continued from page 14)

Each day, great quantities of different kinds of supplies arrive in various ways. The outbound shipments are just as complex. Each day, thousands of questions have to be answered. Is there room in Number Three Warehouse for ten thousand woolen blankets? Are there enough overcoats in Number Eight Warehouse to fill a requisition from Fort Dix? Did the last shipment reach Camp Kilmer? Are there any field kitchens left? How many? Should we order more? In this situation the computer remembers, works out problems, and gives the results which determine the decisions to be made.

The computer is one of the great new tools of the future, a ready servant in man's constant effort to solve the complex, to learn more about his world. And in their laboratories, thinking about bigger, faster memories, about better, more accurate arithmetic units, Jan Rajchman and his group are making their contribution.

Transistor-Operated Radio Receiver Runs 500 Hours on Flashlight Cells

A COMPACT experimental radio receiver that harnesses a new and greatly improved type of junction transistor to provide sensitivity and fidelity comparable to conventional table model receivers several times its size has been developed at the David Sarnoff Research Center of RCA, Princeton, N. J.

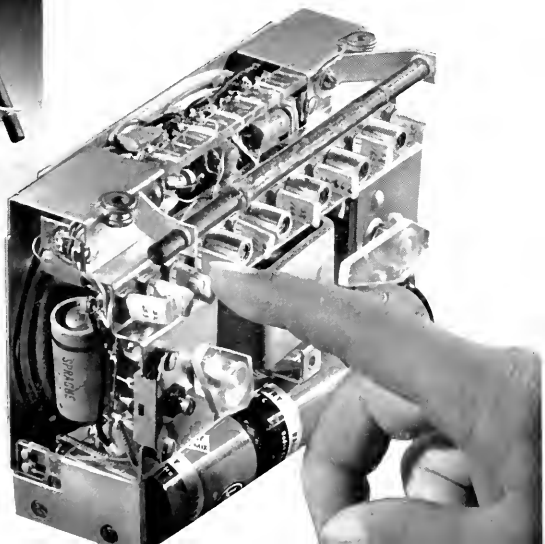
Six small-size flashlight batteries—the set's entire power supply—will operate the laboratory receiver for at least 500 hours, according to its designer, Loy E. Barton, RCA research engineer, who demonstrated the instrument at meetings of the Institute of Radio Engineers and at The Franklin Institute.

The remarkable performance of the RCA experimental transistor-operated receiver is made possible, Mr. Barton said, by the development of junction transistors that provide useful amplification at radio frequencies as high as 10 megacycles, in contrast to previous junction types that usually perform well only at audio frequencies.

Before receivers of the type demonstrated can be produced commercially at reasonable cost, transistor techniques will have to be refined and new materials and associated miniaturized components will have to be developed and mass produced, it was pointed out. At the present stage of development, the cost of the transistors and of the new components would be far in excess of comparable mass-produced, tube types of receivers.

The new type of transistors is the result of research by Dr. C. W. Mueller and Jacques I. Pankove, of the RCA research staff.

Though still in the laboratory stage, Dr. Mueller said, the new transistor is of relatively simple triode construction, thus giving promise of eventual quantity



Front (left) and reor views of the experimental completely transistorized radio receiver developed at RCA Laboratories. The row of transistors is pointed out below.

production. The large frequency span it opens up, he said, should broaden considerably the potential application of transistors. Unlike its predecessor types, it can operate in IF (intermediate frequency) stages of AM broadcast receivers, and in the video amplification stages of television receivers.

Receiver Boasts Large Speaker

The transistor receiver used in demonstrations by Mr. Barton has six transistors of the new radio-frequency type and three experimental junction transistors of the audio-frequency range. Although not much smaller than conventional portable radios built with tubes, the set employs the space saved by use of transistors (and miniaturized IF transformers) for a 4- by 6-inch loudspeaker.

In comparing the experimental receiver with a typical portable tube receiver, Mr. Barton said the former required only one-ninth the battery power yet produced roughly twice the audio output.

To show that a variety of receiver designs are possible with the new transistor, Mr. Barton has made another transistor-operated receiver that uses six standard penlight batteries as a power supply good for 50 hours. This set has a smaller speaker (3 inch) and its size is less than half that of the higher performance receiver. Smaller size was achieved by sacrifice of speaker size and playing life, he said.

Studies Lead to Basic Changes

Dr. Mueller explained that higher frequency operation of the transistor had been obtained by studying in detail the physics of the RCA audio-frequency alloy junction transistor and determining the characteristics which reduced its frequency response.

As a result of these studies, he said, basic changes were made in the geometry, the type of germanium, and the alloy used. A thicker wafer of germanium is employed in order to reduce resistance between the junction region and base connection, thereby giving higher gain at higher frequencies.

At the same time, the distance between the two junctions of impurity material has been markedly reduced by drilling a hole that almost perforates the wafer, he said. The two junctions, of smaller area than in previous designs, are then formed on either side of the paper-thin layer of germanium that remains. Of great importance, also, he said, is the use of an alloying material which already contains some germanium.

The experimental transistor type described by Dr. Mueller was of the p-n-p (positive-negative-positive) variety. Similar methods can be used to make n-p-n transistors thar operate at the higher frequencies, he said.

The new radio-frequency units, he said, can provide a power amplification of about 10,000 to 1 (gain of up to 39 decibels) at 455 kilocycles, the common intermediate frequency of broadcast receivers. Their amplification is somewhat less at higher frequencies, but amplification of about 16 to 1 (gain of 12 decibels) is available at frequencies as high as 10 megacycles. The transistor may be used as an oscillator at frequencies as high as 40 megacycles, he added.

TV Problems — as Viewed in 1929

The instantaneous projection through space of light images produced directly from the object in the studio, or the scene brought to the broadcasting station through remote control, involves many problems. Special types of distribution networks, new forms of stagecraft, and a development of studio equipment and technique are required.

New problems would rain in upon the broadcasting station. New forms of artistry would have to be encouraged and developed. Variety, and more variety, would be the cry of the day. The ear may be content with the oft-repeated song; the eye would be impatient with the twice-repeated scene.

DAVID SARNOFF (1929)

Toscanini and NBC Symphony Open 17th Season on November 7

The NBC Symphony, under the leadership of Arturo Toscanini, will open its seventeenth season on the air with a broadcast from Carnegie Hall in New York on November 7, starting at 6:30 p.m., EST. For the sixth successive season, Guido Cantelli will share the podium with Maestro Toscanini, directing eight of the 22 scheduled weekly concerts.

Among the features planned by Toscanini for the new season are a two-part concert performance of Verdi's opera "Un Ballo in Maschera," Brahms' "German Requiem," Zoltan Kodaly's "Psalmus Hungaricus," and concerts featuring the works of Sibelius, Wagner and Mendelssohn. The eight performances to be directed by Cantelli will include such works as Debussy's "The Martyrdom of Saint Sebastian," Hindemith's "Concerto for Strings and Brass," and Frescobaldi's "Four Pieces."

During the season, Toscanini also will direct the NBC Symphony for a number of RCA Victor recordings.

George Folster, home from the wars, faces a microphone in an NBC studio

THE FAR EAST IS HIS BEAT

From Australia to Panmunjom George Folster has Followed the Tides of War and the Korean Armistice as NBC's News Correspondent in the West Pacific Area

"WE don't abandon the story even after it cools off."

This is the terse and simple phrase which George Thomas Folster uses to describe the manner in which NBC's news covers the world's hot spots.

Folster is a man who should know.

NBC's chief correspondent in the Far East, it was Folster who directed the network's coverage of the three-year Korean war.

Folster is on another of his visits home. This time he traveled on a short timetable, for he allowed himself all of ten days in the States.

But in spite of that, Folster has spent much of his time consulting with William McAndrew, manager of news and special events; Joseph Meyers, Central News Desk editor, and other members of the staff.

The last time George Folster came home, he made the trip in his own 50-foot ketch, a sailing yacht, crossing the vast Pacific from Toyko to San Francisco in 47 days. He was compared to a swashbuckling Magellan. He was on an official vacation, his first in years, and he used it to satisfy a lifetime ambition —to make a round trip through 5,000 miles of shark infested sea across the Pacific.

In 1940, he left Worcester, Mass., where he had been born on May 6, 1906, of a New England whaling family, to accept a job as assistant director of the Fahnestock Expeditions. His duties required that he captain the three-masted schooner *Director Second* across the Pacific.

The expedition which Folster organized was commissioned by the American Museum of Natural History to collect birds and to record native music on South Sea Islands. It was on this same trip that he did his first broadcasts for NBC, on a special arrangement.

Nine months after the expedition weighed anchor, the *Director Second* was forced onto the treacherous

coral of Australia's great barrier reef. Folster and a handful of men continued the expedition through the Solomon Islands, in native canoes and small boats, traveling 3,000 miles by sail and paddle, and finally reaching Australia.

Once he was ar his destination, Folster was able to settle down to the more conventional job of writing and broadcasting news for the Australian radio network. In 1941, Folster did something which was eventually to serve America well: he helped align and test radio circuits between there and the U.S.A. which subsequently proved to be of immense importance when the war spread to the Pacific.

The Japanese attack on Pearl Harbor marked the appointment of George Folster as a war correspondent in Sydney. He moved to Darwin and was the only American to cover General MacArthur's arrival in Australia.

Thereafter Folster moved island by island through the Pacific with MacArthur's and Admiral Nimitz' forces as they beat back the Japanese. He made the first broadcast from bloody Guadalcanal on Nov. 6, 1943, and broadcast first from the front lines on Bougainville in March, '44.

Folster plowed ashore with the First Cavalry Division at Luzon in 1945, and made the first post-War broadcast from inside Japan the morning of the first landing at Yokosuka. Folster and his wife, the former Helen J. Fausey, of Grand Rapids, Mich., became NBC's correspondents in Tokyo at the war's end.

The outbreak of the war in Korea three and a half years ago found NBC on the spot with a fully staffed news bureau, in contrast to other networks which at that time depended upon "stringers". When former President Harry S. Truman made it clear that the United States would regard the Communist attack on South Korea as an act of aggression and would send American forces into the country to help resist the invasion, NBC's staff in the Far East—backstopped by seasoned personnel, many of them former war correspondents themselves, at home—moved into action to report developments for America.

War Coverage has no Parallel

The coverage which was then given the war by NBC has no parallel in radio and television history. Reporters were accredited to the United Nations armies, broadcast from the front lines under fire with the troops. Cameramen established a routine for newsfilm coverage destined to give a new dimension to journalism.

Jim Robinson; Wilson Hall; Robert Hecox; Jung Su Kwan; Irving R. Levine; John Rich; William J. Dunn, these were among the names of NBC radio reporters who helped bring the meaning of this war against Communist aggression home to the vitally concerned people of the United States.

The NBC combat correspondents, exposing themselves to the same dangers to which troops were subjected, moved forward with the armies; Pusan Perimeter . . . Inchon landing . . . Wonsan landing . . . Operation Little Switch. . . .

During the first week of the war, NBC had its tape recorder machines and other broadcasting equipment on the front lines, to the surprise (and consternation) of competitive networks. The first "actuals" heard from the combat area by the people of America, were made by NBC, inaugurating a long series of news breaks for the network's listeners. One oldtimer recalls that correspondents, often caught short in their determination to get their stories back home, were forced to wrap the tape around old beer cans and ration boxes so as to preserve it.

Folster estimates that NBC news broadcasts, not including special events, originating from Korea or dealing with the war and originating in Tokyo, during the three-year period ending July, 1953, exceeded 3,500. No one has a record of the film footage made by the network and flown to the States dealing with the Korean war, but if laid end to end, it would probably reach the moon and back.

Jim Robinson, NBC wartime reporter, is typicol of the combat correspondents who kept the homeland informed of Communist aggression in the Far East.

In This New Field of Custom Recording Even Cows are Made to Talk

Phonographs and Special Discs are being Widely Adopted by Many Branches of Industry as Effective Aids to Sales

By James P. Davis

Manager, Custom Record Division
RCA Victor Division

TIME was when cows were expected only to moo, automobiles to honk their horns, and refrigerators to purr gently. Now you'll find some that talk.

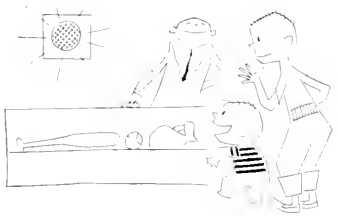
This phenomenon is an accomplishment of the RCA Victor Custom Record Division, which, among its other activities, has recorded some brisk sales talks for delivery by the most unlikely parties. For example, there is Carmelita, a cow associated with Kraft Foods, who spoke to customers in retail grocery stores around the country some months ago during a special promotion of the firm's caramels. There is also the Crosley refrigerator, which has intrigued customers in numerous showrooms by delivering its own commentary to anyone who opened its door. Now automobiles in the hands of certain dealers are preparing to do the same, and it is likely that the habit will spread among hitherto non-talking commodities.

It is, of course, the familiar phonograph record that is behind these unusual activities, and they simply confirm that this time-honored means of sound communication is making itself more useful than ever in modern sales promotion. Aside from these occasional spectacular phases, the custom-made record has been steadily moving up into a role of considerable importance in the business world.

Last year, the RCA Victor Custom Record Division filled orders for millions of transcriptions, phonograph records and slide-film recordings for customers ranging from the International Civil Aviation Organization to an advertising concern promoting bridal photographs. This year, orders have been running at a rate 20% higher than in 1952. The recorded contents, aside from talking cows, automobiles and refrigerators, have run a gamut from animal calls to the conventional human voice. The array has been recorded on a wide variety of discs, from the 6½-inch pure vinyl "spinner" to the 16-mm slide-film, designed for use with slides and filmstrips.

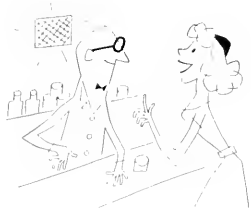
Musical Recordings Predominate

A large percentage of the custom record business consists of musical recordings for more than 100 commercial record companies who lack recording facilities of their own. But the growth of the versatile custom service since its establishment some eighteen years ago points also to the greater effectiveness of the spoken over the written word in numerous situations. A voice is peculiarly effective as a consumer attraction when it emerges from something that is not ordinarily expected to talk, although the bulk non-musical custom record buyers have called on the service as an extremely handy



way of getting a statement, a set of instructions or a spot announcement around to a scattered audience in a manner that makes more of an impression than does a letter or a circular saying the same thing.

Prominent among the orders filled during the past year by the RCA Custom Record Division have been those placed by firms anxious to reach dealers, salesmen or customers. Sears Roebuck, for example, ordered 45-rpm records bearing spoken messages from two of the firm's sales executives to managers and sales personnel outlining a major scale sales campaign in the 400 Sears Roebuck stores. A similar venture was a four-minute statement of company plans recorded by John C. Sharp, president of the Hotpoint Company, for more than 10,000 dealers and distributors handling company products. Both companies reported themselves pleased with the results.



Other organizations and individuals have made use of custom records as a convenient vehicle for reaching a wide membership or a scattered constituency. The American Legion ordered a 6½-inch disc to introduce its new commander to Legion posts and to push a campaign for new members. And a candidate for a Rotary International office reached all prospective voters ahead of time with a recorded message as part of his successful election campaign.

Discs have long been used as language aids, but a new wrinkle was added last year through the RCA Victor Custom Record Division by the International Civil Aviation Organization in the form of multilingual basic radio communication lessons. Flying vernacular being what it is, the pilot holding radio conversation over foreign territory these days is likely to find himself coping with a tongue bearing no resemblance to anything in his phrase book. The ICAO recordings, featuring aviation trade talk in several languages, are designed to smooth the path for him.

Other instructional uses to which the recent crop of custom records has been put include the instruction of retail sales personnel in selling techniques, the training of secretaries and clerical workers, and tips to display staffs on the proper way to feature given products. Under the last heading came another oddity in the form of a talking display case used by Kraft Foods to point out that improper display loses customers.

While the human voice has accounted for the greater volume of non-musical record production at RCA Victor, the engineers of the custom record division have been called upon at one time or another to handle everything audible, from a foghorn to a set of apparently meaningless tones and vibrations.

Recorded Foghorn Saves Money

The foghorn was recorded for use—logically enough, as a foghorn—in a West Coast area where amplification of a record turned out to be far more economical than installation of an actual horn. On the other hand, certain tones and vibrations were put on a disc for the benefit of sinus sufferers at the order of the International Hearing Institute. It seems that application of suitable vibrations through earphones opens the sinuses.

In addition to these two samples, the division has recorded a vast collection of bird and animal calls, underwater sounds (for Navy instructional use), bells, heartbeats, and, of course, a very great quantity of music.

About half of the users of custom records send in their own tape, wire or discs to be processed and pressed at the New York plant of the Custom Record Division. The other half arrange for original recording by the division at one of its three studios, located in New York, Chicago and Hollywood. The studio recordings are made first on magnetic tape, then transferred to discs, processed and pressed through the most up-to-date facilities and shipped out according to the customer's specifications.

Experience in the custom record division up to now indicates that apparently there is no limit to which the recordings can be put by both business and non-commercial users. The RCA Victor engineers who fill the custom requests have learned by now not to be surprised at what they are called upon to record. By the same token, the buying public had better brace itself—there's no telling what may be talking next year.

RCA-NBC "FIRSTS" IN COLOR TELEVISION

The foundation for a color television system was laid by RCA's pioneering in research and engineering development of black-and-white television.

Throughout the 1930's field tests and experimentation with black-and-white television continued. In April, 1939, at the opening of the New York World's Fair, RCA-NBC began the first regular television broadcasting service to the public, and RCA Victor introduced television receivers for public use. Fundamental developments in all-electronic black-and-white television provided the base for RCA's pioneering research in color television that led to the following advances:

1940 Color television, produced by electronic means, was demonstrated to the Federal Communications Commission by RCA at Camden, N. J.

1940-1941 NBC started work on a field sequential color system and transmitted the first color signals from that system over station W2XBS, Empire State Building, on February 20, 1941. On December 1, 1941, NBC gave a closed circuit demonstration of color television using the NBC field sequential system with 441 lines. Purpose of the demonstration was to prove to the FCC that the field sequential system, when limited to the same bandwidth as the black-and-white system, was lacking in resolution as compared to the latter.

1941-1945 RCA-NBC devoted its research and engineering resources to wartime military applications of electronics including television.

1945 RCA demonstrated field sequential color television and 3-D color television to the industry, and started post-war evaluation of color TV.

1945 RCA gave full attention to the development of an all-electronic color television system after further tests and demonstrations proved that a mechanical color system had fundamental limitations. Two main objectives were: High standards of performance, and compatibility with black-and-white television.

1946 An all-electronic projection type color television receiver with a 15 x 20-inch screen was demonstrated publicly for the first time at the David Sarnoff Research Center of RCA at Princeton, N. J.

1947 All-electronic color television pictures projected on an 8 x 10-foot screen were demonstrated by RCA at The Franklin Institute, Philadelphia, Pa.

A color television camera for use with the RCA all-electronic color television system was demonstrated to the FCC and others at the David Sarnoff Research Center, Princeton, N. J., studio and outdoor pick-ups were featured.

1948 RCA continued its reasearch and development work to improve and simplify the all-electronic color television system.

1949 RCA informed the FCC it had developed a new high-definition all-electronic color television system operating on a 6-megacycle channel and completely compatible with the existing black-and-white television system.

Field tests of the RCA all-electronic compatible color television system operating on 6-megacycle channel, began in Washington, D. C., over NBC station, WNBW, and a demonstration was held for the FCC. Tests also were conducted in Washington over an experimental UHF station simultaneously over VHF.

NBC conducted compatible color television tests in Washington D. C., for the first time during regular broadcast hours. The puppet show, "Kukla, Fran and Ollie", televised by color cameras in Washington, was fed to the NBC-TV network. It was the first regular TV program to be seen simultaneously in color (in Washington), while viewers in other cities on the network viewed the show on standard receivers in black-and-white.

RCA-NBC transmitted color television over a microwave relay loop between Washington, D. C., and Baltimore, Md., in a demonstration to the FCC.

1950 RCA demonstrated its compatible color television system and the RCA tri-color tube to the FCC, to other government officials and to the industry. One tube utilized a single electron gun and another three electron guns. Also a new transmission development to make color television programs produced by the RCA all-electronic system available to broadcasters over coaxial cable networks, as well as over radio relays, was demonstrated between Washington and New York. The color images, after transmission over the cable, were broadcast by WNBT, New York on VHF (very-high-frequencies), and were also sent by radio relay to NBC's experimental UHF (ultra-high-frequencies) station at Bridgeport, Conn., for rebroadcast.

(Continued on page 32)

In this mobile TV truck are complete facilities for picking up remote programs and for relaying them to the main studio or transmitter.

New Mobile Unit Carries All Equipment Needed For Remote TV Pickups

A mobile unit to carry all equipment needed to pick up, monitor, and relay remote television events to a TV station, has been developed by the RCA Engineering Products Department.

The newly-designed television studio on wheels is mounted on a standard 1½-ton truck chassis. It has a separate air-conditioned control room with seating facilities for driver, program director, and up to three operating technicians. It has a separate "air-exhaust" enclosure for power supplies, complete storage section for up to three camera chains with large cable reels at rear, and a reinforced roof to support personnel and operating equipment when on location.

As a complete studio, the mobile unit is ready to move when needed, and ready for operation in a minimum of time.

RCA-NBC "Firsts" in Color Television

(Continued from page 31)

1951 RCA presented detailed technical and engineering information on its tri-color tube to competing tube and set manufacturers, at a series of meetings it organized to aid in the further development, testing and introduction of color by the industry.

Network color television tests conducted by RCA-NBC, originating in Washington, D. C., were transmitted by microwave relay to New York and re-broadcast to the David Sarnoff Research Center at Princeton, N. J.

Tests of the RCA compatible color television system began in New York over NBC station WNBT. Field tests featured reception on the RCA tri-color picture tube and outdoor pick-ups by the color television camera.

RCA conducted public reaction tests of compatible color television with receivers in the Lounge of the Center Theatre, Radio City, N. Y. The programs were also produced on a 9 x 12-foot screen at the Colonial Theatre, New York.

RCA color television signals originating in New York were transmitted in a test via microwave to Los Angeles and looped back to New York over an 8,000-mile circuit.

1952 Compatible color television tests were conducted in New York for the first time by NBC during regular broadcasting hours. The Colonial Theater in New York was equipped with color studio equipment making it the first studio to be made ready for large scale television programs in color.

1953 RCA demonstrated its compatible color television system to the Committee on Interstate and Foreign Commerce, House of Representatives, to the FCC and to the industry. A color television camera equipped with a single tri-color tube, instead of three color pick-up tubes. Both outdoor and indoor pick-ups were presented.

RCA made available to competing manufacturers in the radio-television industry the latest information on design and production of its improved tri-color television picture tube at a technical symposium in New York.

RCA-NBC petitioned the FCC on June 25, 1953 to adopt the compatible technical signal specifications used by RCA color television system as standards for commercial color television broadcasting.

RCA NEEDS ENGINEERS

who won't be held back!

RCA, pioneer and leader in every important branch of radio-electronics, has a permanent position for you if you are an experienced ELECTRONIC, COMPUTER, ELECTRICAL, MECHANICAL OR COMMUNICATIONS ENGINEER . . . PHYSICIST . . . METALLURGIST . . . PHYSICAL CHEMIST . . . CERAMIST . . . GLASS TECHNOLOGIST.

You may choose to specialize in research, development, design and application. Both commercial and defense projects.

POSITIONS OPEN IN RESEARCH— DEVELOPMENT—DESIGN—APPLICATION

in any of the following fields:

RADAR—
Circuitry—Antenna Design—Servo Systems—Information Display Systems—Gear Trains—Stable Elements—Intricate Mechanisms

COMPUTERS—
Digital and Analog Systems Planning—Storage Technique—Circuitry—Servo Mechanisms—Assembly Design—High Speed Intricate Mechanisms

COMMUNICATIONS—
Microwave—Aviation—Mobile—Specialized Military Systems

MISSILE GUIDANCE—
Systems Planning and Design—Radar and Fire Control—Servo Mechanisms—Vibration and Shock Problems

NAVIGATIONAL AIDS—
Loran—Shoran—Altimeters—Airborne Radar

TELEVISION DEVELOPMENT—
Receivers—Transmitters and Studio Equipment

COMPONENT PARTS—
Transformer—Coil—Relay—Capacitor—Switch—Motor—Resistor

ELECTRONIC TUBE DEVELOPMENT—
Receiving—Transmitting—Cathode-Ray—Phototubes and Magnetrons

ELECTRONIC EQUIPMENT FIELD ENGINEERS—
Specialists for domestic and overseas assignment on military electronic communications and detection gear.

There's not a temporary job among them. War or depression, RCA has continued to grow . . . growth in which you'll share when you launch your lifetime RCA career.

For many other reasons, too, RCA is a *good* place for you to work. RCA affords unexcelled facilities in pleasant surroundings . . . every chance for advancement in rank and income . . . enjoyable suburban or country living conditions . . . *professional recognition* for achievement . . . modern retirement program. Many Company-paid benefits for you and the family. PLUS modern tuition-refund plan for advanced study at recognized universities.

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If you qualify for any of the positions listed above, please send us a complete resume of your education and experience. Please state your specialized field preference. Send resume to:

MR. ROBERT E. McQUISTON, Manager
Specialized Employment Division,
Dept. 215-J
Radio Corporation of America,
30 Rockefeller Plaza, New York 20, N.Y.

RADIO CORPORATION of AMERICA

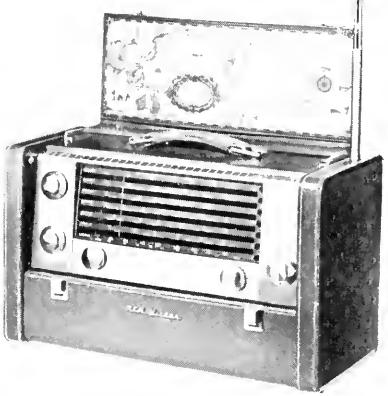
With this new multi-wave portable you can circle the globe in the time it takes to twist a dial.

That's because the RCA Victor Strato-World radio has Electronic Band Spread Tuning.

Instead of being squeezed together on one band segment, short-wave stations are in spread formation across the dial of your 7-band Strato-World. You can tune London, Rome, Moscow, Tokyo just as you do the local stations.

There's real *one-handed* portability, too. The Strato-World is a trim 23 pounds, including batteries . . . or it can be plugged into an electrical outlet.

Here is the performance, the engineering and design you've come to expect from RCA Victor, a division of the Radio Corporation of America. See this globe-trotting, pace-setting portable at your RCA Victor dealer's.



RADIO CORPORATION OF AMERICA

World leader in radio—first in television

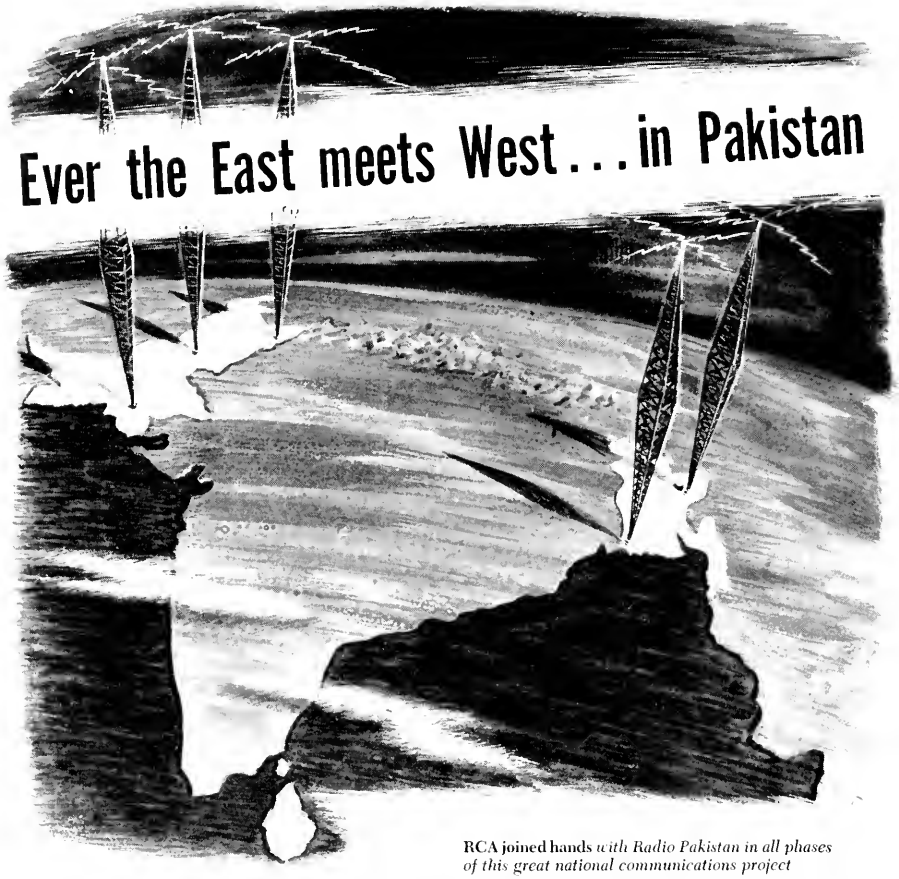
RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

ANUARY
1954

"CARMEN"
in
OR TELEVISION

Ever the East meets West . . . in Pakistan



RCA joined hands *with Radio Pakistan in all phases of this great national communications project*

How the two parts of a great country achieve unity in spite of a 1,000-mile separation . . . by means of modern radio broadcasting

Six years ago Pakistan had neither a government nor a capital. There were over 77 million people and 360,000 square miles of land, but commerce was almost at a standstill . . . transportation and communications were disrupted. And the greatest migration in history was taking place . . . 7,000,000 displaced persons crowding into the as yet unorganized nation.

The years have wrought an astounding change. Today Pakistan is far advanced in a co-ordinated program of enlightenment and education for its own people . . . and deeply concerned in helping to promote greater understanding, tolerance and friendship among the peoples of the world.

Radio has played a great part in Pakistan's rapid development. From the very birth of the new nation, radio was used as the quick and sure medium of communication, of enlightenment. Radio Pakistan came into being . . . attracted competent engineers to its program . . . developed into a compact powerful voice. To RCA was given the job of providing the powerful radio equipments installed by Radio Pakistan.

Today in Pakistan there are two 50 KW short-wave stations operating on an international schedule. A 7½ KW short-wave transmitter at Dacca is used to link East with West Pakistan. A 5 KW broadcast transmitter at Dacca covers East Pakistan. Others join the great network at Lahore, Peshawar and Rawalpindi . . . operating a total broadcast time of 96 program hours a day.

Radio Pakistan is completely co-ordinated. Its nine transmitters link all sections of the nation into one united network . . . as well as being an enlightened voice heard 'round the world.

RCA products and services are available in all open world markets, through RCA distributors and associated companies. The new book "Communications, Key to Progress" tells the inspiring story of radio at work in many countries. Write to RCA International Division, 30 Rockefeller Plaza, N.Y., U.S.A.

"Marcas Registradas"

RCA INTERNATIONAL DIVISION
RADIO CORPORATION of AMERICA
RCA BUILDING
30 ROCKEFELLER PLAZA, NEW YORK, N.Y., U.S.A.

World leader in radio, first in recorded music, first in television.

VOLUME 13 NUMBER 1

Radio Age

CH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

JANUARY 1954

COVER

Color cameras focus on a scene from "Carmen" at NBC's Colonial Theatre in New York during the first performance of opera on color television.

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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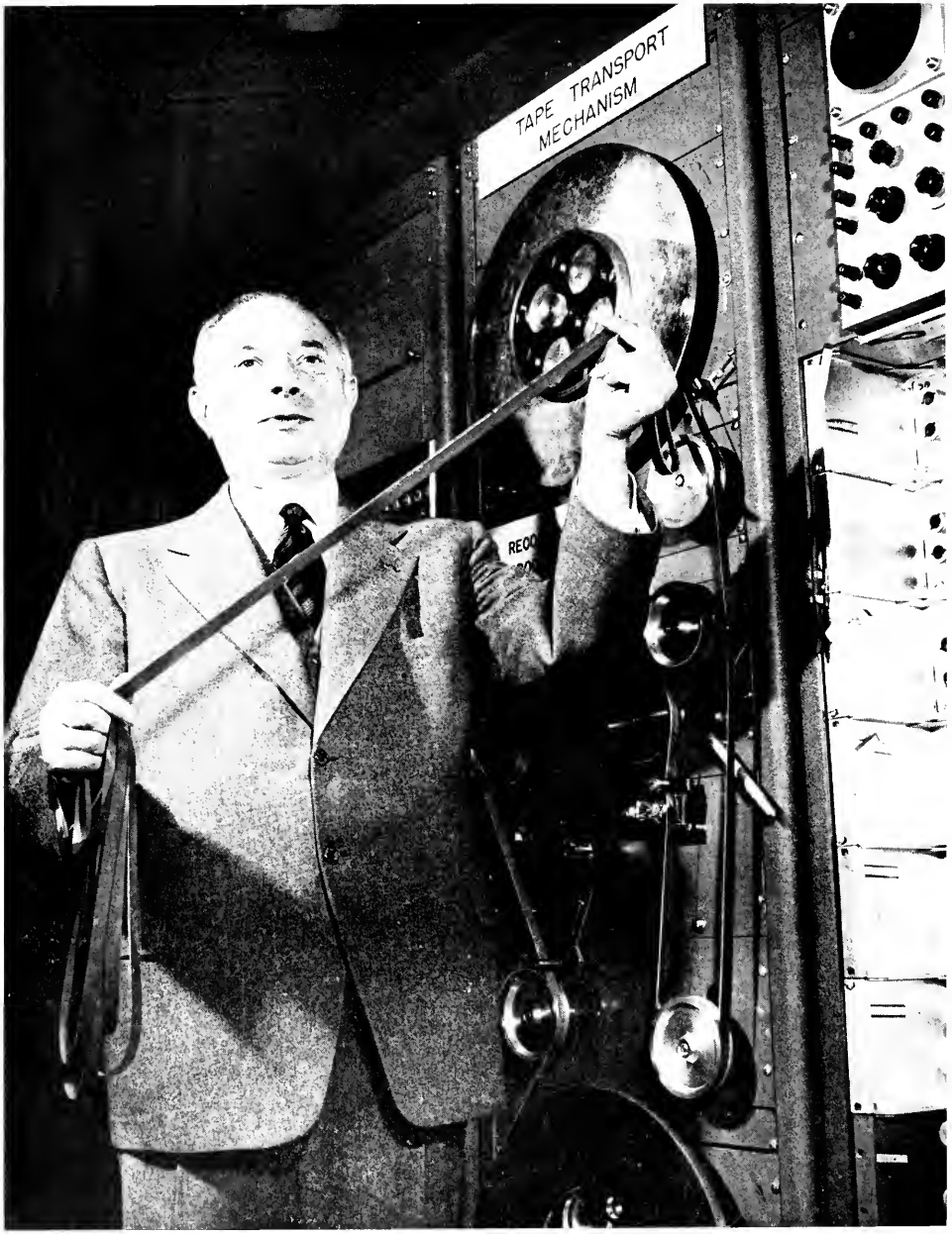
Printed in U.S.A.

CONTENTS

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*



Brig. General Dovid Sornoff, Chairman af the Board af RCA, displays the magnetic tape and recording unit developed by RCA to record both color and black-and-white television programs. (Story on Page 13)

Sarnoff Reports Stage Set for Color TV as Science of Electronics Makes New Advances

RCA Board Chairman Says in Year-end Statement that 1954 Holds Promise of New Progress in Radio-Television and Electronics

by Brig. Gen. David Sarnoff

Chairman of the Board
Radio Corporation of America

PROGRESS in development of color television, approval by the Federal Communications Commission of signal standards using the RCA compatible color television system, and preparation by stations for colorcasting, set the stage for 1954 to be the "Introductory Year" of color television.

Color telvision holds great potential for future expansion of the industry. Other branches of electronics also advanced on many fronts throughout 1953. Major advances during the year included:

1. Great strides in development of electronic weapons and instruments for national defense.

2. Expanded and improved television broadcasting service, including progress in the use of ultra high frequencies.

3. Development of magnetic tape recording for television in both color and black-and-white, ushering in a new era of "electronic photography".

4. Further development and application of transistors, promising simplification and miniaturization of electronic equipment.

5. Further clarification of radio's enduring position as a vital broadcasting service to the American public.

6. Inauguration of the world's most powerful radio transmitter by the U. S. Navy, marking an historic milestone in world-wide communications.

7. New levels of popularity for recorded music, sparked by progress in high fidelity records and phonographs.

8. Progress in industrial electronics, including push-button controls, electronic computers, food sterilization, and closed-circuit television.

The year 1954 holds promise for new advances throughout the radio-television and electronic industry. Fulfillment of the promise of this new year, however, will depend upon how well the leaders of the industry meet current economic problems and the new challenges of our times.

The Radio Corporation of America in 1953 produced the largest volume of business in its 34-year history. Sales of products and services approximated $830 million during the year. Net profits are estimated at $34,700,000. Dividends declared on the Common Stock amounted to $20,312,000. In addition, $3,152,952 was paid in dividends on the Preferred Stock. Employment totaled 65,000. Manufacturing accounted for 70% of net earnings; radio-television broadcasting, 15%; communications, 5%, and all other activities, 10%.

Government business accounted for about $160 million, or 19% of total sales. The current backlog of Government orders was about $500 million at the year-end, and is expected to expand in 1954.

NBC Organization Strengthened

The organization of the National Broadcasting Company was greatly strengthened during the past year in every phase of its operation. Sylvester L. Weaver, Jr., elected President of NBC on December 4, 1953, has an awareness of high purpose, a sincere regard for public service, proven capacity for showmanship, a thorough understanding of the advertisers' needs and problems and an appreciation of the economic facts of life in the broadcasting industry. He has youth and a breadth and depth of experience.

Robert W. Sarnoff, the newly elected Executive Vice President of NBC, has served in a wide range of capacities which include excellent experience in programming, production and sales. These two men working together as a harmonious team will lead NBC in strengthening its position as the Nation's No. 1 broadcaster and keep it at the forefront as "first" in service to the public in both radio and television.

Since the end of World War II, great advances have been made in the military application of communications, radar, missile control, airborne television and many other phases of electronics which fit into the modern ramparts of our Nation's security. Our objective is not only to produce electronic weapons and instruments, but

through research and engineering to keep the United States at the forefront of science in its relationship to military electronics.

Color Television Advances

The date December 17, 1953, on which the FCC approved standards for the commercial broadcasting of *compatible color television,* will be remembered in the annals of communications along with the historic date of April 30, 1939, when RCA-NBC introduced *all-electronic black-and-white television* as a new broadcast service to the public at the opening of the World's Fair in New York.

RCA is proud of the leadership its scientists and engineers achieved in developing the all-electronic *compatible* color television system and the RCA tri-color tube.

Compatibility means that existing television sets can receive color programs in black-and-white without any changes or additional devices. For this principle and feature of compatibility in television, RCA fought hard and long, not only to achieve it scientifically, but to advance such a system as the only logical and practical service in the interest of the public and the television industry.

Because of compatibility, no one need hesitate to buy a black-and-white television set. It will not be obsolete because of color, and it will perform many years of service. Color television sets at the outset will cost from $800 to $1,000, and production will be in relatively small quantities until the industry is geared for mass production.

The National Broadcasting Company has completed program plans for color television's introductory year that call for each of NBC's regular productions to be broadcast in color at least once during the year—at the average rate of two programs a week.

During the past year NBC's personnel had an opportunity to acquire extensive experience in the broadcasting of color television programs. Significant developments in 1953 pointed the way to further progress that may be expected in 1954:

1. Compatible color television was viewed for the first time in Chicago on September 22, 1953, when RCA-NBC staged a demonstration at the annual meeting of the Association of National Advertisers. This inter-city program was transmitted over a closed circuit from New York.

2. On November 3, 1953, RCA-NBC staged two historic "firsts": A live show performed in the NBC color television studio at the Colonial Theatre on Broadway in New York was relayed by microwave across the continent to Burbank, California, and a color film also was televised for the first time from the Atlantic to the Pacific coast.

3. A color television version of the opera "Carmen" telecast by NBC in New York was acclaimed as "breathtaking and beautiful" and "a magnificent feat of technology and showmanship".

4. The first sponsored network program in compatible color television broadcast on November 22, 1953, featured "The Colgate Comedy Hour" starring Donald O'Connor. This telecast was the first of a number of premieres scheduled by NBC.

5. These impressive demonstrations led to another history-making colorcast by NBC — the Tournament of Roses at Pasadena, California. This event was colorcast on New Year's Day through 21 stations, which were equipped for colorcasts, while other stations in the network presented the pageant in black-and-white.

Said *The New York Times:*

"Color television's most exacting test came with the NBC's outdoor pickup of the Tournament of Roses. All things considered the results were exceedingly good, — There was no question that the essence of the parade's panorama of color was projected successfully on home screens some 3,000 miles away."

The Daily News noted that the Tournament of Roses parade, "picked up by a special NBC mobile color unit, the only one of its kind in existence, was the first transcontinental colorcast from West to East. It also

NBC's New Team

Sylvester L. Weaver, Jr.
President

Robert W. Sarnoff
Executive Vice-President

went into the books as the first remote (outside the studio) program in compatible tints, under the new FCC standards and the first network color show carried by a series of coast-to-coast stations."

Television is also extending its usefulness to perform new services for business and industry. Television's basic function is "extension of human sight", and wherever such applications are needed the TV camera and associated equipment are ready for practical use. Wherever danger, remoteness or discomfort precluded the presence of human observers, the industrial TV camera comes into play.

RCA's light-weight industrial TV equipment using the small Vidicon camera tube has led to substantial expansions of industrial television, and this field now becomes one of great potential for phenomenal growth, not only in factories but for banks, department stores, hotels, theatres, lecture halls and auditoriums and even for inter-office "sight" communication.

Radio

Radio broadcasting in 1954 moves into its 34th year and during that period has become intimately integrated with American life. Naturally, over such a long period any service undergoes fundamental changes to keep pace with the times, and in the case of radio it has confronted television as a new competitive service.

Nevertheless, radio has continuing economic opportunities for it performs where television and other mediums of communication and information do not reach. Today there are more than 45 million radio families in the United States. There are 26 million automobile radios, and many millions of portable sets. In 1953 alone, 13 million radio sets, including nearly 5 million auto radios, were produced.

Ultimately, the application of transistors should result in the advent of pocket radios no larger than a wallet, and eventually a watch. This will offer radio new opportunities for extended service in programming, entertainment, information and news.

Radio Communications

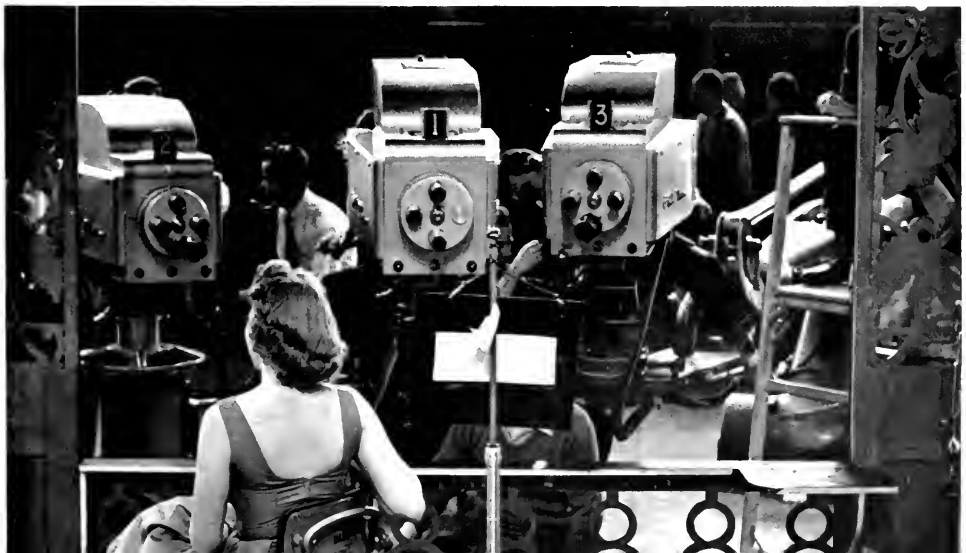
In the field of radio communications, opening of the most powerful radio transmitter in the world (1,200,000 watts) built for the U. S. Navy by RCA at Jim Creek Valley in the State of Washington, marked an historic milestone in world-wide communications. It demonstrates to a marked degree how teamwork between private industry and the military forces contribues to the nation's welfare and to the leadership of the United States in international communications.

Magnetic Tape for Sight and Sound

A new era of "Electronic Photography" was ushered in during 1953 when on December 1, RCA demonstrated magnetic tape recording of both black-and-white and color television. This is a development of great significance to the motion picture world as well as television.

Eventually magnetic tape recording of video signals should make it possible for television set owners to make their own recordings of television pictures in the home. Then they can be "performed" over and over through the television receiver just as a phonograph record is played at will. Many more new uses will

"Intensive color production activities are under way . . ."



undoubtedly be developed as means are found for the packaging of magnetic tape in low cost cartridges. Electronic cameras are in prospect.

Phonographs and Records

Phonographs and records reached new levels of popularity in 1953, and this renaissance may be expected to continue in 1954. In 1953 the phonograph-record industry as a whole sold more than 238 million disks. Major factors that lifted record sales to a new peak in 1953 were: Increased use of 3-speed turntables; wide acceptance of 45-rpm Extended Play recordings, and the influence of High Fidelity in generating new interest in records and phonographs.

High Fidelity — a new dimension in sound created by the perfect union of recorded music and the modern electronized phonograph, gained momentum during 1953 through a nationwide interest that reflects the public's growing interest in music of the highest quality. "Hi-Fi", the popular term for High Fidelity, has introduced a new epoch in music which is bright with promise for 1954.

The Outlook

As we look ahead into 1954, we have a clearer view of the field of science than of economics. Science and engineering in 1954 will move forward to new achievements.

Based upon standards of the past, 1954 should be a good year for the radio-television electronics industry. This does not necessarily mean that new records will be made in production and sales. It is more likely that a moderate degree of economic adjustment will take place in many industries throughout the year. But this can be achieved without dislocation of our economy.

Growing Demand for Radio and TV

America is still a growing country. Its population, annually increasing at the rate of more than 2½ million, continually calls for more and more radio and television sets. In 1953 the radio-television industry as a whole produced 13 million radio sets, including auto radios, and approximately 7,000,000 TV receivers.

Those who first saw the light of day in 1953 most certainly will grow up in an age of color television. They will also find tiny personal radios and other small but powerful sets made possible by the transistor, far different from the large sets used by their grandparents.

RCA now enters its 35th year dedicated, as in the beginning, to pioneering and steadfast in purpose to give America preeminence in communications. Pioneering, vision and scientific research are vital factors in long-range planning. The opportunities ahead for business and industry, for employment, for new and useful services to the public are truly great. We will continue our efforts to do our part to advance and to merit the faith and confidence the American people have in "RCA" as an emblem of quality, dependability and progress.

Sarnoff Commended for "Great Victory" in Compatible Color Television

Senator Edwin C. Johnson, of Colorado, former Chairman and present member of the Interstate and Foreign Commerce Committee of the U. S. Senate, in a letter to Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, commends him for the "great victory you have won for the American people in getting them a compatible system of color TV." The complete text of Senator Johnson's letter, dated December 31, 1953, follows:

"Dear General Sarnoff:

"I must not let 1953 pass into history without commending you heartily for the great victory you have won for the American people in getting for them a compatible system of color TV. You spent money like water in the laboratory to develop this system and you pressed for its adoption relentlessly.

"The scoffers said it could not be done but you were not influenced by their pessimism. The demands for delay only made you press the harder for prompt and forthright action. You faced the identical obstacles thrown in the paths of all men who have really gotten things done. Columbus for instance. Please accept my congratulations for a mighty important achievement in the Art of Communications.

Gratefully,
Ed. C. Johnson"

Dr. Lee de Forest, inventor of the audion, or 3-element tube, sent the following message to General Sarnoff on January 5, 1954:

"Highly significant of the glorious future of television was the ushering in of the New Year with RCA's nation-wide compatible color, a magnificent triumph of man's indomitable ingenuity and resourcefulness. Sincerest congratulations to your talented corps of scientists for demonstrating this complete vindication of your twenty years of courageous foresight. The past is but a prelude."

Folsom Sees Opportunities for Business In Current Trend to Buyers' Market

American merchandising reached a significant turning point in 1953, presenting new challenges and opportunities for the coming year—a year that can be good for business, Frank M. Folsom, President of the Radio Corporation of America, declared in a year-end statement issued on December 30.

"The new trend in merchandising represents a closer approach to normal business operations," said Mr. Folsom. "The 14-year-old sellers' market is gone. Many industries are now adjusting their operations to meet the demands of a buyers' market. Careful planning and hard work are needed to maintain the sales volume developed during the years that business enjoyed a sellers' market."

The changed market condition requires evaluation by business leaders, not only along economic lines, but in over-all strategy of operations, he asserted, and added: "Recognizing these needs, RCA is charting a positive course of action to maintain relatively high volume in production and sales during 1954."

Major Steps Being Taken

Among major steps reported by Mr. Folsom as being taken to achieve this aim are:

1. Reshaping of productive capacity to meet changed merchandising trends and to increase efficiency so that values of products may be enhanced for the consumer.
2. Streamlining of operations and selling organizations.
3. Establishment of closer teamwork between retailers, wholesalers and manufacturers.
4. Strengthening of distribution system so that consumer demands in certain areas can be more readily met by wholesale outlets nearer to dealers.
5. More assistance to dealers in building effective sales staffs.

The growing importance of the radio-television industry in the progress of America was demonstrated convincingly in 1953, Mr. Folsom said. He pointed out that new dimensions of television and sound, in particular, and the continuing electronic requirements of government and military services, provided major areas of development and production.

"Abundant sales opportunities," he said, "are ahead in such fields as black-and-white television, compatible color television, industrial TV, transistors, high fidelity phonograph instruments and records, office and home communications systems, radio sets, and electronic equipment for industry and military uses, as well as the older lines of communications apparatus."

Television—Black-and-White and Color

RCA expects sales of black-and-white television sets to continue in the millions, during the orderly introduction of compatible color television in 1954, and plans to accelerate promotional activities to achieve this, asserted Mr. Folsom, adding:

"The importance to the public of compatibility in television cannot be over-emphasized. It means that color programs can be received in black-and-white on all existing sets, at no additional cost to set owners, and without added devices. Color sets can also receive black-and-white programs in black-and-white."

RCA commercial planning for color TV made substantial progress in 1953, he revealed, stating that production schedules were mapped to provide stations with necessary equipment to broadcast network-originated color programs in key cities by the end of 1953. Pilot production of color components—including the RCA

One of the most popular home television receivers in the RCA Victor line — the "Master 21."

Supermarket methods have widened the market for recordings. Photo shows self-service store in Hollywood.

tricolor tube—was underway. Pilot production of RCA Victor compatible color receivers was begun.

In regard to the servicing of television, Mr. Folsom said that the RCA Service Company, "in addition to the superlative job of installing hundreds of thousands of television home receivers in 1953," continued to promote high standards of television service in its own branches and cooperated with independent service organizations which share this objective. Special service clinics were devoted to UHF (ultra high frequency) installation and service in 93 cities with more than 10,000 independent technicians in attendance.

Additional Sales Potentials

Mr. Folsom stated that the phonograph and record industry is expected to continue its impressive growth in 1954 with a 10% rise in record sales—on top of a 12% increase in 1953, expected to push industry volume past the $250 million mark.

He said the chief factors in the increase of record sales are notable improvements in both the making of records and their presentation to the public, the introduction of high fidelity sound recording and reproduction highlighting the advances.

In the recording field, Mr. Folsom pointed out that the introduction by RCA Victor of 45-rpm Extended Play recordings provided means for offering shorter classical selections and new couplings of popular music. Industry production of "EP" recordings exceeded the 10,000,000-disc mark in the first twelve months, he added. In record merchandising, the trend toward "super market" or self service record stores has meant a wider market, he said, adding that "evolution of the retail outlet from a library-type operation to a 'super market' using island displays for pop singles and point-of-purchase salespower of album art and liner material has made new customers and bigger customers of old record buyers."

He reported that sales of radio sets—the "hardy perennial" of home entertainment—continued good in 1953 with industry production of 13 million new sets establishing an all-time high of 115 million radios now in use in America.

A new magnetic sound tape recorder, developed by RCA for non-professional use, also is proving attractive to customers, he reported, and listed RCA home air-conditioners and RCA Estate Ranges as other new products that are establishing themselves in the market.

Folsom Honored At Dinner On 10th Anniversary With RCA

Frank M. Folsom, President of RCA, was honored on December 14 at a dinner given by Brig. General David Sarnoff, Chairman of the Board of RCA, to commemorate the tenth anniversary of Mr. Folsom's association with the corporation.

The dinner, held at the Waldorf-Astoria Hotel in New York, was attended by 375 leaders in the fields of radio, television, publishing, business, industry, finance and the military services. At the head table, with General Sarnoff, Mr. Folsom and Francis Cardinal Spellman, were the Directors of RCA.

In paying tribute to Mr. Folsom, General Sarnoff spoke of the close teamwork between Mr. Folsom and himself, saying, "Of all the things I've tried to do in RCA during a long period of years—I am now in the forty-eighth year of my service in radio—I know of nothing of which I am as proud as I am of the selection I made of Frank Folsom for President of RCA."

Mr. Folsom joined RCA on January 1, 1944, as a Director and Vice President in Charge of the RCA Victor Division, after thirty years in merchandising and two years as head of the procurement branch of the U. S. Navy. He was named President of RCA in December, 1948, on the recommendation of General Sarnoff, whom he succeeded in the position.

Joseph B. Elliott

W. Walter Watts

Dr. Elmer W. Engstrom

Charles M. Odorizzi

Four Executives of RCA Are Promoted

Elliott, Watts, Engstrom and Odorizzi Elevated to Executive Vice-Presidents in Move to Keep Pace with Continued Growth of Corporation's Business

Promotions and organizational realignments in the Radio Corporation of America were announced in a joint statement issued on January 8 by David Sarnoff, Chairman of the Board and Frank M. Folsom, President. Four RCA Vice-Presidents were elevated to the position of Executive Vice-Presidents who will be in charge of their respective operations.

The organizational changes included the creation of a new Consumer Products Division, a new Electronic Products Division and a consolidation of staff functions for the entire Corporation. Present Divisions engaged in other activities of the Corporation continue as before.

The announcement stated that the promotions and organizational realignments would become effective immediately.

Joseph B. Elliott was promoted to Executive Vice-President in charge of Consumer Products Division.

W. Walter Watts was promoted to Executive Vice-President in charge of Electronic Products Division.

Dr. Elmer W. Engstrom was promoted to Executive Vice-President in charge of the RCA Laboratories Division.

Charles M. Odorizzi was promoted to Executive Vice-President in charge of a newly consolidated corporate staff serving all units and subsidiaries of the RCA.

The headquarters of Messrs. Elliott, Watts and Odorizzi will be at the RCA Executive Offices in the RCA Building, Radio City, New York. Dr. Engstrom's headquarters continue at the David Sarnoff Research Center of RCA, Princeton, New Jersey.

In their announcement, General Sarnoff and Mr. Folsom said: "These organizational changes and promotions are made to keep pace with the continued growth of the Corporation's business. In the last fifteen years, RCA sales have increased eight-fold and the number of employees has trebled to more than 65,000.

"In the television, radio and phonograph fields, RCA products and services continue to expand. In the home appliance field, sales of our air conditioners and ranges are also on the increase. Our production of military communication and electronic apparatus is at new high levels. The new and promising fields of color television, industrial television, and magnetic tape recording of sound and pictures are well under way.

"The promotion of these experienced and able executives to their new positions of increased responsibility and authority is designed to meet the needs of a steadily growing business in a constantly changing art and industry."

Hagerty Named to NBC Board

Election of Harry C. Hagerty as a member of the Board of Directors of the National Broadcasting Company and promotion of three NBC executives has been announced. In addition, three officials of the RCA Laboratories Division were appointed to new positions.

Mr. Hagerty, Financial Vice-President of the Metropolitan Life Insurance Company and a member of the RCA Board of Directors, was elected to the NBC Board of Directors during January. He fills the vacancy on

(continued on page 28)

FCC Approval of Compatible Color Standards Launches RCA and NBC "Introductory Year"

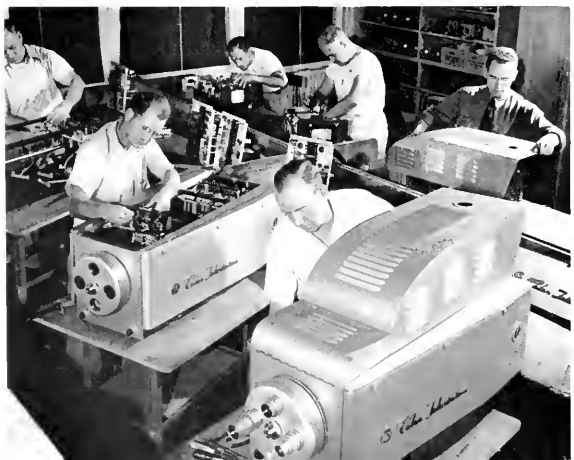
Comprehensive Programming, Production, Training Schedules Are Announced; Network Broadcast January 1 Highlights First Series of Programs

The opening of the color television era, launched on December 17 by approval of the Federal Communications Commission of standards for the compatible system pioneered and developed by RCA, put into practice the widespread programming, production and training plans prepared and rehearsed during 1953 by RCA and the National Broadcasting Company.

For NBC, the FCC decision opened the "Introductory Year" plan under which each of the network's major programs will be done at least once in color and a number of special events will be covered by color cameras for the nationwide audience. For RCA Victor Division, it gave impetus to production of both broadcasting and home receiving color equipment, and to extensive plans for training television manufacturing and service personnel of RCA, its licensees and its dealers in the techniques of color.

Within minutes of the FCC action on December 17, NBC went on the air with a network color signal — a multi-color slide reading "Color News Bulletin," and an announcer said: "Attention, please! Color television is here. You are looking at the first color picture telecast since compatible standards for color television were approved."

Assembly of RCA color TV cameras at Camden, N. J.



A short time later, NBC presented a special color broadcast featuring a statement by Brig. General David Sarnoff, Chairman of the Board of RCA, who was introduced by Sylvester L. Weaver, Jr., President of NBC. From the stage of the Colonial Theatre, the world's first fully equipped color television studio, Mr. Weaver appeared before the RCA color cameras and took the audience on a brief tour of the theatre's facilities.

First Sponsored Color Program

From the same stage three days later, on December 20, came the first sponsored color broadcast following the FCC decision — NBC's famed presentation of the Gian-Carlo Menotti Christmas opera, "Amahl and the Night Visitors." This was the second operatic production to be telecast in color from the Colonial Theatre; Bizet's "Carmen," the first major opera presented in the new medium, was broadcast in a one-hour version in color on October 31 under temporary experimental authorization from the FCC. Thanks to the compatibility of the RCA color system, both productions were seen in high quality black-and-white on the nation's millions of monochrome receivers.

Following the Menotti opera broadcast, "Season's Greetings," a variety show featuring leading NBC stars, was presented in color on December 22. And on New Year's Day, NBC color cameras, operating from a two-truck custom-built color mobile unit, covered the Tournament of Roses parade in Pasadena in the first West Coast origination of a color program and the first transcontinental West-to-East transmission. The first coast-to-coast color broadcast in either direction was transmitted by RCA and NBC on November 3 over a closed circuit from New York to Burbank, California. Color film also was transmitted for the first time by television on this occasion.

The Pasadena broadcast also was the first network color program handled by a coast-to-coast series of stations using special equipment for broadcasting a true color signal — and behind this fact lies the story of a remarkable production and delivery program carried out by the RCA Victor Division to equip stations in major

cities across the country for color reception and transmission in time for the January 1 program.

To meet the deadline, the special production unit at the RCA Engineering Products Department in Camden, N. J., worked on a 24-hour schedule seven days a week to turn out the stabilizing amplifiers, color monitors, phase correction networks and other items required by the stations to handle programs received over telephone circuits. The first shipment, covering the requirements of five stations, left the factory on November 30.

Planes Rush Station Equipment

As fast as equipment was completed and tested at Camden, it was trucked to Philadelphia's International Airport for shipment by air express to the stations. Five crews of specially trained technicians from the RCA Service Company, travelling by air, kept pace with the delivery schedule, calling at each station to supervise installation soon after the broadcast equipment had arrived.

At the same time, other technicians trained in color equipment courses given by the Service Company were assigned to install monitors in broadcast stations and telephone company locations where the program was to be taken off the network. This group also installed the pre-production model color receivers in distributors' headquarters, as well as the sets supplied by NBC to stations handling the program.

Indicative of the scope of the operation is the fact that color equipment was installed by January 1 in Los Angeles, San Francisco, Salt Lake City, Denver, Omaha, Minneapolis, Chicago, St. Louis, Milwaukee, Cleveland, Cincinnati, Toledo, Detroit, Philadelphia, Washington, Wilmington, Baltimore, New York, Wilkes-Barre, Johnstown, Pa., and New Haven.

Plans for the production of color receivers for the home also moved ahead with the announcement of the FCC decision. Initial output of RCA tri-color tubes proceeded from the pilot production line established in the RCA tube plant at Lancaster, Pa., where tubes for test and demonstration purposes had been turned out during 1953. At the Bloomington, Ind., plant of RCA Victor's Home Instrument Department, production of home receivers also moved ahead on a pilot basis. At the same time, production specialists advanced provisions to expand tri-color tube output into existing black-and-white kinescope production facilities as the demand for the color tubes increases beyond the 2,000 per month expected of the pilot line at Lancaster.

Training Plans For Service Industry

The official start of color television broadcasting brought with it the announcement of further plans by

Black-and-White Television Has Assured Future, Elliott Says

By J. B. Elliott

Executive Vice President in Charge of Consumer Products Division, Radio Corporation of America

Now that the Federal Communications Commission has given the official "green light" for compatible color television, more and more people are asking: "What is going to happen to black-and-white television?"

The answer is simple.

For years to come, all stations and networks will continue to broadcast many of their top programs in black-and-white; manufacturers will continue to produce technically improved black-and-white sets and millions of persons will buy new black-and-white sets to bring the marvel of television into an ever expanding number of homes.

The progressive action of the Federal Communications Commission in approving standards for compatible color will serve as a guaranty that the adoption of color will not make obsolete any of the more than 27 million black-and-white sets now in use in American homes. It also assures today's purchaser of a black-and-white set that colorcasts will not affect the usefulness of his new receiver. With the RCA system of compatible color, programs broadcast in color can be received on black-and-white sets as black-and-white programs without any changes whatever in the receivers.

In terms of screen size, picture quality, cabinet styling, and all-around technical performance, black-and-white receivers today offer the greatest values in television history.

The Consumer Products Division of the Radio Corporation of America, as it has since the birth of all-electronic television, will continue to manufacture the finest black-and-white receivers on the market — just as it will produce the finest color sets to be available in the months and years ahead.

The NBC mobile color unit, used for the first time on Jan. 1 for colorcast of the Tournament of Roses parade.

RCA to make available to the servicing industry all needed information on the installation and servicing of color equipment.

The policy of sharing RCA know-how on the broadest basis took several forms during 1953 prior to the FCC decision. In July, licensed tube manufacturers received full information on the RCA tri-color tube, and in October the full design and performance details of RCA's basic color receiver were given to 250 industry representatives at a symposium in New York. The RCA Victor Tube Department also made available to equipment manufacturers special color television kits containing more than 20 special developmental tubes and components, including the RCA tri-color tube.

In addition, the RCA Victor Division held technical seminars in Camden for broadcast engineering consultants to help prepare broadcasters for the handling of color programs. The RCA Service Company, continuing during the year to develop and refine test equipment and servicing techniques, provided technical assistance to television stations in the installation and checking of the equipment for handling network color broadcasts, and trained additional engineers to meet future demands for this type of service.

In the broadcasting field, NBC conducted an indoctrination program to give personnel from affiliated stations the benefit of experience in the color programming and technical fields.

Clinics To Be Held Through 1954

The plans for 1954, designed to cover the servicing field, were announced by RCA on December 22. The program comprises color television servicing clinics for RCA receiving set licensees, RCA distributors and TV service technicians, beginning early in 1954 and continuing through most of the year.

The first clinics, consisting of four days of intensive instruction and demonstration, will be held for the licensees, it was announced by E. C. Anderson, Vice President in Charge of the RCA Commercial Department. For the convenience of set manufacturers, the same clinics will be held in each of three cities beginning in New York on January 11, followed by Chicago on January 25 and Los Angeles on February 28. Each of the clinics will involve a total of 28 hours of instruction, presented by lecturers of the RCA Service Company. The subject matter has been designed to provide basic color information for service technicians already acquainted with black-and-white television, with the curriculum covering color theory, color signals, basic circuitry, components and adjustments.

The industry-wide training and educational program for TV service technicians, supplementing the program for licensees and distributors, was announced by Edward C. Cahill, President of the RCA Service Company. The principal phase is a series of two-day clinics to be held in 65 cities across the country, starting early in February. Technical specialists of the RCA Service Company, using textbooks, test equipment and other instructional materials developed especially for these clinics by the Company, will conduct the courses, to which service dealers and servicemen in each city will be invited.

The Service Company also has prepared a comprehensive textbook, "Practical Color Television for the Service Industry," based on the experience of more than 5 years in research, development and field testing of color receiving and broadcasting equipment by various departments of RCA. Copies will be made available to servicemen completing the clinics, and will also be distributed through RCA parts and tube distributors or directly from the RCA Service Company in Camden at $2 a copy.

Mr. Cahill also disclosed that a new type of test equipment for use with color television sets has been installed in RCA factory service branches in areas where color television will be received. Called the color signal stimulator, the equipment is essential for the proper phasing and alignment of color sets.

Another phase of training, a color television home study course for technicians of the electronics industry, was announced by George F. Maedel, President of the RCA Institutes, Inc. The course, in nine lessons, covers all phases in the principles and servicing of color receivers, based on material prepared by the Service Company for the over-all color training program. Mr. Maedel said that a bulletin describing the course in detail may be obtained from the Home Study Department of RCA Institutes at 350 West 4th Street, New York 14.

Magnetic Tape Recording of Television Pictures Demonstrated by RCA

Color and Black-and-White Video Programs Reproduced with Device Hailed as Major Step toward New Era of "Electronic Photography"

COLOR and black-and-white television pictures were recorded on magnetic tape and played back over color television receivers at the David Sarnoff Research Center of RCA in Princeton, N. J., on Dec. 1 in the first public demonstration of new techniques that will simplify the art of making motion pictures.

The achievement was described by Brig. General David Sarnoff, Chairman of the Board of RCA, as the first major step into an era of "electronic photography," in which motion pictures in color or black-and-white will be produced quickly and economically, without the need for photographic development or processing.

The revolutionary device, which records the sight of television by a method basically similar to the tape recording of sound, is the answer by RCA scientists and research men to the first of three requests made by General Sarnoff two years ago, on the occasion of his forty-fifth anniversary of service in radio. At that time, he asked for a video tape recorder, an inexpensive electronic air-conditioner without moving parts, and a true amplifier of light. Research is in progress on the second two items, and the successful development of the first was proven in the Dec. 1 demonstration to newsmen and leaders in the fields of motion pictures, broadcasting and electronics.

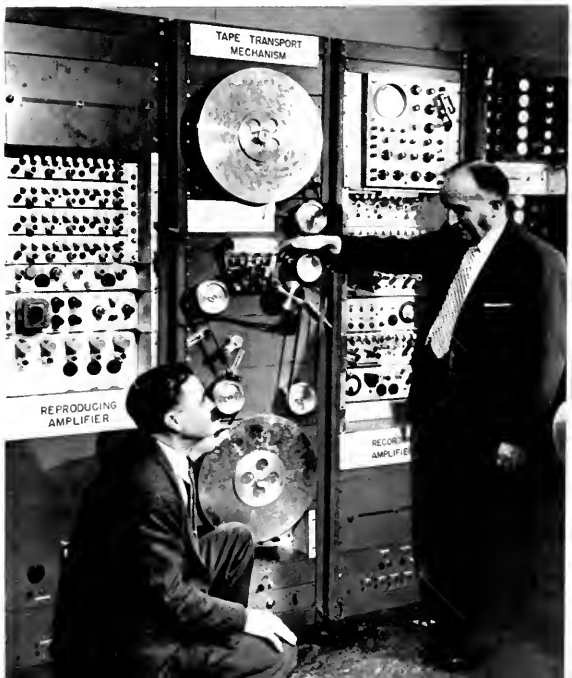
In the demonstration, a color television program originating in Studio 3H of the National Broadcasting Company in Radio City, New York, was beamed by radio microwave across the 45-mile span to the Princeton research center. As the program arrived, it was seen on two RCA color television receivers.

Picture and Sound on Single Tape

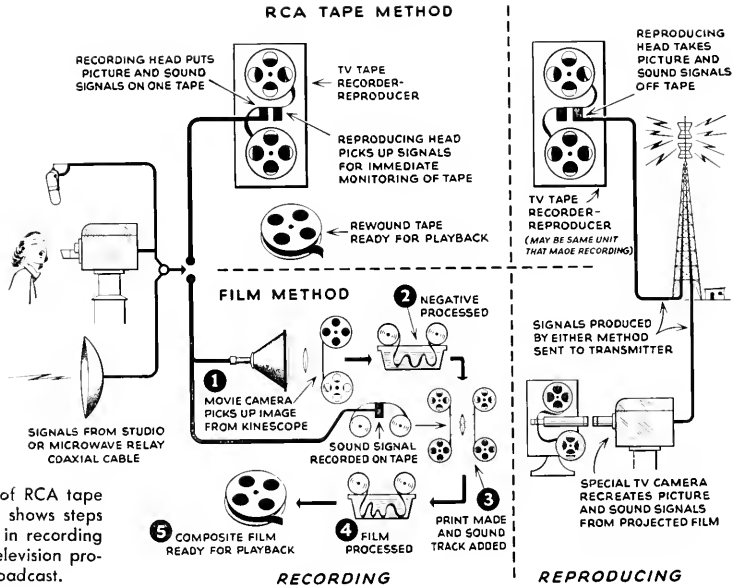
At the same instant, the new video tape recorder recorded the television picture and the sound on a single strip of magnetically coated plastic tape as thin as paper and one-half inch in width. During part of this transmission, both the live program and an immediate playback of the tape recording were shown, permitting direct comparison of the recorded program on one receiver with the live broadcast being received on the other.

As soon as the tape reel was rewound, it was played back, and the recorded television pictures appeared on the two receivers. In an earlier phase of the demonstration, the guests had viewed both black-and-white and color programs previously recorded on the magnetic tape.

The same apparatus handled both the recording and playback of the tape for both the color and the black-and-white tests. This relatively compact experimental equipment was developed by a seven-man team of RCA research engineers including Dr. Harry F. Olson and William D. Houghton, who head the development program, and Maurice Artzt, J. T. Fischer, A. R. Morgan, J. G. Woodward and Joseph Zenel.



The developmental model of the television tape recorder is checked at RCA's Princeton laboratories by Dr. Harry F. Olson, right, and W. D. Haughton.



Diagrammatic comparison of RCA tape and ordinary film methods shows steps eliminated by use of tape in recording color or black-and-white television programs for later re-broadcast.

To the guests at the demonstration, General Sarnoff said:

"Magnetic tape recording of television programs as shown today has great possibilities first for television broadcasting and, later, for national defense, for the motion picture and theater industry, for industry in general, for education and for home entertainment.

"While this electronic video tape equipment is still in the developmental stage, the basic principles and principal elements of our system have been tested and confirmed. We are confident that it is only a matter of time, perhaps two years, before the finishing touches will bring the system to commercial reality.

"It is essential for the future of the television art that video tape recording be introduced to give the television industry a practical, low-cost solution to program recording, immediate playback, and rapid distribution. Video tape will be important for black-and-white broadcasting; it will be essential in the creation of a full color television service.

"According to our present estimates, the cost of recording a color television program on magnetic tape would be only five percent of what it would cost to put it on color film, since the tape can be reused."

The Advantages of Tape

Summarizing the advantages of the tape recording method over conventional film methods now in use by the television industry, General Sarnoff emphasized that the tape, unlike film, requires no processing, but that the pictures can be used the instant they are taken, can be preserved indefinitely for reference use or can be electronically erased, permitting repeated reuse of the same tape.

"With further development of video tape techniques, numerous possibilities will open up," he added. "Small portable television cameras are already in wide use in industry, in stores, in banks, in schools and colleges. Low-cost television cameras that work like satellites off home television receivers are ultimately possible. Eventually, low-cost video tape equipment of simpler and more compact design than the studio-type equipment shown today can be made available as attachments for these cameras.

"The all-electronic chain of portable television camera, video tape recorder and standard television receiver would make a convenient and versatile system for making amateur as well as professional motion pictures. It will speed the preparation of newsreels and will be a useful

tool for news reporters. The tape would not have to be sent away for processing with its attendant delays and extra costs. In the home, the tape equipment could be used for home movies or connected to the television set to make personal recordings of favorite television programs."

The primary reason for development of the video tape recording process is to promote the advancement of color television, Dr. E. W. Engstrom, Executive Vice President in Charge of RCA Laboratories Division, told the guests. Use of the tape in color television, he said, will eliminate the "substantial" time lag involved in processing color film for television use and will prove far less expensive.

When a television program is recorded by kinescope recording methods, the pictures pass from the television camera through most of the television system to be reproduced on a small kinescope. A special motion picture camera then photographs the program on motion picture film. The film must be chemically processed and, usually, a print made before the picture can be reproduced. The reproduction requires another installation in which a television camera picks up the scene from a motion picture projector for rebroadcast.

Film Method Called Costly

"The current kinescope recording process is a roundabout and costly approach," Dr. Engstrom said. "It is time-consuming, with film processing time running to several hours in most cases. And the quality may be limited, since the pictures must encounter all the hazards of both the television system and the photographic process.

"In going from the electrical signals of the camera to the signals for rebroadcast by a television transmitter, kinescope recording requires four separate intermediate pictures to be formed, two by television and two photographically. There is no fundamental need for these intermediate steps.

"Magnetic tape recording, in contrast, stores the electrical signals directly as they come from the television camera. No processing, electronic or photographic, is necessary before the tape is played back. A single compact piece of equipment, which handles both recording and reproduction, will do the job of two complex installations needed with photographic methods."

Comparative estimates of operating costs, including payroll, cost of tape or film and amortization of equipment, are highly favorable to tape methods. Although magnetic tape today costs more per minute of program time than 35mm color film, the fact that tape needs no processing before playback compensates for the expense of raw tape. What makes the savings on tape so great, according to the engineers, is the fact that the program can be electronically "wiped off" and the tape reused, as in present-day sound tape recording. In most normal operations it would be reused many times.

Recording black-and-white programs on film is estimated to be at least five times as costly as it would be on ¼-inch magnetic tape, assuming that the tape would be reused many times. In making copies for distribution to television stations, a half-hour program could be taped for less than $15 per copy, provided the tape is reused many times. (These figures, of course, refer only to the cost of producing the recorded tape, and not to the cost of the program.)

Even greater economies are estimated for making the original tape recording of color television programs, which under normal operating circumstances could be handled for only five percent of the cost entailed in color film recording. In making copies on tape that is to be used over and over again, a tape recording of a half-hour color program would cost roughly $20.

The recording head, which puts signals on tape and provides for video pickup, is held by Joseph Zenel.

How Video Tape Works

RCA's method of video recording is similar, in basic respects, to the techniques used to record speech and music with present-day magnetic tape sound equipment. Electrical signals are impressed through a recording head — a small horseshoe electro-magnet — onto the magnetically treated surface of a plastic tape. As the tape is drawn across the recording head, the head continuously

(Continued on page 32)

RCA Patent Licenses and Royalties

Statement Outlining Corporation's Policies Made by General Sarnoff before New York Society of Security Analysts

Brig. General David Sarnoff, Chairman of the Board of RCA, discussed RCA's patent licensing and royalty policies for the New York Society of Security Analysts at a luncheon on December 14, 1953. Following is the text of his statement:

I have been told that you are much interested in the subject of Patent Licensing and income from Royalties. For this reason I am glad to give you the facts as I know them.

There has been a lot of talk by some uninformed people that RCA nets about 20 to 25 million dollars a year in patent royalties. Of course I wish this were true, but let me tell you very frankly that it's the bunk.

In the seven years from 1947 to 1953 our net income from royalties, after deducting costs and expenditures incurred in connection with carrying on the fundamental research work of the RCA Laboratories Division alone, averaged less than three and a half million dollars a year. In 1953, it will be less than two and a half million.

Further—and this, too, is important—in addition to the expenses of the fundamental research carried on by the Laboratories Division, very substantial amounts are expended for applied research and development work, by other divisions and subsidiaries of RCA.

Research and development are the life-blood of our business, as they are of many other businesses. To keep this blood in healthy circulation, necessarily costs a lot of money. For example, in order to create the great television industry which exists today, RCA invested more than fifty million dollars in research and development of black-and-white television before it made a dime of profit. Before the end of next year we will have spent more than thirty million dollars in research and development of color television. And we cannot possibly hope to make a dime on color TV in the first year of its life.

Research Fundamental to RCA

It is fundamental RCA policy to continue to spend substantial sums on research and development of new products. For that reason, a substantial amount of our money has gone in the past, and will continue to go in the future, into research and development work.

At the RCA Laboratories in Princeton, where the major part of our fundamental research takes place, we have three hundred engineers and scientists of the highest competence and reputation. Working alongside them is a large staff. Altogether we have a total of more than one thousand people employed at the Princeton Laboratories alone. In addition, there are 2200 scientists and engineers, with a large supporting staff, at the manufacturing plants of the RCA Victor Division. Other divisions of RCA—such as Communications and Broadcasting—also have extensive scientific and engineering personnel. All this involves a very substantial expenditure. But it represents the best prospects for our future and the future of the entire industry. We firmly believe it is money well spent.

Recently there has been some talk about the law suit brought by General Electric and Westinghouse with respect to our sublicensing rights under their patents. As you analysts who are familiar with this subject know, RCA grants licenses to the industry under its own inventions in what we refer to as the radio and electronics field, as well as under the inventions of the Telephone Company, the General Electric Company, and the Westinghouse Company.

The General Electric Company and the Westinghouse Company have recently taken the position that RCA's right to license under inventions made prior to December 31, 1954—what we call sublicensing rights—expires December 31, 1954. The Telephone Company does not take that position.

Facts of the Case

RCA does not agree with the position taken by the G. E. and Westinghouse Companies. The argument in this case took place about six weeks ago before the District Court in Delaware. No decision has yet been handed down by the Court. Therefore, it would not be appropriate for me, at this time, to speculate on what the decision will be.

However, without arguing the pending case I can tell you certain facts concerning it, and these are important:

First, no matter what the outcome of the case may be, no question has been raised as to the fact that both GE and Westinghouse are required to continue to pay

(Continued on page 28)

World's Most Powerful Radio Transmitter, Built for Navy by RCA, is Dedicated

A RADIO message flashing from a giant antenna strung across a deep valley in the Cascade Mountains of Washington State circled the world on November 17, 1953, to bring all of the far-flung elements of the United States Navy within direct and instant reach of their homeland.

The historic message signalled the entry into the nation's service of the most powerful radio transmitter ever built — a 1,200,000-watt station erected by the Radio Corporation of America for the U. S. Navy in the remote Jim Creek Valley some 55 miles northeast of Seattle. Tapped out in wireless code by Brig. General David Sarnoff, Chairman of the Board of RCA, the dedication message as dictated by Admiral Robert B. Carney, Chief of Naval Operations, gave dramatic proof of the station's power as it penetrated to vessels in distant seas and to shore stations on the five continents.

Brig. General David Sarnoff taps out first message from Jim Creek to naval units around the world as Admiral Robert B. Carney looks on.

"With this first message we forge another link between you and your homeland," Admiral Carney told the scattered units. "With it, we build a new security channel from America to the naval units which form its outer ramparts of defense."

Six minutes later the acknowledgments began to return, some of them relayed four or five stages to reach Jim Creek Valley. The first came from the battleship *Wisconsin,* operating off Japan. Then came word from the carrier *Yorktown,* the destroyer *Floyd B. Parks* and the submarine *Bluegill* in the western Pacific; the submarine *Sablewish* in the North Atlantic and the cruiser *Pittsburgh* in the South Atlantic; the carrier *Tarawa* in the Mediterranean and the destroyer *Charles S. Sperry* in Florida waters.

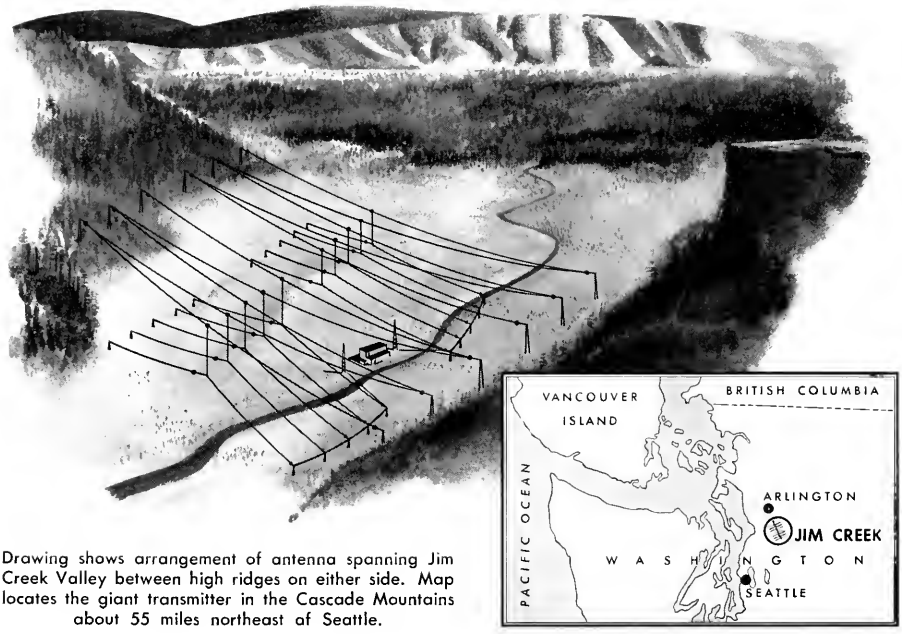
As the replies arrived, Admiral Carney and General Sarnoff plotted the location of the units on a world map set up for the ceremony at the transmitter site. Along with the acknowledgments from the naval units, RCA Communications relayed word of receipt of the message at distant locations in its 65-nation radio circuit and aboard passenger liners at sea.

Project Took Six Years To Complete

The ceremony marked formal acceptance of the powerful transmitter by the Navy from RCA, whose engineers and communications experts had worked for six years with Navy engineers to complete the $14,000,000 project. The result of their labor, put to its first test with the initial message, is a transmitter at least twenty-two times more powerful than the strongest commercial station in the country, emanating a very low frequency (VLF) signal capable of penetrating the magnetic disturbances that interrupt higher frequency communications and able even to reach through water to make contact with submarines cruising below the surface.

Turning the installation over to Admiral Carney, General Sarnoff said:

"No branch of the armed services has been more closely associated with RCA than the Navy; none has teamed with us more intimately in devising and producing electronic implements of defense. None, certainly, has based its existence more completely on the science of communications, which we pursue.



Drawing shows arrangement of antenna spanning Jim Creek Valley between high ridges on either side. Map locates the giant transmitter in the Cascade Mountains about 55 miles northeast af Seattle.

"A scroll of our joint ventures would unfold a triumphant story of the electron harnessed to the service of the nation. For more than forty years, we have labored together to produce the radio, sound and electronic equipment that gives the Navy cohesion and mobility. We have demonstrated to a unique degree how teamwork between private industry and the military forces contributes to the nation's welfare."

Reviewing past highlights of RCA-Navy partnership in developing and producing electronic equipment, General Sarnoff mentioned the first modern shipboard radio receivers for the Navy, direction finders, radio transmitters, diversity reception for ship to shore use, homing devices for planes returning to the mother ship, shipboard radar, radio altimeters for Navy patrol and torpedo bombers, one phase of loran, the analogue computer that simulates test runs of guided missiles, and the new combat information center materials with which naval units are being equipped.

Recalls Navy Helped Found RCA

He recalled that the Navy, "more than any other organization in or out of government, gave us being" by insisting upon the establishment after World War I of an American radio communications company — an insistence that resulted in the formation in 1919 of RCA with the mission of setting up a world-wide wireless communication network.

"Of course, our company has branched into other fields, finding new applications in radio, television and associated electronic arts," General Sarnoff said. "But it has — as this monument of stone and steel and copper testifies — remained faithful to that original radio wireless trust."

He added that the giant transmitter is "an enduring testimonial to teamwork" symbolized by the 175 business firms that supplied RCA with parts and components for the project.

"They deserve high commendation for their part in a job well done — a job that typifies American industry's teamwork with the armed forces," he said.

Presenting Admiral Carney with the keys to the control panels of the transmitter, General Sarnoff said:

"I turn over to you, on behalf of the Radio Corporation of America, the most powerful radio transmitter ever built. May I express the wish, which I know all in our armed forces share, that this powerful instrument for transmitting intelligence, may add to our national security and to the peace of the world."

Admiral Carney, accepting the installation for the Navy, spoke of the close liaison between the armed serv-

View from one of the towers connecting the antenna with the transmitter shows the transmitter building nestled in the narrow valley on the bank of Jim Creek.

ices and private industry in meeting the complex requirements of national security.

"This great installation at Jim Creek is the newest of RCA's answers to our requirements and is a most eloquent testimonial to the fact that America's great strength lies in the wedded efforts of all elements of our population," he said. "It is a strength built up of the closely knit sum of industrial, economic and military potentials which are welded together by a common objective and a common determination to achieve great national teamwork."

He emphasized the importance of the great transmitter in an era when nuclear power for ships promised to become a reality. Such ships would be able to remain at sea for long periods, indicating "an increasing need for the use of effective radio in directing our tremendous and complicated maritime operations," he said. Referring to the ability of the transmitter to communicate through water as well as air, he added that "we must be able to talk not only to ships on the surface, but we must also be able to communicate with the elusive submarine and with the planes on their sundry missions in the air."

Rear Admiral W. B. Ammon, Director of Naval Communications, explained that the need for the unprecedentedly powerful transmitter had emerged after World War II with recognition that the naval communications system was inadequate to support worldwide naval operations in time of peace. Since many ships, such as submarines and smaller surface craft are unable to carry extensive antenna systems, he said, "reliance must be placed on powerful transmissions to overcome this handicap and to make sure that any forces operating independently or submarines on war patrol receive combat orders and information promptly." The requirements could be best met by a powerful very low frequency broadcast, requiring large and complicated equipment, he said — and the result was the beginning of the Jim Creek project.

Greater Developments Predicted

Even as the giant transmitter went into operation at the highest power level ever employed in radio communication, General Sarnoff cautioned against any inclination to regard it as the ultimate in communications. More powerful transmitters may yet be built, and better means will be discovered to communicate with the fleet, he said.

"When we look at this big structure, we must remember that while its skeleton is concrete, steel and copper, its heart is the electron — the tiniest thing in the universe," General Sarnoff said. "For forty-seven years I have lived with the electron, and my experience points to one conclusion: great as the electron's achievements have been, we are still in the horse and buggy era of its development. It is not difficult to visualize the day when the electron will carry sight as well as sound to our armed forces around the world."

Already we possess the scientific knowledge to make television world-wide, he said. It is technically possible to circle the globe with a land chain of microwave relay towers, to equip aircraft with relay equipment to form an aerial bridge across an ocean and to lay coaxial cable across the ocean floors to carry both sight and sound internationally. And such advances, he said, "will lead to new uses of the electron for military as well as commercial purposes."

Details of the Installation

The background of the dedication ceremony, attended by about 200 naval, industrial and governmental leaders, was a squat, concrete building nestling in the deep valley between steep slopes and roofed by a web of antenna slung between the ridges looming 2700 feet above the valley floor on the north and south.

The entire assembly — known already to Navy communications men as "Big Jim" — is the answer to a set of requirements determined by the Navy's Bureau of Ships and specified in a contract signed with RCA in 1947. The site itself was chosen on the basis of terrain suitable for the massive antenna, access to the electric power of Bonneville Dam, the nearly ideal ground con-

ductivity of the area, relative access to supply lines in contrast to even more remote sites, and security in the event of a war. For six years, in cooperation with Navy experts, the skilled staff of the Engineering Products Department of the RCA Victor Division worked out details and construction of the extremely powerful transmitter while the unique problems of antenna arrangement and assembly were overcome by the specialists of RCA Communications, Inc.

The transmitting equipment, manufactured at the RCA Victor plant in Camden, N. J. and transported to Seattle aboard 27 freight cars for trucking into the remote valley over a road cut through by the Navy, occupies most of the two-story concrete building at the heart of the installation. On the ground floor are power transformers, switch-gear, pumps, water tanks, heat exchangers, telephone cable terminals and shops for servicing the equipment. The transmitter itself — actually a combination of two 500,000 watt transmitters — is located on the second floor. Its very low frequency transmission ranges from 14.5 to 35 kilocycles, as compared with the 550 to 1600 kilocycle range of the standard broadcasting band for commercial radio.

Antenna System is Spectacular

The signal goes out over an antenna system that forms the most spectacular feature of Big Jim. This is not the first use of mountains to replace high towers for antenna — it has been done before at Haiku, Oahu, and Trinidad, B.W.I. — but it is by far the largest and most complicated arrangement of the kind ever undertaken.

The ten antenna spans, or catenaries, soar across a space ranging from a little over a mile to a mile and two-thirds from one ridge to the other, forming a zigzag pattern over the floor of the valley. Twelve 200-foot towers along the crests of the ridges support the heavy spans, the longest of which stretches over an 8,700-foot gap. At the mid-point above the valley, the spans sag as much as 1,063 feet to allow for wind and ice conditions expected in the area, and from the lowest point of each span plunges a cable down to the towers of the system connecting the antenna with the transmitter. The whole antenna system is divided into two sections of five spans each. With the transmitter also divided into two units, this makes possible the operation of one half of the station in case the other half should be out of service for any reason.

The site of the powerful station was selected by the Navy after a careful survey of all possible locations in the Puget Sound area, and the initial measurements, including erection of a single wire 8,000-foot antenna span for test transmission, were characterized by Admiral Ammon at the dedication ceremony as "a story to match any of those in the history of the taming of the West." Before the full system now in operation could be installed, the Navy spent nearly a year clearing thousands of Douglas firs from the valley slopes to facilitate rigging, eliminate the danger of forest fire, and, most important, improve the efficiency of the transmitter. Trees, it appears, absorb large quantities of the energy radiated by the antenna.

RCA experts had also to cope with a substantial problem created by the electromagnetic field around the transmitter. The field generates enough electricity to spark across a foot-wide gap, and to ground the system, copper shielding and a ground screen were installed in the transmitter building while more than 200 miles of copper wire were laid in a radial arrangement of buried ground conductors. As an added point, the transmitter building was constructed to resist earthquakes.

In operation, Big Jim requires a permanent staff of 4 officers and 70 enlisted men, plus 35 civilian employees. Most of the personnel will live in quarters on the 725-acre site, and the remainder in Arlington, Wash., some 11 miles away.

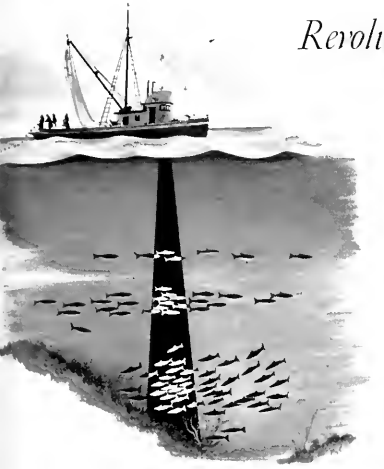
The installation will be a relatively self-sufficient community with its own water and sewage disposal system, a completely equipped fire house, and electricity from Bonneville Dam — the primary source of power for the transmitter itself.

Commander G. W. Warren, Officer in Charge of Jim Creek station, looks on as enlisted men operate code perforator machine, center, and receive teletype tape.

No Secrets Beneath the Ocean for

the "FISH FINDER"

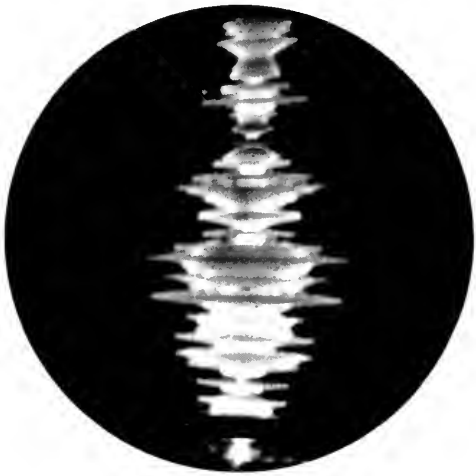
Revolutionary Device Tracks Down and Identifies Fish in the Sea for Men on the Trawlers



By George P. Aldridge
Vice President in Charge of Sales and Government Contracts, Radiomarine Corporation of America.

IN the late fall of 1953, the trawler *Flying Cloud,* out of Boston, made fishing history by dropping its nets unerringly into schools of haddock and cod off the New England coast and returning to port with a rich harvest days ahead of the normal schedule for a full catch. The secret was an uncanny electronic device that arms the fisherman with information that has been available in the past only to the fish themselves.

The *Flying Cloud* was the first American commercial vessel to be equipped with a revolutionary device that removes the guesswork from fishing by scanning in radar fashion beneath the water with an accuracy that distinguishes between varieties of fish and picks out even a single fish, describes the condition of the ocean bottom and warns of obstacles on which nets might snag. On the basis of its spectacular performance, the equipment has been ordered for installation in the six trawlers of the Irving Usen Trawling Company, owners of the *Flying Cloud,* and considerable interest has been aroused among other fishing concerns faced with the problem of tracking the great schools of food fish as they move away from their traditional grounds to less familiar areas of the sea.

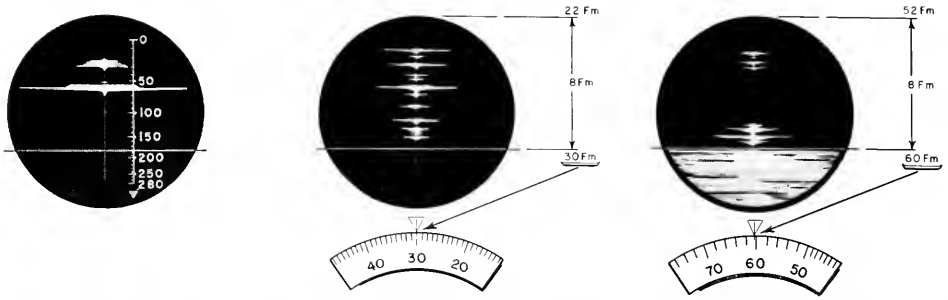


This photograph of the Fischlupe's cathode ray tube shows a school of fish sighted during a test run.

The fish finder, developed by Electro-acustic G.m.b.H. of Kiel, Germany, is being distributed by the Radiomarine Corporation of America. As installed aboard the *Flying Cloud* for several experimental trips, the equipment comprises a finding unit known as Fischlupe (combining the German word for fish and the French term for the small magnifying glass used by watchmakers), and a recording depth sounder known as the Echograph. Prior to the commercial tests, similar units had been installed for test purposes aboard the motor vessel "Oregon," of the United States Fish and Wildlife Service. During all of the experimental phases, a team of Radiomarine engineers, headed by Melvin Schoenfeld, assisted in the operation and adjustment of the equipment to its maximum effectiveness.

Gives Constant Picture of Sea Beneath Ship

The Fischlupe unit gives a running picture of the waters beneath the ship down to an effective range of



From left to right, drawings show Fischlupe tube face with range control (1) set at fixed range, showing sea bottom at 60 fathoms and school of fish at 30 fathoms; (2) selecting 8-fathom section from 22 to 30 fathoms to show depth of school; (3) selecting 8-fathom section at sea bottom to locate fish swimming at greater depth.

280 fathoms (1680 feet), on the same basic principle employed by radar in spotting objects in the air. Powerful supersonic signals are sent downward from the ship and are reflected by the sea bottom and all objects between. The echoes, bouncing back from the sea bed, rocks, wrecks, layers of plankton and fish, appear as light reflections on the face of a cathode ray tube equipped with a calibrated scale indicating the depth of the reflecting object.

The appearance of a school of fish, which shows up on the tube as a set of short, horizontal traces of light, is the first step for the fisherman. Reading the depth of the school from the calibrated scale, he can turn to a range control switch permitting him to view an 8-fathom (48-foot) vertical section anywhere within the total range — giving him, in effect, a substantial enlargement of whatever he wishes to see. This 8-fathom enlargement may be moved up and down the total range, making possible the accurate measurement of the depth and density of the school.

The Fischlupe does its job with remarkably few controls. The range control switch has only two positions — Fixed, to cover the normal maximum range of 280 fathoms, and Variable, to select an 8-fathom section between the ship and the sea bottom. The depth scale is controlled by another knob, permitting its adjustment to any depth setting up to an extended range of 320 fathoms. The only other manual dials are a sensitivity control, which sets the picture on the cathode ray tube at the desired intensity, and a dimmer control, operating as a rheostat for the panel lights and dial scales. An eight-day clock on the front panel helps the fisherman to determine the extent of a school by estimating the time required for the ship to pass over it at a given speed.

Captain Richard Dobbin, master of the *Flying Cloud*, reported at the end of the profitable first run that the equipment did not stop at merely finding the schools.

"I can tell the difference between hard and soft bottom, large haddock and small haddock, and cod and haddock," he said. "I can even pick out single fish — easily spot a dogfish. Unless I see a large catch on the Fischlupe, I never drop my nets."

While the Fischlupe can serve as a normal depth sounder in addition to its duties in locating fish, the new Echograph is being installed in the Irving Usen trawlers to obtain a permanent record of the sea floor and underwater conditions. Operating on the same basic echo sounding principles as Fischlupe, the Echograph produces a lasting record of the underwater information on 8-inch-wide, electrosensitive dry recording paper. Working in tandem with Fischlupe, it supplements the radar-type fishfinder by preserving in permanent form the navigational and survey information that will help the fisherman to set his nets most efficiently and to return on future voyages to the most heavily populated fishing grounds.

Captain Richard Dobbin, master of the trawler *Flying Cloud*, shows Fischlupe installation aboard vessel.

Blood Counting is Speeded by Electronics

Sanguinometer Uses Television and Unique Computer to Total Microscopic Particles Swiftly and Accurately

The television camera has been turned into the eye of a simple and ingenious computer to count microscopic particles such as blood cells, bacterial cultures or grains of photographic emulsion. The system, known in its laboratory stage as the Sanguinometer, was developed by a team of electronics engineers at the David Sarnoff Research Center of RCA in Princeton, N. J., working in close cooperation with the Sloan-Kettering Institute, research unit of the Memorial Center for Cancer and Allied Diseases, in New York.

The equipment was devised to provide a simple, rapid and accurate mass method of taking blood counts to detect the first signs of radiation sickness among persons in the target area of an atomic bomb. A blood count is an important indicator in many diseases and in those circumstances where anemia may be a complication, such as overexposure to radiation which may occur during atomic attacks.

In addition to this possible emergency use, its application is foreseen in hospitals and research centers to perform almost instantaneously and with a minimum of error a process that has long been a laborious, time-consuming and often unprecise manual operation in laboratory work.

The Sanguinometer is essentially a closed-circuit industrial television system combined with an optical microscope and a novel computer that has the ability to make a count of particles in a given field by means of a unique electronic circuit developed by L. E. Flory and W. S. Pike of the technical staff, RCA Laboratories Division. The television camera, substituting for the eye of the observer at the eyepiece of the microscope, feeds the information which it "sees" to both the computer and a monitor viewing screen used in the developmental version to help in focus and illumination of the microscopic specimen.

The development of the sanguinometer was carried out together with Dr. Leon Hellman, of the Sloan-Kettering Institute, who encouraged use of the television "eye" as the basis of a rapid counting system and worked closely with the RCA technical staff both in adapting the controls into a simple form suitable for clinical use and in conducting tests of the instrument on samples of human blood.

Video Pulses Operate Counter

In operation, the camera tube of the Sanguinometer, scanning the specimen under the microscope, sends out video pulses as the scanning beam strikes the images of particles to be counted, and the pulses in turn actuate an electronic counter. As in all television processes, the beam scans its field of vision from side to side, progressing downward in a series of parallel lines. The lines are so close together that in a normal microscopic magnification each particle to be counted interrupts several lines as the scanning beam moves across the field, and consequently produces several pulses in the output of the television system. This means that large particles will interrupt more lines and produce more pulses individually than will small ones, and that the counter would be unable to distinguish between a large number of small particles or a small number of large ones unless compensation were made for their size.

(Continued on page 32)

The Sanguinometer undergoing tests at Sloan-Kettering Institute in New York. Television camera attached to microscope in foreground feeds information to computer, center, and to monitor in background.

NBC Studio 5H at opening in December. Technicians mon console while broadcast coordinator occupies glass-paneled booth at left, facing large monitor panel at right of picture.

New Flexibility for TV in NBC Studio 5H

By Leonard Hole

Director of Production, National Broadcasting Company

FOR the first time in television history, the National Broadcasting Company last month placed at the fingertips of one man the ability to weave into a unified program the fast-breaking elements of a news story or major public event involving widely scattered locations throughout the country, and to break into any outgoing television program with news bulletins or emergency announcements.

The revolutionary control is built into a compact suite known as TV Coordinating Studio 5H at the heart of the NBC television complex in Radio City, New York. Its entry into service solves a combination of needs that had become apparent to the NBC broadcast operations and engineering staffs over the past few years. From the standpoint of news coverage, for example, the facilities of Studio 5H embody lessons learned in television treatment of the political conventions and the election campaign of 1952, when rapidly shifting action underlined the need for a central point at which a single coordinator might view material picked up by various cameras and switch the outgoing program from one to another to keep pace with developments of greatest interest. Frequently, too, important news flashes were delayed by the somewhat complicated job of cutting into studio programs being broadcast over automatically pre-set circuits.

The solution to these two problems, among others, has been built into Studio 5H. The result for the television viewer will be more rapid handling of important news flashes, more complete and smoother presentation of major news events, conventions and campaigns, sports roundups and other far-flung features calling for simultaneous coverage in several widely separated areas. For the future, it will make a practical reality of program concepts that have been up to now only a planner's dream.

Originally Planned as a Film Studio

The finished studio was several years in the making. Originally, 5H was planned principally as an additional television film studio to cope with increased program schedules. Before the NBC staff had finished with its planning, however, the project had grown into a complex $375,000 unit capable of originating film programs and integrating film with live programs, originating substitute film programs in case of scheduled program failure, broadcasting network identifications, local spot commercials and apology announcements when necessary, originating spot news bulletins or emergency announcements, combining incoming programs from sources outside Radio City, and coordinating all broadcast transmission so that emergency changes in program routine could be handled swiftly and smoothly. The circuits through which these processes are accomplished are

capable of handling compatible color as well as black-and-white television programs.

The nerve center of the completed studio is a glass-enclosed booth occupied by the broadcast coordinator. Spread out before him, beyond the glass, is a long console with positions occupied by a program producer, a director and technicians controlling sound and picture signals. All face a large monitoring panel, studded with an array of monitor screens presenting a constant view of outgoing programs and of incoming signals from as many as ten outside cameras.

In the event of a major news development, the coordinator can see on the ten receiving monitors the pictures being picked up by NBC news and mobile units covering the story, and, with the help of the technicians, he may select and put on the air at any moment the action of greatest interest. A special 10-position telephone communications systems allows him at the same time to maintain direct contact with the camera units for advice and direction.

Studio 5H also is equipped with a "live commentary" booth for a commentator or announcer who may be called upon to play a part in any special events program. The booth is fitted out with a console for the announcer and a television camera which focuses upon him while he talks, feeding the picture to one of the incoming program monitors from which the coordinator selects his program material.

Vidicon Cameras Used

The film equipment of Studio 5H includes two iconoscope film camera chains, two Vidicon film pickup cameras and their associated projection devices. The whole unit can handle both 16mm and 35mm film, film strips, opaques and transparencies.

The tiny Vidicon used in two of the cameras is the smallest television camera tube ever developed for broadcast use. A product of the Tube Department of the RCA Victor Division, the Vidicon was used for the first time in regular broadcasting on Oct. 12, when NBC employed it in two local and network film programs. The tube is only one inch in diameter and six inches long, and its small size and simplicity make possible a simpler, more compact and lower-cost television film camera for broadcast use. As used in the broadcast film camera, the Vidicon is a refinement of the tube originally developed by RCA and now widely used in industrial television. The Studio 5H installation has left room for two more Vidicon cameras in the future.

Satyavati Buch, of India, at work with the electron microscope at the RCA Victor laboratory in Camden, N. J.

Indian Woman Scientist Plans Fight On Cancer with Electron Microscope

A cancer research program based on electron microscopy will be established in Bombay by a youthful Indian woman scientist as a result of her recent studies of the RCA electron microscope at RCA Victor's Camden, N. J., laboratory.

Twenty-eight year old Satyavati Buch, whose educational visit was arranged under a U. S. State Department public health fellowship, concentrated her studies at Camden on the most advanced technique for operating the electron microscope as a research tool.

A proponent of the theory that cancer is caused by a virus, Miss Buch, now en route to Bombay, plans to study typical cancer tissue under the fabulous magnification of the electron microscope in the hope that it will expose the virus. India has two RCA electron microscopes, gifts of the American Point Four Program, in use at the University of Bombay and at the National Physical Laboratory in Delhi. Nearly 500 RCA electron microscopes are now being used by medical centers, universities, laboratories, government bureaus, manufacturers, and other important centers of research throughout the world.

World of Electronics Produces a Long-Run Hit Sh

By Harry P. O'Brien

Manager of the RCA Exhibition Hall

ALTHOUGH "science fact" may not be any stranger than science fiction, the real thing is just as popular as the fantasy when it is presented with clarity, color and imagination. This has been proven by the Radio Corporation of America in the RCA Exhibition Hall, designed to give the public an understanding of the present and a glimpse into the future of this electronic age.

Inside the glass-fronted showcase, located across the street from the RCA building in Radio City, New York, is a miniature world's fair of science that demonstrates how electronic development is affecting life in the 20th Century. And like the wheel of fortune, the revolving door that leads into the wonderland of electronics keeps turning, turning, turning. More than 8,000,000 people in six years have visited the Hall to see the latest "miracles" that science has wrought — from an electron microscope to a large-screen color television set.

Whenever new products and developments are perfected in the RCA laboratories, they are introduced to the public in the Exhibition Hall and, when possible, actual demonstrations are performed. Currently, visitors can see the steps involved in the manufacture of the revolutionary transistor, a diminutive device that is replacing the vacuum tube in certain vital electronic functions; they can view the delicate processes involved in the making of an electron tube, and alongside these they may see the most recent technical products that have been developed.

Besides its exhibit of scientific developments, the Hall houses a wide assortment of RCA products, ranging from RCA Victor portable radios to RCA Estate gas and electric ranges. This attractive display has caused the Hall to pay off in more ways than just good will and prestige. According to RCA Victor dealers, visitors frequently are "pre-sold" in the Hall, and many, after leaving, order products they have seen exhibited.

Amusement Blended with Science

Because amusement has been skillfully blended with science and information, the Hall attracts persons of all ages and interests. Sightseers can watch programs on a television screen (no small item during the World Series), hear RCA Victor recordings on request, and even stand before a TV camera and see themselves on a special viewing screen.

This feature, called "See Yourself on Television," has been one of the biggest drawing-cards in the Hall. Millions of ordinary visitors, frustrated actors and professional TV performers have stood before the image orthicon camera staring in amusement, "performing," or checking costumes and facial expressions before a telecast.

One young man used to appear every time Arturo Toscanini was scheduled to broadcast with the NBC Symphony Orchestra. As a radio brought the symphonic music into the Hall, he would stand before the self-television camera and, surrounded by other visitors, watch himself conduct as he thought the Maestro might be doing it. The "audience" in the Exhibition Hall usually applauded the young conductor's performance.

en by More than 8,000,000 at RCA Exhibition Hall

Another entertainment feature is the Dave Garroway News Center on the main floor of the Hall. Garroway broadcasts the television shows "Today" each morning from 7 to 10 and has as a live audience passers-by who can see the show through the window from the sidewalk outside the building. Often during the telecasts the camera turns the audience into participants by switching from the show to the crowd outside. One morning recently, both the spectators and the professionals on the show were surprised when the camera picked up former President Harry S. Truman, who happened by on a morning walk just as the camera was scanning the audience. When the Hall opens at 11 a.m., the News Center serves as an exhibit of all the electronic equipment required to produce a network television program.

Hall Has Small Theater

On the floor beneath this industrial and scientific display, RCA has constructed the small, acoustically perfect Johnny Victor Theater. To the last detail, it is completely modern in equipment and functional in design.

Business organizations, cultural groups, fraternal and charitable societies and school groups can meet in the theater, free of charge, to view films, hold discussions or watch television programs. Questions of international scope have been debated behind the soundproof walls when Iranian oil officials, for example, met there, or when United Nations delegations have used the room. Not without some justification, the theater has been labelled a second U.N. General Assembly, for in the last two years some 50 U.N. delegations have booked the theater and the adjacent lounge for meetings, films and television viewings.

In order to arrange reservations for the theater, answer queries about RCA from all over the world, conduct tours of the Hall and maintain the complicated electronic equipment, the Hall employs a staff of twenty-six, including a manager, three assistant managers, a secretary, technicians, engineers, maintenance men, porters and guides.

When the Hall first opened six years ago, many showmen predicted that the automatic counters at the door would never click past the one million mark, because the public would not be interested in so technical a subject as electronics. But instead, the average attendance has been well over a million a year, and it is increasing annually.

Aside from the fact that scientists and industrialists are now realizing what fiction writers have known for a long time — that people are fascinated by the "magic" of science — there is perhaps another reason for the overwhelming success of the Hall. Many can still remember the prophets of electronics who, in a wilderness of skepticism, predicted that radio and television one day would be an integral part of our lives. Now that it is evident that the comparatively new science is going to continue making today's mode of living obsolete tomorrow, the public may well feel determined not to be caught off guard again when it comes to this fabulous business of electronics.

Licenses and Royalties

(continued from page 16)

the RCA, after December 31, 1954, royalties on all radio, television and other electronic patents in our field which they use and which were developed by GE, Westinghouse, the Telephone Company or RCA before December 31, 1954.

Second, it is the opinion of our experts—and I fully share it—that the most important inventions for the future of our business and for the business of those whom we license, are not the GE and Westinghouse inventions.

Among the areas for licensing which we regard as most important, are color television and transistors. In color television I'm sure you all know that RCA has made the basic inventions. In transistors the basic inventions have been made by RCA and the Telephone Company.

So, while we naturally hope to be able to sub-license under Westinghouse and GE inventions, nevertheless, we feel that the inventions of our own Laboratories, and the patents and applications on them, are of such value for the future that they represent the important inventions in our field.

Another point not generally appreciated is that because we are in the patent licensing business we take the disadvantages that go with that business as well as the advantages.

Policy Encourages Competition

If RCA were not in the business of licensing its competitors on the inventions which it makes, we would be the only one able to market our own important developments and to retain for the RCA all the benefits from such exclusivity. As matters stand now, we share our inventions with our competitors at a very moderate royalty rate of less than two per cent of the manufacturers' selling price of apparatus which uses our inventions. And, our very liberal license agreements contain no restrictions at all as to price, quantity, territory or anything else.

In fact, it is this liberality in our licensing policy which has contributed to making the television industry the highly competitive industry it is today. If RCA were to give up its licensing business and stop licensing the rest of the industry, it would be RCA's competitors who would suffer most in relative standing and not the RCA.

Some of our largest competitors have become successful and have grown prosperous because they benefited greatly from the research and development work of the RCA. The pioneering efforts of RCA have opened new fields of opportunity for the entire industry.

I believe it will also be conceded that we would not have the highly competitive, highly successful television industry that we have today, were it not for the positive assistance which RCA has made available to its competitors through its inventions, licenses, "know-how" and pioneering efforts to create and develop new products and services for the public.

We are confident that we have basic inventions in the important fields for the future of our business irrespective of what may happen to our sub-licensing rights. For that reason, we believe that an RCA license will continue to have as great or even a greater value for our competitors after 1954, than it has today.

Hagerty Named

(continued from page 9)

the Board created by the resignation of Mr. John K. Herbert from NBC.

At NBC, George H. Frey has been promoted to Vice-President in Charge of Television Network Sales. Thomas McAvity was elected Vice-President in Charge of Television Network Programs and Carl M. Stanton became Vice-President in Charge of the Film Division.

Dr. Douglas H. Ewing was named Director of a newly-formed Physical and Chemical Research Laboratory of the Research Department, RCA Laboratories Division, with headquarters at the David Sarnoff Research Center in Princeton, N. J. Dr. Ewing was formerly Director of Research Services for the Division.

In other RCA Laboratories' promotions, Ralph S. Holmes was appointed Director of Research Contracts, responsible for the administration of governmental and university contracts as well as the supervision of publications of the Division. Arthur W. Vance has become Director of the newly established Special Projects Research Laboratory of the Research Department.

Now a Portable Battery Kit Lets a Man Shave Anywhere

A handy battery kit that will allow the owner of an electric razor to do his shaving anywhere is now being produced by the Tube Department of the RCA Victor Division.

Designed for travelers, fishermen, hunters, campers and anyone else who takes to the open spaces, the RCA Shaver Battery Kit is built around two batteries and a standard-type receptacle into which any AC/DC electric shaver can be plugged. The elements are packed into a small simulated leather traveling case with a flap-over top that protects the plug, and the assembly is removable for easy replacement of batteries. The whole unit was designed to fit into luggage or outdoor gear.

Sturdiest Icebreaker Plows Labrador Waters; RCA Equipment Aids in Arctic Patrols

So important has the industrial development of Labrador become and so significant the establishing of more outposts for scientific purposes throughout the eastern Arctic, that the Canadian government has put into service the sturdiest icebreaking ship ever constructed, the Canadian Government Steamship *d'Iberville*. To support her operations, she is equipped with a 7-way compact RCA radiotelegraph unit meeting the high specifications demanded by the Canadian Department of Transport.

Canadian built at Lauzon, the 310-foot C.G.S. *d'Iberville* is the latest in a long line of icebreakers operated by the Canadian government since 1876 in the St. Lawrence River and its Gulf, the Atlantic coast, Hudson Strait, and the Canadian Arctic.

She is a dual purpose ship, the *d'Iberville*, accommodating both cargo and passengers. Of her cargo, possibly the most precious is the oil which the *d'Iberville* carries in addition to her own supply sufficient to power her for the 12,000 mile round trip. Oil is an even greater necessity to far northern outposts than it is in civilized areas. Apart from fuel oil and diesel, the icebreaker also sets out with some 7,000 gallons of high-test gasoline for her two helicopters.

These aircraft serve not only to scout for ice packs, aiding the ship in her visual and radar navigation, but supplement the lifesaving and landing use of four motor lifeboats.

Other cargo includes food and prefabricated houses such as those for the latest Royal Canadian Mounted Police post at treeless Cape Herschel on the east coast of Islemere Island. Also in the cargo on her travels in Arctic waters is equipment for maintenance of buoys and of meteorological stations.

The icebreaker's passengers are a colorful lot: missionaries and mounties, Hudson Bay Company factors and government officials, research scientists and radio operators, meteorologists and federal Health and Welfare specialists, and Eskimos being transported to areas where game is more plentiful.

On her return from the far north to keep navigation open on the St. Lawrence, the C.G.S. *d'Iberville* will not be idle. With increasing industrial development in eastern Canada, there is a greater demand than ever before for navigation to be made possible during the winter months. In this task, the icebreaker may expect

A helicopter, directed by radio from the mother ship, takes off from deck of the *d'Iberville* off Labrador

In the radio room of the icebreaker *d'Iberville*, Radio Officer Charlie Seaman tunes in one of the several RCA radiotelegraph units built into the console.

calls for her service to come pouring through her RCA radiotelegraph unit at all hours.

Before going on regular service, the C.G.S. *d'Iberville* went on a shakedown cruise in the early summer, crossing the Atlantic to visit the ports of London, Liverpool, Glasgow and Le Havre, but also to take her place in the Coronation naval review at Spithead. Apart from a much smaller, wooden craft operating from the Falkland Islands, the *d'Iberville* was the only icebreaker to take part in that historic event.

The ship is named for a distinguished Canadian pioneer and explorer. Pierre LeMoyne d'Iberville, born at Montreal in 1661, travelled as far north as Hudson's Bay, discovered the mouth of the Mississippi River, and established a fort on the site of what is now New Orleans where he became the first Governor-General of Louisiana when that tract belonged to France.

Radio Officers Laud Equipment

One of the modern distinctions of this ship bearing the distinguished name of d'Iberville, is that there is probably no other icebreaker anywhere so well equipped for radiotelegraph communications. This is the opinion of her radio officer, Charlie Seaman, of Pugwash, Nova Scotia. He and the second radio officer, Leo Irvin of Dartmouth, Nova Scotia, have expressed confidence in the usefulness and versatility of their equipment.

Both of these young Bluenoses have a lively appreciation of reliable radio communications. In the 12 years that he has served with the Canadian Department of Transport, Seaman spent two years on land stations in Labrador. Irvin, with seven years' service in the Department, did a 20-months stretch on lonely Sable Island whose shifting sandy banks have snared Atlantic shipping from the days of the earliest explorers. To these radio officers the need for reliable communications in isolated parts of the north-eastern Arctic is keenly appreciated. And Irvin, who once sailed aboard a Norwegian sealer in northern waters, knows the threat of voyages in ice-filled seas.

That these two men set out confidently on the *d'Iberville's* first voyage to the Arctic indicates their confidence in the RCA radiotelegraph unit. This unit, neat and compact, brings to within arm's length of a radio officer's swivel chair these communications and safety devices:

A 250 watt main transmitter with eight crystal controlled channels covering the 350 to 518 kilocycle band;

A 300 watt high frequency crystal-controlled transmitter providing long distance communication on the six, eight, 12 and 16 megacycle bands;

A 40 watt emergency transmitter battery operated in case of failure of the main power supply and covering five frequencies;

An alarm signal Keyer for automatic transmission of the international alarm signal indicating distress at four-second intervals on 500 kilocycles;

An automatic alarm that reacts to the reception of international alarm signals from other ships in distress by activating a series of relays and vacuum tubes to set alarm bells ringing on the bridge, in the cabins of the captain and radio officers, as well as in the wireless cabin itself;

A main receiver, Model AR-8506-B, covering from 85 to 550 kc and 1900 to 25000 kc;

An emergency receiver, Model AR-8510, powered by either the ship's main line or by batteries and covering from 15 to 650 kilocycles.

That all these aids to Arctic travel have been knit together by Radiomarine Corporation of America into one neat console is a miracle of modern electronics.

Through this unit may come a call at any time of day or night from a ship in distress and back from the *d'Iberville* will be sent words of comfort as she ploughs through ice to the rescue.

Or the message may be a command from Ottawa to take aboard scientists eager to report to headquarters their latest findings. It may be a message giving directions for the delivery by helicopter of ballot boxes, as was done on the first northern voyage of the *d'Iberville* when the privilege of voting was ensured those in even the most remote settlements. Or the RCA radiotelegraph unit may receive a call for medical aid from a lonely outpost. On the ship's first voyage four Eskimos who had been treated at a hospital in Quebec City were taken back to their homes in Arctic Bay by the icebreaker.

NBC-TV Program Selected for U. S. Overseas Information Program

Kinescope prints of the NBC-TV "Voice of Firestone" program will be distributed through the United States Information Service throughout Europe, the Far East and Latin America, the State Department has announced. The radio version of the program, which celebrated its 25th anniversary on NBC on Nov. 30, has been distributed overseas by the State Department for the past six years. The television version is to form part of a new U.S.I.S. program, "Your TV Concert Hall," which is being distributed for television showings in foreign countries.

Transistorized broadcast radio receiver capable of fitting into a breast pocket is shown in comparison with an earlier model equipped with a 4 x 6-inch speaker.

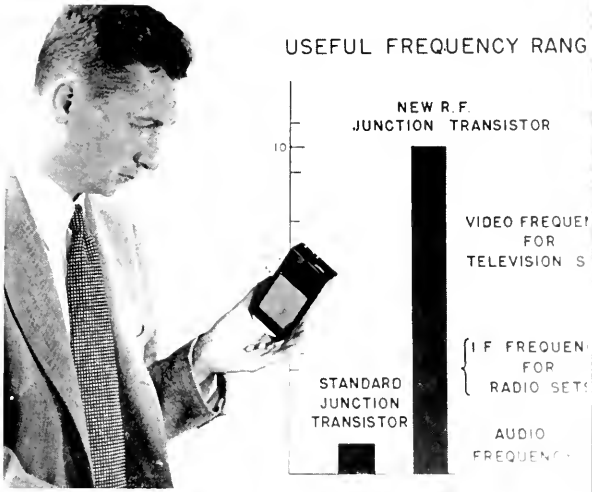
Tiny Broadcast Receivers Use Improved RCA Transistors

An experimental radio broadcast receiver that fits into the breast pocket of a man's suit is the latest by-product of transistor research and development at the David Sarnoff Research Center of RCA in Princeton, N. J. Weighing only a pound, the tiny receiver has an audio output comparable to conventional small portable radios built with tubes.

The new receiver is considerably smaller than an earlier experimental transistorized receiver with a 4 x 6-inch speaker. The larger model (see RADIO AGE, Volume 12, Number 4) compares in sensitivity and fidelity with table model receivers several times its size. Both of the transistorized sets are powered with small flashlight batteries. Although they are still in the laboratory stage, both have been extensively field tested.

These new approaches in portable radio broadcast receivers have been made possible by RCA's development of simply-constructed junction transistors that amplify signals at frequencies as high as 10 megacycles.

The amplification of high frequency signals has been enhanced in the new RCA experimental transistors by the drilling of a "well" in the center of a germanium crystal wafer, leaving a layer less than 1/500 of an inch in thickness. Before their application in the unique receivers, the transistors have been exhaustively tested



David D. Holmes, co-developer of the miniature set, holds it against chart showing performance of new transistor, three of which are in the palm of his hand.

Below, Dr. C. W. Mueller, RCA scientist, checks experimental transistor, seen through magnifying glass.

19-Inch Tri-Color Tube Is Developed By RCA

Development of a 19-inch tri-color television picture tube was announced by RCA to its tube licensees on December 31. The new tube is of the shadow-mask type, similar in construction to the 15-inch tri-color tube which RCA plans to introduce in its first color sets.

Announcement of the larger tube was contained in a letter to the licensees from Ewen C. Anderson, Vice President in Charge of the Commercial Department, RCA, together with an invitation to the licensees to attend a demonstration and technical discussion of the tube on January 21 at the David Sarnoff Research Center of RCA in Princeton, N.J.

The symposium will be the third in six months for the licensees, under the RCA policy of spreading the results of its research and development as widely as possible through the industry. Last July 15, the licensees attended a symposium on the RCA 15-inch tri-color tube, and in August they visited the tri-color tube pilot plant in Lancaster, Pa., to see and discuss production processes and equipment.

Blood Counting

(Continued from page 23)

This obstacle was overcome with an ingenious diameter compensation circuit that is able to determine the average size of the particles by taking account of a direct relationship between the average time duration of the pulses and the diameter of the particles. This indicates the number of video pulses created by each particle, a figure that is electronically fed to the counter where it divides the total number of pulses to give an automatic reading of the actual number of particles.

The entire process, as performed by the latest laboratory model of the Sanguinometer, is both simple and far more rapid than any manual count. Once the slide is prepared and put under the microscope, the operator manipulates a single control knob on the counting meter until an electric eye tube on the meter case is closed. This indicates that compensation has been made for the average diameter of the particles to be counted. It is then necessary for the operator only to read the meter to determine the number of particles in the field of the microscope.

The Sanguinometer has indicated in tests that it is capable of handling with only a small margin of error a count of many varieties of microscopic particles as long as the particles within any one specimen are nearly uniform in size. It is not suitable for counting particles whose sizes and shapes vary widely in a single specimen.

Video Tape Recording

(Continued from page 15)

changes the magnetic polarity of the magnetic oxide particles on the tape so that they become a compact code of the original signal.

For playback, the tape is drawn across the same, or a similar head. The magnetic "shorthand" on the tape causes an alternating current to flow in the windings around the reproducing head. The reproduced current closely duplicates the original signal.

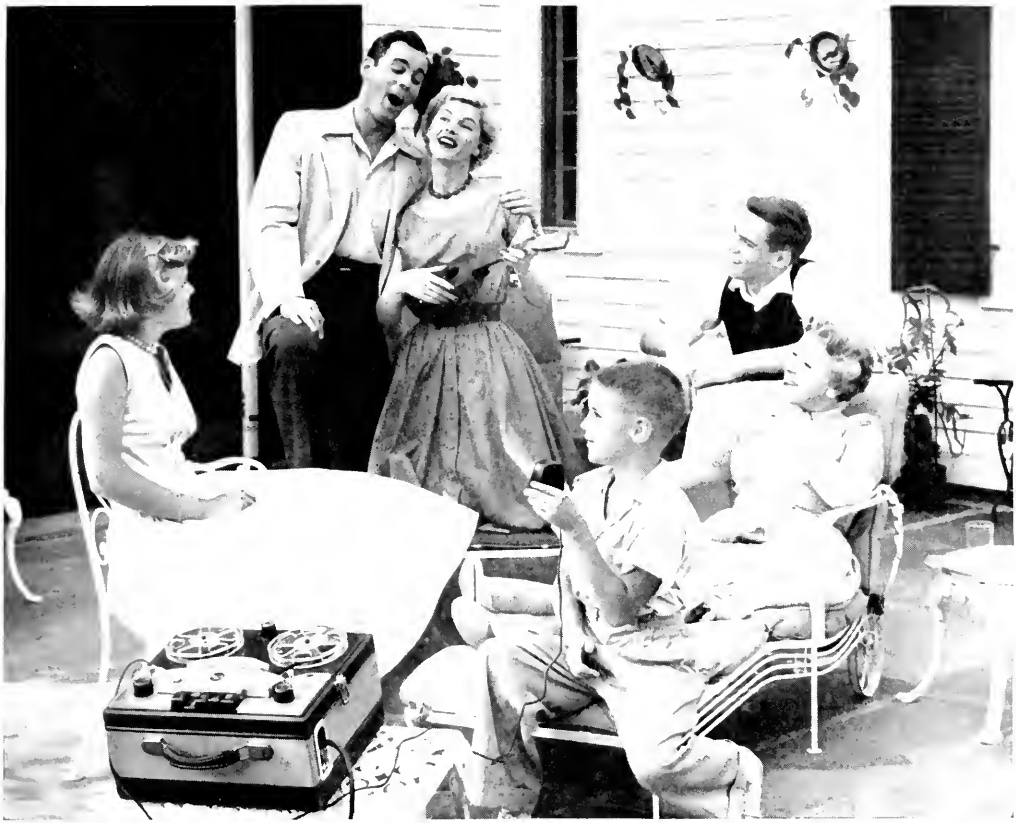
Although the principles are similar, the engineering problems are not; audio recording is today an easy task compared with video recording. The reason is that audio signals are in the range of 20 to 20,000 cycles per second, while video signals range up to 4,000,000 cycles per second. Color television signals, as now formulated, must carry at least twice as much pictorial information as black-and-white. Video tape also must carry the associated sound signals along with this pictorial information.

RCA research has resulted in specially developed recording and reproducing heads which respond to frequencies many times above the cut-off point for the recording heads used in sound recording on magnetic tape. This means that the speed of the tape across the head has been brought within manageable limits. The equipment demonstrated on Dec. 1 had a tape speed of 30 feet per second. Advanced equipment now under construction will move the tape at a lower speed, and with time, further reductions of tape speed appear likely.

The magnetic tape reels of the present laboratory equipment are 17 inches in diameter and will record 4 minutes of a television program. RCA is working now for a reel 19 inches in diameter which will carry a 15 minute program.

For video tape recording of color television with the RCA system, five parallel channels are recorded on a single magnetic tape ½-inch in width. There is one recorded channel for each of the primary color signals (red, green, and blue), for the synchronizing signal, and for the sound signal. For black-and-white recording the tape carries two recorded channels, one for the video signal and the synchronizing signal, and one for the sound signal. For black-and-white television, a ¼-inch wide tape would suffice.

To rebroadcast a color television program from a tape recording made on the equipment shown at Princeton, it is necessary to combine the three primary color signals with the synchronizing signal to form a composite signal to send to the transmitter. While this operation is not yet ready for demonstration, Dr. Engstrom said that it is the subject of current development that will provide the necessary apparatus to produce this result.



You're funnier than Berle... better than Pinza!

Make *your* debut on the new RCA Push-Button Tape Recorder

A push of a button—and *you're on!*

The new RCA Tape Recorder proves it: yours is without question the greatest theatrical family of all time. Well, better than the Talbots next door, anyway.

There are countless hours of entertainment and years of precious memories built into this electronic wonder—the finest portable tape recorder made. And it has its practical side, too.

You can tape your favorite radio programs and the sound portions of top TV shows. Your children can use the recorder to polish up on piano lessons—and there's no better way for you to rehearse important business talks and speeches. You can keep your recordings forever—strong and clear. Or erase them on the spot.

But mainly this versatile recorder will be the sound and voice of your family. Birthday parties, holiday gatherings, weddings—captured for a lifetime on tape!

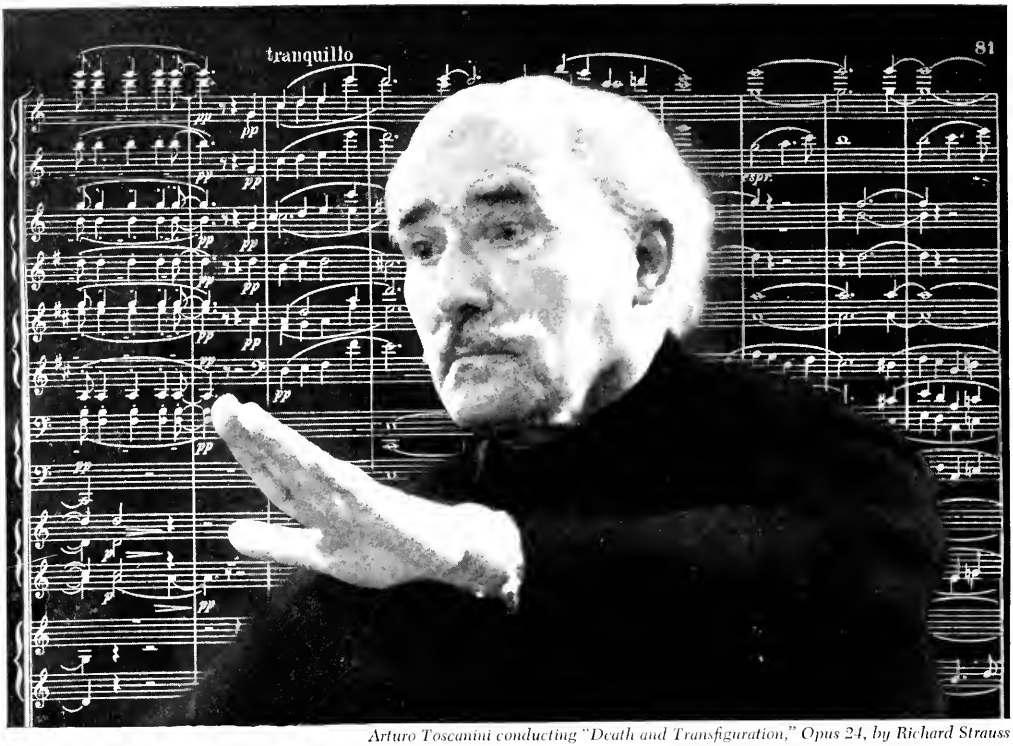
The RCA emblem is your assurance of perfect tonal clarity, of top operational ease, and of many, many years of dependable wear.

Another great RCA achievement. Another mission accomplished in RCA's never-ending program of bringing the very best in sound and entertainment into the home.

First the RCA Victor phonograph, then RCA Victor radio, and RCA Victor television. Today the new RCA Push-Button Tape Recorder. *And there are many tomorrows now in the RCA "workshop," too!*

RCA® *Radio Corporation of America*

World leader in radio—first in television



Arturo Toscanini conducting "Death and Transfiguration," Opus 24, by Richard Strauss

RCA Victor High Fidelity is the result of a half century of leadership in recorded music, phonograph research and development of radio and motion picture sound equipment. It is a new dimension in sound created by the perfect union of recorded music and the phonograph.

A genuine high fidelity instrument re-creates the full range of tones and overtones of the original composition—exactly as the composer intended. The precise balance of sounds from the highest to the lowest must be maintained if perfection is to be achieved free of distortion.

"Victrola"® phonographs, Victor records, and "intermatched" high fidelity equipments for those who want to assemble their own units—all are designed to work together to bring the brilliance of the original performance into the home. Now, with RCA High Fidelity instruments, you can hear the full gamut of the orchestra—from the shimmer of the cymbals to the beat of the tom-tom. You can hear your favorite music as it would sound if you were in the presence of the recording orchestra and artists.

True Hi-Fi—as in RCA Victor instruments and components—embraces the entire scale of tones from the rich lows to the colorful highs. There is nothing missing . . . the sounds reach the ear in their proper proportion and relation.

The nation-wide interest in high fidelity reflects the public's growing taste for the highest quality music. Developments by RCA scientists and engineers now make it possible for you to enjoy this new musical experience. Visit your RCA Victor dealer and hear the new Hi-Fi models of "Victrola" phonographs, Victor records and "intermatched" components.

Radio Corporation of America

World leader in radio—first in television

APRIL 1954

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

COLOR TV SETS

A Year of Progress!

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

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

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

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

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

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

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

David Sarnoff
Chairman of the Board

Frank M. Folsom
President

Results at a Glance

from RCA 1953 Annual Report

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

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

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World leader in radio—first in television

VOLUME 13 NUMBER 2

Radio Age

ARCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

APRIL 1954

COVER

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

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

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

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

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

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

RCA announced that it planned:

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

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

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

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

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

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

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

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

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

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

Information to Competitors

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

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

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

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

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

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

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

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

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

The Production Line

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

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

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

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

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

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

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

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

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

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

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

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

Challenges and Opportunities of Today

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

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

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

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

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

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

Science and Religion

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

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

Brig. General David Sarnoff

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

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

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

(Continued on page 32)

Guided Missiles

Rocket propels a pilotless bomber on its takeoff

By P. B. Reed

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

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

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

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

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

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

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

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

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

Preparing for the Test

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

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

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

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

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

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

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

Four Aspects of Test Work

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

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

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

Air Force map shows guided missile range

R. G. Meier checks camera that will record takeoff

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

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

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

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

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

RCA Begins Deliveries Of Powerful TV Transmitter

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

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

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

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

Folsom Urges Equal Job Opportunity for All

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

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

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

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

Good Business as well as Principle

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

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

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

Frank M. Folsom

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

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

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

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

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

RCA Atomic Battery

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

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

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

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

Consists of Two Small Units

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

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

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

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

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

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

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

Direct Source of Energy

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

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

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

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

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

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

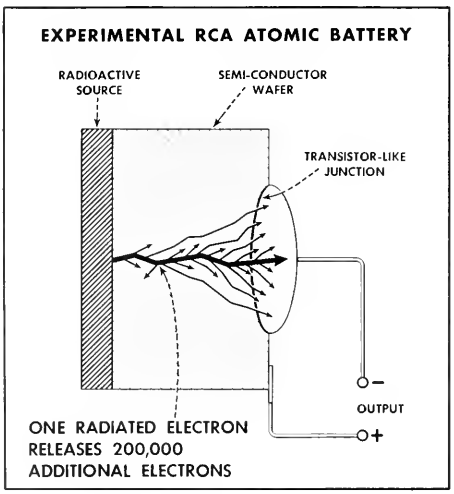


Diagram shows how the battery operates.

Vacuum-Type Generator Tried

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

Brig. General David Sarnoff with demonstration battery.

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

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

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

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

While almost any radioactive material could be used to supply the energy of an atomic battery in theory, strontium-90 was selected for its high energy beta radiation, relatively long life, low shielding requirements and availability in experimental quantities from the Atomic Energy Commission. Since the strontium-90 obtainable at the present time is nor completely free of other fission products which emit unwanted gamma radiation, the experimental battery has had to be shielded in a lead container which adds considerably to its size and weight. Use of purified strontium-90, which emits only beta particles, would greatly reduce the required shielding for the minute quantities required in an atomic battery.

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

Turkish President Sees Color TV On Tour of NBC Headquarters

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

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

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

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

Electronic Sound Absorber

By Dr. Harry F. Olson

Director, Acoustical Research Laboratory
RCA Laboratories Division

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

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

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

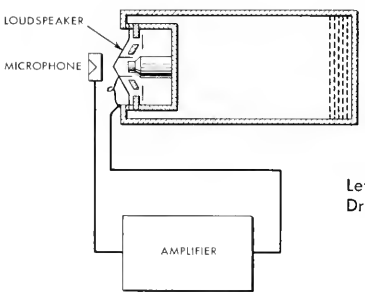
The electronic sound absorber works by turning sound waves back against themselves, and in the process it performs a job that conventional types of sound-proofing marerial cannot handle efficiently. All sounds consist of waves of air that are similar in behavior to the waves in water, and they cause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

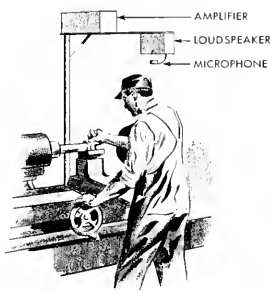
Present sound absorbing systems are based on the use of porous materials containing a maze of tiny passages in which the energy of sound waves is dissipated. But this type of sound-proofing works most effectively at the upper end of the sound scale. To dissipate the longer waves of sound in the lower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

Absorber Creates Counter-Waves

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

The device consists of three units — a special elec-





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

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

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

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

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

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

Operates On Battery or House Current

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

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

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

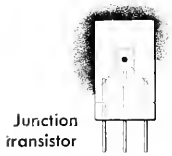
The absorber also can be used in the same manner as conventional wall materials in a room to handle the low-frequency waves that now escape. Three of them placed at the intersection of two walls with a ceiling, for example, would catch oncoming low-frequency sounds before the waves could reach the surfaces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

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

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

Making Transistors

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



Junction transistor

Point-contact transistor

Purifying and "Growing" Germanium

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

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

Assembling the Point-Contact Transistor

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

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

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

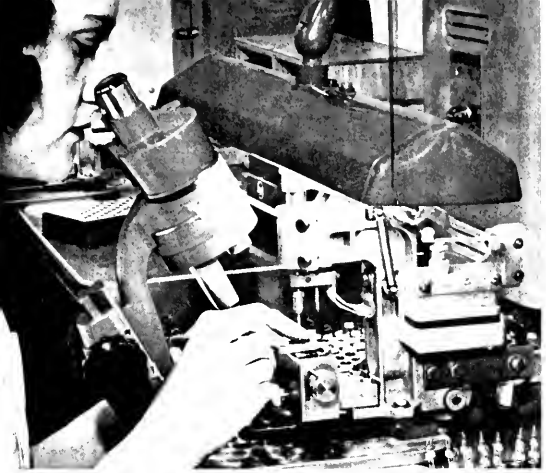
Assembling the Junction Transistor

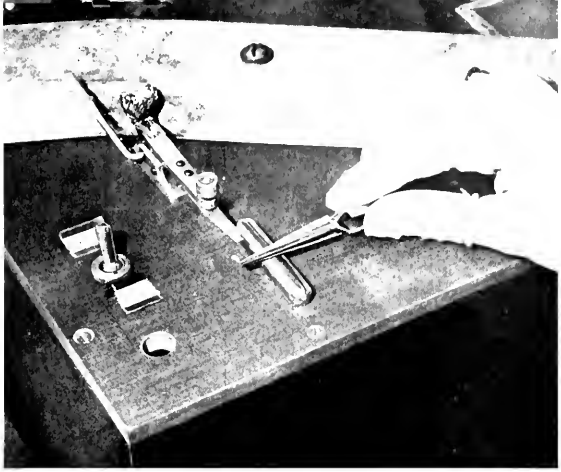
6 Tiny "sandwiches," formed by fixing slightly impure germanium pellets to crystal wafer, go into electric furnace for fusing.

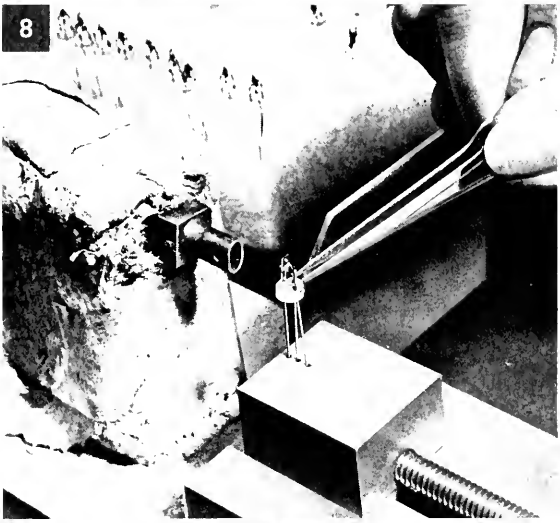
7 Resistance of "sandwiches" is tested on circuit formed by metal bar and spring arm above tweezers.

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

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



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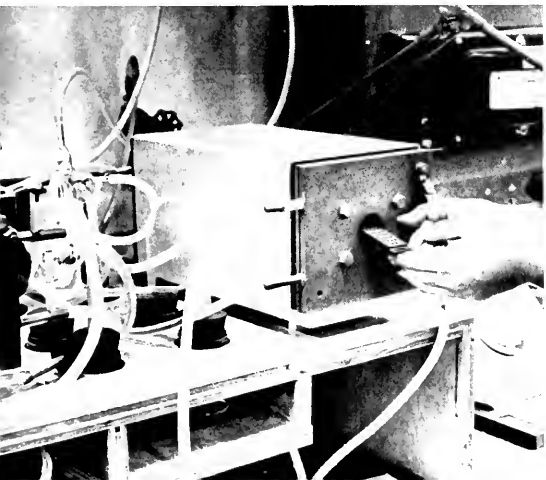


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New York Police Scan Suspects with TV

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

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

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

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

Elements of System

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

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

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

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

Television in Japan

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

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

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

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

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

Difference in Program Standards

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

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

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

An NTV camera focuses on a children's droma

A cooking lesson for viewers of NHK

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

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

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

Licenses from RCA

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

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

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

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

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

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

Commercial Network Planned

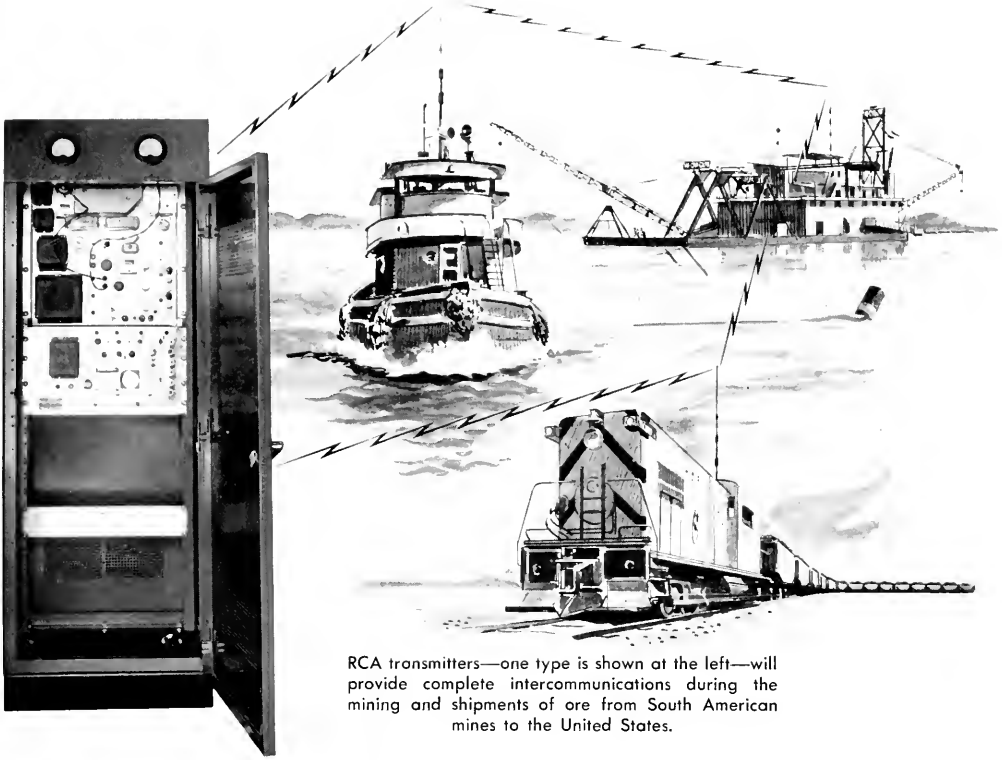
The Nippon Television Network Corporation, a privately owned company, began regular telecasts in August, 1953. Leading newspapers and industrial corporations are stockholders in the organization, of which Mr. Matsutaro Shoriki is president. The company's future plans call for an all-Japan commercial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

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

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

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

(Continued on page 32)



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

Radio Helps to Move a Mountain

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

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

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

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

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

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

Rail Traffic Control

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

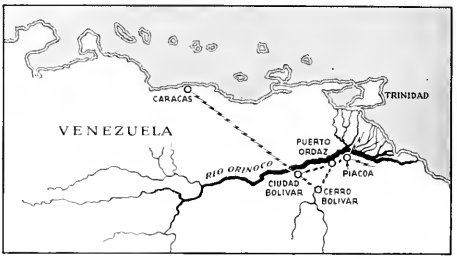
The system utilizes RCA facilities installed to handle telephone and teletype communications as well as the radio waves controlling signals and switches at the four sidings along the railroad. Radio towers capable of carrying the microwave channel and transmitting and receiving VHF-FM have been located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

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

Components of System

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

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



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

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

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

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

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

Syndicated Film Opens New Field in TV

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

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

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

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

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

One year later, the Division's inventory included fourteen properties, including one package of 26 feature films nor previously shown on television, while the exchanges were servicing 256 stations with 2,000 prints a week. In addition, the Division's film library in New York, containing the largest collection of stock footage photographed especially for television, had multiplied its activities in servicing stations, agencies and producers throughout the country from the more than 20,000,000 feet of completely cross-indexed film in its vaults. This total, incidentally, has been increasing by a quarter of a million feet each month.

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

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

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

What I Found Out About Television

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

By Rosita Sarnoff

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

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

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

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

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

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

Rosita Sarnoff

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

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

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

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

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

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

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

Versatile Stage Supports New NBC Show

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

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

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

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

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

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

Can Hold a Large Car

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

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

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

Artist's sketch shows aerial camera, left.

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

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

Editor's Area For Interviews

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

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

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

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

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

New Aerial Camera Used

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

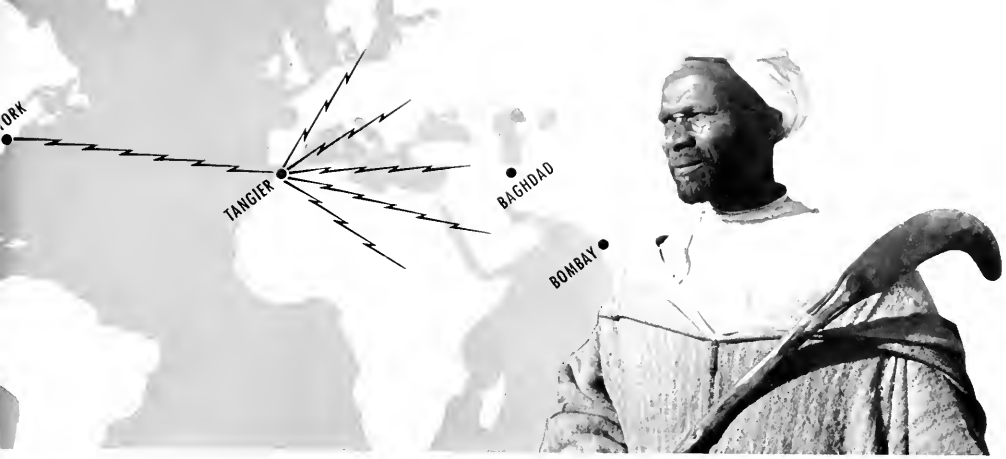
The "Home" set is absolutely practical. Its facilities mean that much can be done "live" and imaginatively which previously required the use of expensive film, edited in order to reproduce similar effects. The new studio set will also make it possible not only to inform but to stimulate the housewife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

Foundation Honors NBC

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

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

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



Tangier: Crossroads of Radio

By Eugene D. Becken

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

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

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

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

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

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

Reasons For Tangier Site

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

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

Aerial view of the Tangier station.

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

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

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

Signals Are Put on Tape

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

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

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

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

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

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

They Keep the Standards High

NBC Unit Reviews All Broadcast Material

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

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

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

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

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

Code Established in 1934

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

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

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

Mr. Helffrich defines the function this way:

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

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

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

Sarnoff Accepts Award

(Continued from page 6)

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

Constructive Purpose Needed

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

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

In conclusion, General Sarnoff declared:

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

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

Tangier Relay

(Continued from page 28)

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

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

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

Television in Japan

(Continued from page 20)

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

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

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

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

ENGINEERS:

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

CHECK SHEET

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

POSITIONS NOW OPEN FOR SENIOR DEVELOPMENT AND DESIGN ENGINEERS:

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- √ COMPUTER . . .
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PERSONAL INTERVIEWS ARRANGED IN YOUR CITY. A copy of our booklet "Challenge and Opportunity," describing the role of the engineer in RCA, will be mailed upon request. Please send a complete resume of your education and experience to:

MR. JOHN R. WELD
Employment Manager, Dept. 315D
Radio Corporation of America
30 Rockefeller Plaza
New York 20, N. Y.

RCA

RADIO CORPORATION of AMERICA

Compatible color television reaches every TV home

The rainbow you can see in black and white!

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

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

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

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

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

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

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

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

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

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

RCA pioneered and developed compatible color television

RCA® *Radio Corporation of America*

World leader in radio—first in television

JULY 1954

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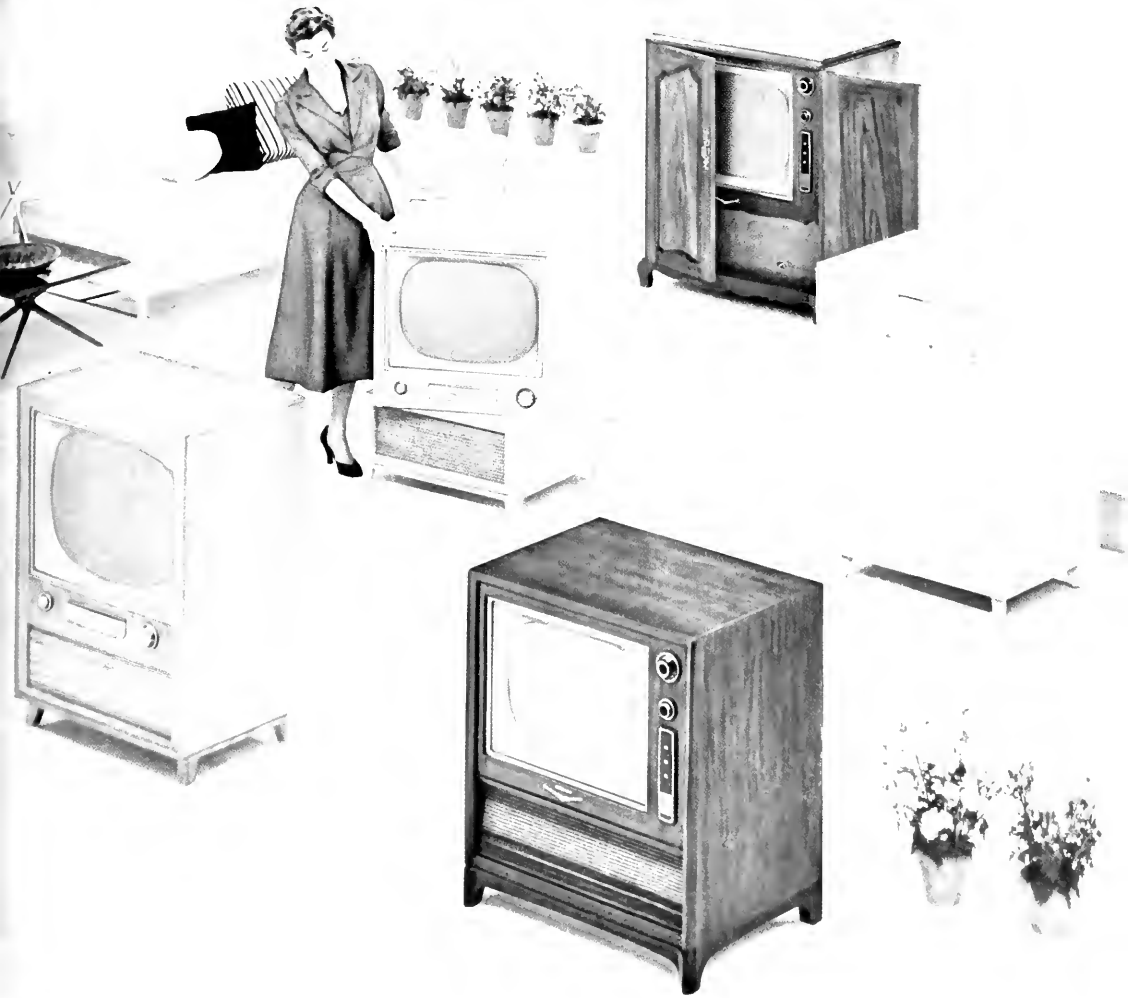

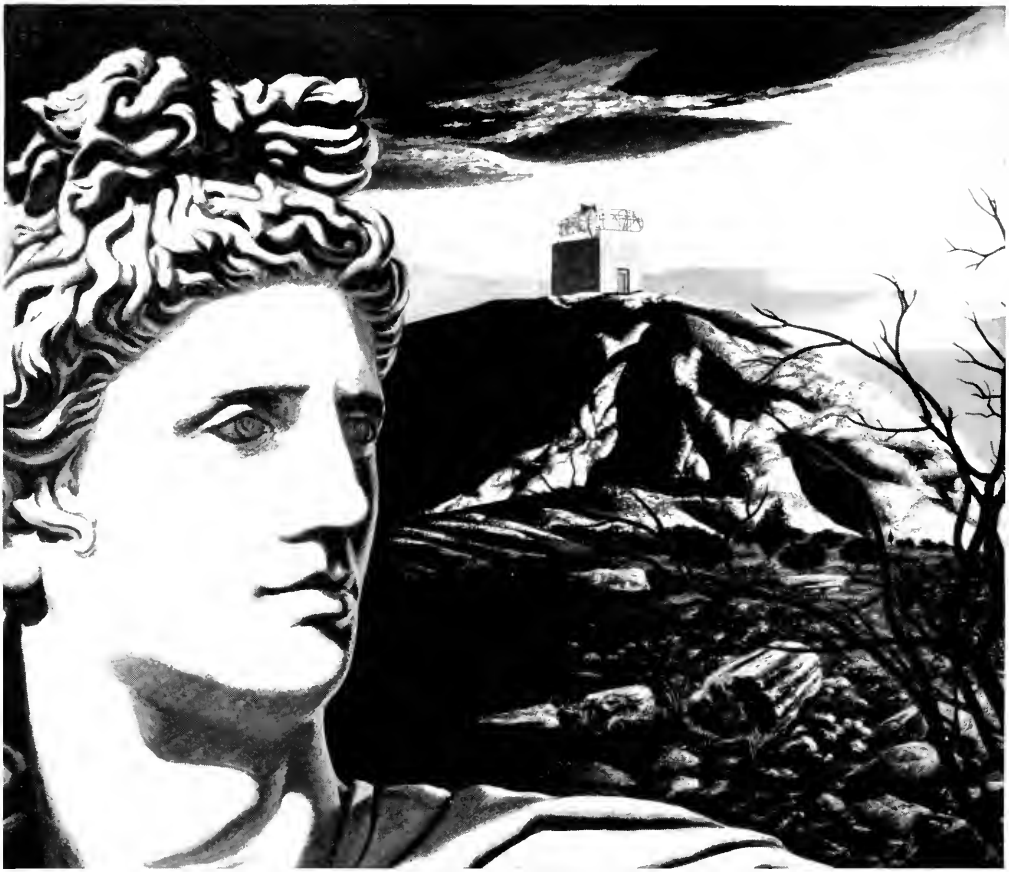

Radar installation on Mt. Parnassus.

"The RCA man was here," said Apollo

Electronics has come to Mt. Parnassus. Capping the heights of this legendary retreat of Greek Gods, Muses and Nymphs, is *radar*—installed under the supervision of RCA field engineers.

And it's no myth, but very real evidence of how American enterprise is contributing to the defense of the free world.

To help in the important Mutual Defense Assistance program, RCA's Government Service Department has mustered corps of hundreds of engineers and technicians to train our own military in the installation and service of electronic equipment abroad—and to teach the science of electronics to friendly nations all over the globe.

Radar, Loran, Guided Missile systems—and a host of other electronic devices—are now in efficient operation from the Aleutians to the Dardanelles to the South China Sea. By shoring up the military establishments of the free world, these installations have become ramparts of defense—deterrents against aggression.

Building! Teaching! Training! No wonder "the RCA man was here" has become an expression of gratitude with free peoples, everywhere.

RCA pioneered and developed compatible color television

RCA®

RADIO CORPORATION OF AMERICA

World leader in radio—first in television

VOLUME 13 NUMBER 3

Radio Age

ARCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

JULY 1954

COVER

Five models in the new line of RCA Victor TV sets, including a receiver mounted on a matching swivel base for convenient viewing. (Story on Poge 12).

NOTICE

When requesting a change in mailing oddress pleose include the code letters and numbers which appeor with the stencilled oddress on the envelope.

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FRANK M. FOLSOM, *President*
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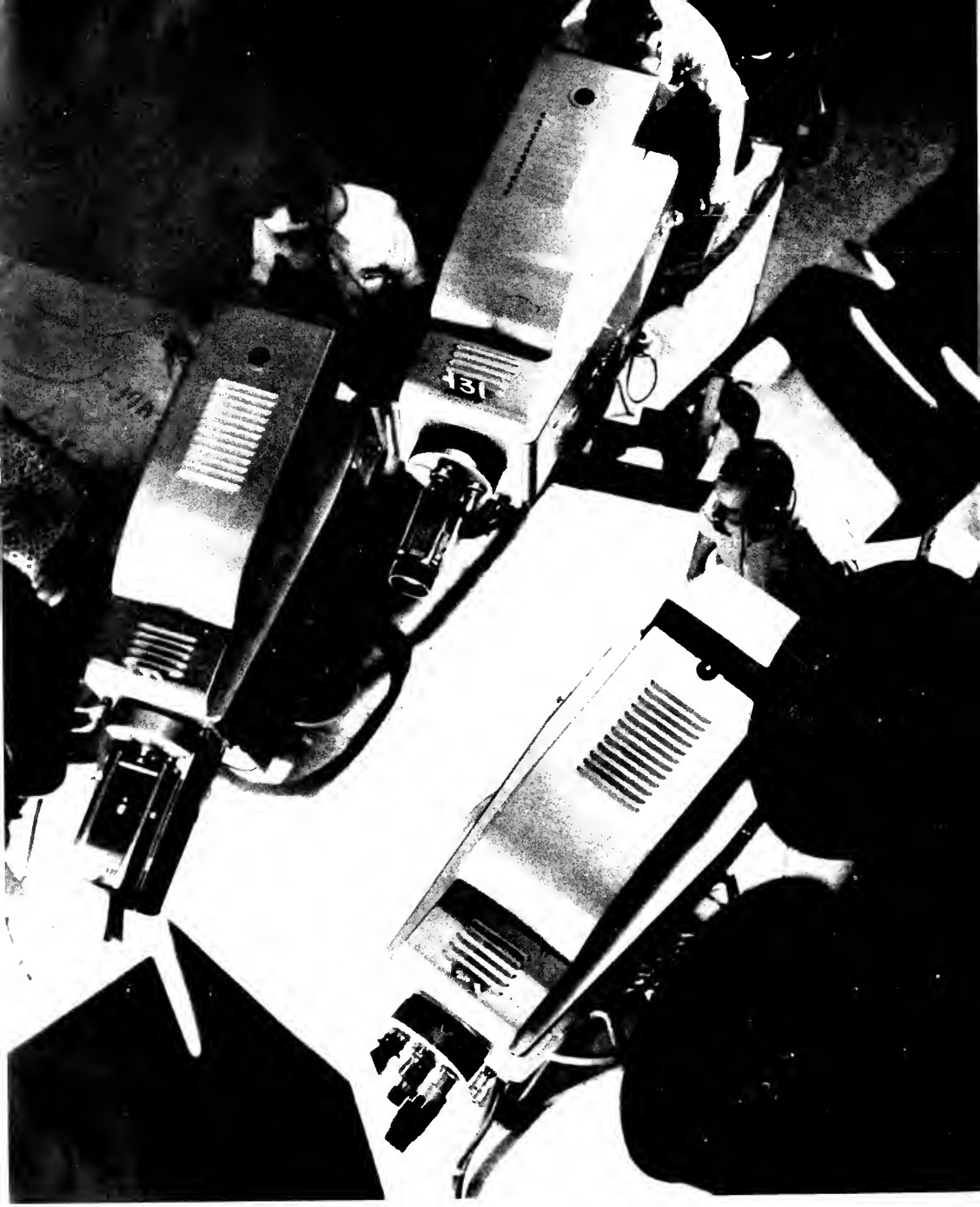


COLOR TELEVISION: A battery of RCA color cameras in an NBC studio.

Youth's Vital and Promising World

Sarnoff in Commencement Address at University of Southern California Says Problems and Perils are Part of the Price of "Monumental Achievements"

"A REMARKABLY vital and promising world" has been built by the parents and grandparents of today's youth, Brig. General David Sarnoff, Chairman of the Board of RCA, told the graduating class of the University of Southern California, Los Angeles, in commencement exercises on June 12. During the ceremonies, General Sarnoff received the honorary degree of Doctor of Laws.

"The conventional pattern of a commencement address, I am aware, requires the orator to apologize for the sins and failures of his own generation—then to congratulate the graduates on their chance to clean up the mess being handed to them," he said. "This shows proper humility and flatters the youthful audience.

"I beg leave to break with the pattern. I cannot in good conscience admit that we have made a mess of things. On the contrary, I believe that your parents and grandparents, which is to say roughly my generation, have built a remarkably vital and promising world.

"It is a world that holds plenty of problems and perils, but these are always part of the price of monumental achievements. Our failures, and they are many, for the most part spring from our successes. They reflect the growing pains of an extraordinary period in human history. Considering the handicaps under which we worked, perhaps you will agree that we have not done too badly."

"The unique and fateful fact about the last fifty years is the dizzy speed with which a multitude of shattering changes have come upon us," he said. "Hardly had mankind gotten over the shock of one tremendous discovery when it was staggered by another and usually bigger one. Small wonder, therefore, that we have been bewildered and a little scared. The terrific acceleration of life has subjected us to immense strains, which at times seemed almost intolerable. We are most acutely conscious of this just now in our reactions to atomic energy.

Mature Technologically, Adolescent Spiritually

"The inability of man as a social and economic creature to keep step with his science—that is the crux of his dilemma today. He is mature technologically while still an adolescent spiritually. Physical distances have shrunk, but the distances between the hearts of man and of nations are wide as ever. This is the primary challenge that awaits you in the world beyond this campus; by this your generation and those that follow will be judged.

"Our choice—more exactly, your choice—is between accepting the challenge or allowing yourself to be crushed by it. You can grovel in terror before the mighty forces released by science, even as savage man groveled before lightning. Or you can face those forces boldly and harness them to your purposes, just as electricity has been harnessed for mankind. That choice is what makes this a time for courage and for leadership."

Progress in Fifty Years

Making what he called a "haphazard inventory of the Twentieth Century," General Sarnoff said that "never before has man's environment been so radically and rapidly modified."

"In comparison with 1954, man at the beginning of the present century was deaf, dumb, blind and earth-bound. He could not speak, hear or see beyond the horizon, or navigate through the air.

"Since then, radio has extended our sense of hearing and carried our voice clear around the globe. Radar has plucked echoes from the moon. Television has projected our sense of sight across continents and soon it will span the oceans as well. Only recently the glorious panoply of full color has been added to this extended vision."

Advances in transportation by ground and air, in chemistry, medicine and agricultural techniques, and in the discovery and development of atomic energy, have made of the Twentieth Century a period "when the worlds of the poet and the scientist have intersected, when the boundaries between the visionary and the practical have been blurred," General Sarnoff said.

"My point is not that these wonders have transpired during my generation and have become part and parcel of our daily experience," he added. "It is that they have come like an avalanche, in so short a time. To understand the world you inherit, you should consider not only the number of these changes, but their tempo —the unexampled speed with which they came."

Following presentation of the honorary degree by President Fred D. Fagg, Jr., of the University of Southern California, right, General Sarnoff is congratulated by Asa C. Vall, President of the Pacific Mutual Life Insurance Co. and President of the University's Board of Trustees, who had presented him as a candidate for the degree.

While mankind is adjusting itself to a changing environment, it is well to recall that victories on the cultural and moral levels have been won during the past half-century despite the "torrential downpour of inventions and discoveries," he said.

"They are spelled out in more widespread education, in easier access to the products of genius in all the arts, in society's vastly larger concern for the old, the widowed, the helpless. The same decades that saw the birth of television and the splitting of the atom also saw a great improvement in race relations and the enactment of vital social legislation.

More Equitable Sharing

"Along with the assembly line has also come the rise of trade unions and a more equitable sharing of the fruits of labor. Though consumption of goods per person has risen two and a half times in these fifty years, the average work week has been reduced by one-third from fifty-eight to forty hours. At the same time, the possibilities for worth-while and enjoyable use of these new margins of leisure have been immeasurably enlarged.

"No, we have no excuse for defeatism in the face of science. We have no warrant for despair. The job ahead is to assimilate the scientific progress, to turn every potential for human benefit into a living reality."

General Sarnoff expressed a fear that "obsessive emphasis on security" in recent years has obscured older and more real values. He suggested that the meaning of ambition and of struggle may have to be relearned, adding:

"Whatever course you have chosen for yourself, it will not be a chore but an adventure if you bring to it a sense of the glory of striving—if your sights are set far above the merely secure and mediocre. In one's personal life, as in world affairs, appeasement can be the shortest road to failure.

Larger Problems Must Be Solved

"Neither personal success nor wealth can any longer provide a guarantee of safety for the individual. They mean little unless the larger problems affecting the community and the nation are solved. To meet the demands of these times, each of you must be prepared to make contributions to society even at what may seem a personal sacrifice.

"The time when government could be left exclusively to professional politicians is past, never to return. For government has become almost co-extensive with life itself. Directly or indirectly you will be called upon to help carry its burdens. To be only a critic on the sidelines is not enough."

The world today, General Sarnoff said, calls for readiness to cultivate and defend the birthright of freedom in the face of a menace to our civilization by a "strong and fanatic" enemy.

"We cannot banish dangers, but we can banish fears," he cautioned. "We must not demean life by standing in awe of death. I do not doubt that we shall win in the deepening struggle between liberty and enslavement; that we can emerge better and stronger from the contest. Indeed, we could lose only by default —and you must see to it that we do not default. American hatred of war is too obvious to need proving. But weakness or fear will surely not avert it.

"America and the world need your fresh energies, the fire and the zeal of youth, no less than the experience of your elders. The hazards of the world I have tried to sketch for you, including its new weapons and newly released forces, put a premium on intelligence. They have made it evident that we need, as a nation, not only more 'man power' but more 'mind power.' Universities like this one represent the prime reservoirs of that 'mind power.'

"You have been bred—and that is the greatest asset of all—by a nation which has given the world an unmatched example of idealism," General Sarnoff said. "Those whom we have liberated from oppression have been free to go their own way. America has responded always and generously to calls for help. Though it has not sought the role, America today stands as the main bulwark of Judeo-Christian civilization. Surely we who are children of this great country must strive to measure up to the splendors of its history and its destiny.

"Let us not lose the sense of the awe and mystery of life. Our very triumphs in penetrating nature have disclosed our mortal limitations. The more we learn, the more remains to be learned. Science, far from making us arrogant, teaches us to be humble. In this universe of endless wonders, the most wondrous is the human mind capable of delving so deep, and the human heart aware of depths we can never plumb."

Electronics and Law Enforcement

Delivering the commencement address at the FBI National Academy in Washington on June 11, General Sarnoff outlined many new uses for television, radio and electronics to aid police in law enforcement.

"Today's graduates have at their disposal a whole spectrum of scientific tools for their trade of which only the most imaginative of the first graduates of the Academy ever dreamed," he said. "By the same token, graduates five or ten years hence will enjoy scientific aids to law enforcement unavailable today."

He recalled the contributions of radio services to this work, pointing out that there is a total of 100,000 police vehicles now equipped with two-way radio apparatus and that major turnpikes are provided instantaneous communications along the route by means of microwave radio systems.

"Eventually, we may be sure," General Sarnoff said, "these expressways will be interconnected not only by radio but by television. It is only a matter of time, moreover, before a coast-to-coast radio-television network will transmit teletype messages, weather reports, photographs, fingerprints and other documents. Law enforcement will have at its disposal an all-seeing eye that scans the country at a glance."

Among the electronic devices now in use by police, or of great potential use in police work, General Sarnoff mentioned these:

Radar, which "will be increasingly an arm of the police forces;"

Radiophoto, by which "photographs or fingerprints can be flashed around the world within minutes, if necessary;"

Television, in which RCA recently cooperated with the New York City Police Department in televising a police lineup, and which already is used for surveillance of prisoners, as in the new jail at Houston, Texas;

Electronic detectors, which may be used in prevention of smuggling of weapons or tools to cells;

The transistor, which makes possible miniature radios with which "the patrolman and detective will be as directly and continually in touch with headquarters as are mobile units;"

The electron microscope, used by the FBI as well as by crime detection laboratories in cities like New York and Rio de Janeiro.

In addition, he foresaw just over the horizon a number of new scientific aids to law enforcement, including miniature battery-powered tape recorders, electronic computers, electronic controls that may automatically trigger traffic signals to halt traffic and clear a path for emergency vehicles, and ultra-sonic alarm systems that could be touched off if broken by a person or object passing through the ultra-sonic signal beam.

The Limestone Air Force Base TV station in operation. Staff Sgt. James R. Dean prepares to roll kinescope film recording as Airman Second Class Robert L. Slezak cues announcer in the studio.

The Smallest TV Station in the World

THE world's smallest television station was officially previewed on June 30 at the U. S. Air Force base at Limestone, Me., from which Uncle Sam's airmen fly the world's largest bombers.

Colonel Bertram C. Harrison, Commander, 42d Bombardment Wing, hailed the "Tom Thumb" TV setup as a "truly significant experiment that we hope will be used as a pattern to bring television to U. S. military personnel stationed at isolated bases around the world."

The tiny, low-powered station has approximately one five-thousandths the wattage of the nation's largest commercial stations. With its maximum coverage range of only three miles, the Air Force station provides ten hours of major network programs daily for more than 15,000 persons living at this 10,000-acre installation only a few miles from the Canadian border.

Conceived by General Curtis E. LeMay, Commander, Strategic Air Command, as an entertainment medium for personnel at isolated bases, the station was built by the Radio Corporation of America after General LeMay sought assistance from Brig. General David Sarnoff, Chairman of the Board of RCA.

The tiny new television station was dedicated at ceremonies which took place at a giant "open house" at the base on the Fourth of July. It was estimated that more than 50,000 persons were on hand to inspect non-security portions of the mammoth base and to catch glimpses of the latest type planes in the nation's air defense armada.

Built and Installed at Cost

Equipment for the miniature 8-watt station, which transmits programs over a three mile radius, was designed, built and erected at cost by RCA. A grant of $34,000 from the SAC welfare fund paid for the equipment and its installation.

"The lessons learned by our engineers in simplifying and miniaturizing television equipment to be used by our Armed Forces enabled us to design and construct this miniature station," Francis H. Engel, Assistant to the Vice-President and General Manager, Engineering Products Division of RCA, said in describing the station.

"The same principles we used in building lightweight, efficient and easy-to-operate television equipment for airplanes and other military uses were applied here. Consequently, less than three months after General LeMay proposed his idea to General Sarnoff, the station was in operation."

Studios and transmitter facilities are housed in a "television shack" — ten by thirteen feet in area — atop the four-story base hospital. A lieutenant and six enlisted men comprise the engineering and program staff. On the air for approximately six months on an experimental basis, the station telecasts kinescope recordings of top network programs from the major broadcasting systems. It also provides three daily "live" newscasts and twice-daily "weather man" programs. Regularly scheduled "flying safety" programs are carried as well as religious telecasts produced by Air Force chaplains and their staffs.

Air Force Morale TV Policy

Colonel Harrison estimated at "more than 1,000" the number of television receivers in use in living and recreation quarters at the base. Stating Air Force policy on the operation of morale TV stations, he declared:

"We will operate television stations only in areas where it is not possible to receive TV programs from commercial outlets. We do not intend to compete with private industry. It is our purpose — and our sole purpose — to provide television service to our people only when and where they cannot get it from privately owned stations."

Recounting the nearly two decades of television use by the Armed Forces, Mr. Engel said that General Sarnoff first assigned RCA engineers and scientists to developing television for the Armed Forces in 1934.

"Long before World War II ended, radio-controlled airplanes with RCA television cameras in their noses had been tested against targets in the South Pacific," he related. "German objectives along the English Channel also felt the devastating impact of similar electronic-controlled, television-guided weapons. World War II saw many successful uses of airborne television in patrol work. Pictures transmitted from high-flying aircraft were relayed scores of miles to receivers installed at land bases and aboard ships.

"Since V-J Day, military television — like its civilian counterpart — has made amazing strides. TV has been used to get close-up pictures of radioactive clouds unleashed by nuclear explosions. Television has guided pilotless drone aircraft to communist targets during the fighting in Korea. Even now, we — and by 'we' I mean RCA in partnership with the Armed Forces — we are developing new and important uses of television and electronics to safeguard national security."

Staff Sgt. Tom B. Legan is staff announcer. Here he presents a newscast from the tiny studio.

Staff Sgt. Charles McDonald scans the teletype in preparation for the hourly broadcast of AP news.

Vidicon Camera Used

Mr. Engel explained how RCA engineers had adapted much existing equipment used in commercial television stations to provide the nucleus of the Limestone installation. The tiny Vidicon camera used to pick up both live and filmed programs is the size of a cigar box and has found widespread applications in industry, as well as commercial television.

"It is significant, I believe, that here at Limestone Air Force Base — the home of the world's largest bombers and the world's smallest television station — the value of morale TV has been proved," Mr. Engel stated.

Limestone AFB's television station presented its first program last Christmas Day. Equipment installation set some kind of a record since the first shipment did not arrive until December 21. The compact transmitter — the most vital piece of equipment — was flown in on December 23. RCA engineers and Air Force technicians worked around the clock to meet the Christmas target date.

The Limestone Air Force Base was selected as the initial site because it is isolated enough to present morale problems, but still near enough to sources of supply — equipment and program material — to insure a continuous flow of necessities.

One of Northernmost Bases

One of the northernmost outposts of the United States defense system, the base is located at the northeastern tip of Maine, 200 miles northeast of Bangor, Me., and 16 hours by rail from Boston, Mass.

Limestone is the headquarters of the 42d Heavy Bombardment Wing, which operates B-36 "intercontinental" bombers capable of flying nuclear explosives non-stop to any point in the world. The base also is capable of servicing all latest-type aircraft, including jet fighters and bombers. A feature of the base is a cement hangar capable of housing two giant 10-engine B-36's in addition to various facilities especially designed for defense against atomic attack on the United States.

Construction of the Limestone Air Force Base was started in the winter of 1946-47, and it continues today. Unlike many Air Force installations which formerly served the Army and were designed for ground force needs, Limestone AFB was planned from the beginning as an Air Force base. Thus training, flight line, barracks and headquarters facilities have carried the Air Force stamp from the moment they left the drawing board.

The end product—an interested TV audience in an enlisted man's home at the Limestone base.

Thomas F. Joyce, right, President of Roymand Rosen and Co., Inc., of Philadelphia, receives an inscribed, gold-plated 45-rpm phonograph from Joseph B. Elliott, Executive Vice-President, Consumer Products, RCA, in recognition of the Rosen organization's achievements in sales contest sponsored recently by RCA. Looking on at left is Raymond W. Saxon, now General Sales Manager, RCA Victor Television Division.

Five Years of Success for the "45"

REVITALIZED by the 45-rpm recording system introduced by RCA five years ago, the phonograph-record industry has been lifted to new high levels with more than 200 million "45" records sold, Frank M. Folsom, President of the Radio Corporation of America, said on June 29 in a statement marking the fifth anniversary of the "45."

He said that 13 million homes now have turntables capable of playing "45s," and estimated that within another five years the "45" will account for more than 75 per cent of the total record volume.

"The '45' records now represent more than 50 per cent of all single records sold," said Mr. Folsom. "The older 78-rpm records are obsolete. So quickly did the '45' gain popularity that by the end of its first year, the sale of '45' records represented 10 per cent of all record sales, and this percentage has steadily increased from year to year. In 1949, when RCA introduced the '45' system, record industry sales totaled $160 million. This year, because of the interest the system has generated for all types of records, the sales volume for the industry should be greater than $225 million — and the quarter-billion dollar figure is only a matter of time.

"The '45' system has won recognition from every quarter, even from those who were its severest critics, and it has given the American public recorded entertainment of matchless tonal quality and more music for less money. Today all major record and phonograph manufacturers are producing discs and record-players utilizing the '45' system, yet five years ago great furor was created by what was proclaimed as 'the battle of speeds.' In 1949, those who would have clung to the old and thus deterred progress by not adopting the '45' must now realize that their lack of vision and faith threatened to keep their own business at low levels and prevent the public from enjoying the many advantages of the '45' system.

Fastest, Simplest Record Changer

"We have made available to the public RCA Victor's unsurpassed library of the world's greatest artists and music on '45' records, as well as on 33⅓-rpm (long-play) records. And we have provided the fastest and simplest record changer ever developed, designed for the finest possible music reproduction. The results have been extremely satisfactory and dramatically show the value of recognizing the merits of an invention and American ingenuity in creating new electronic instruments that keep the art of music in step with scientific progress."

Indicative of the continued growth of the "45" system, Mr. Folsom revealed that beginning July 1, RCA Victor will ship only "45" popular records to more than 2,000 radio stations throughout the country, replacing the shipment of 78-rpm records for broadcast use. He pointed out that this is another signpost of listener acceptance of the "45" system and represents a logical follow-up to the conversion that already has taken place in automatic music machines.

The "Listener's Digest"

"The '45' system has become the standard for virtually all new popular records," Mr. Folsom declared. "It also has created new and expanding interests in the field of classical music.

"In this connection, RCA Victor has produced a truly monumental new record album to commemorate the fifth anniversary of the '45' system. It is the 'Listener's Digest,' which, in one album, brings condensed versions of twelve great musical masterpieces. These records feature the world's greatest recording artists playing selections by seven renowned composers.

"More than thirteen months of intense effort was expended in preparing the 'Listener's Digest'. The original uncondensed recordings are five hours, fifty minutes, seventeen seconds in length. The 'Listener's Digest' album runs two hours, thirty-five minutes and sixteen seconds. It is a masterpiece destined to interest millions of people in music of the masters."

Mr. Folsom explained that in order to implement the distribution of the "Listener's Digest," RCA is offering the new album as part of a package which includes a 45-rpm "Victrola" phonograph and a 42-page Musical Enjoyment Guide.

"We are convinced," he said, "that the 'Listener's Digest' will please parents who will find this new concept in records a perfect and inexpensive way to introduce their children to fine music. It also will be ideally suited to adults who want to become better acquainted with great music. Schools, too, are expected to make extensive use of this new approach to musical education and enjoyment.

"Success of previous RCA Victor albums — such as the 'Heart of the Symphony,' 'Heart of the Piano Concerto,' and 'Heart of the Ballet' — has proved that the general public will buy great music, even if they are somewhat unfamiliar with it, when the music is presented in an exciting manner. This is done with the 'Listener's Digest' as it has never been done before in the history of recording."

Greatest Advance in 50 Years

Observing that the recording industry has kept technological pace with developments in electronics, Mr. Folsom appraised the "45" system as "the greatest advance in fifty years of recorded music." It is, he added, a new standard of musical enjoyment in the "Victrola" field — a standard that highlights and reflects the industry's search for quality and perfection in music reproduction. The small, unbreakable, vinyl plastic, wafer-thin records, Mr. Folsom said, have revolutionized many aspects of the "Victrola"-phonograph industry, including the merchandising of records.

Mr. Folsom paid tribute to merchandisers for the outstanding role they have played in making the 45-rpm system a part of the American home entertainment scene. He cited Raymond Rosen and Company, Inc., RCA Victor distributor in the Philadelphia area, as an outstanding example of a firm which has successfully merchandised the 45-rpm system. He said that in five years the Raymond Rosen organization has sold more than 3,500,000 45-rpm discs and nearly 195,000 45-rpm "Victrola" phonographs.

Recalling the advertisement in March of 1949, announcing RCA's development of the "45," which stated

Keeping a close eye on quality in the making of 45-rpm records—here the first master pressing is tested at the RCA Indianapolis plant.

that "the '45' is here to stay and destined to lead all other types of recorded music," Mr. Folsom added:

"That prediction has come true as we knew it would because of the determination and concerted efforts of scientists, artists and businessmen in calling the public's attention to the 45-system. We were confident that once the public was exposed to the '45' success would be assured because it represented progress in artistic fulfillment as well as simplicity, convenience and economy."

Developments Continue

The "45" system, Mr. Folsom pointed out, is not "static," and because of its relationship with the unlimited possibilities inherent in electronics, it can continually adapt itself to new advances. For example, RCA Victor's "New Orthophonic" high fidelity records represent the latest improvements in recorded sound. He cited the successful introduction in November, 1952, of the "Extended Play" — or EP — 45-rpm record as another important milestone in the progress of the system. The EP record, he said, won immediate acceptance, and at the end of its first year, more than 10 million discs had been sold, providing the consumer "more music for less money."

"Introduction of the EP record," continued Mr. Folsom, "was an important milestone in recorded entertainment because it permitted the development of new repertoire such as combining four hit tunes on one record. It has also enabled us to introduce new concepts in recorded entertainment like the new series which combines famous operatic arias sung in their original language by Metropolitan Opera artists with especially written adaptations in English."

Development of the "45s", Mr. Folsom pointed out, marked the first time a player and a record were designed as a matching unit. This brought about three distinct advantages, including:

1. A distortion-free, seven inch disc of optimum quality which can be conveniently packaged in small storage space.
2. A trigger-sharp, silently-working changer mechanism which eliminated both record damage and the need for adjusting the changer to discs of various sizes.
3. The most compact "Victrola" in the history of the industry offering the finest in quality reproduction.

"The 45-rpm system opened up new and untapped markets for the merchandising of the 'Victrola' and phonograph records," Mr. Folsom said. "The 45-rpm's compact size made possible the expansion of customer self-service in stores and resulted in the trend toward super-market sales. Planned in terms of small homes and apartments where bookshelves would serve as storage cabinets, the new 'Victrola' and record found its way into many homes where conservation of space was essential."

He said that the unbreakable discs also offered:

1. Eye-attracting window and counter display material for record dealers.
2. A handy, compact portable unit for music enthusiasts while traveling or for students and campus living.
3. A sturdy, nursery-sized product for the kiddies' disc market.

"The '45' system revitalized the entire record industry," Mr. Folsom said. "It has rendered a continuing service to the consumer and the artist because it so faithfully reproduces music and sound. Because of the contribution it has made in increasing the confidence of the consumer in the lasting value of recorded music, the record industry is today on the threshold of its greatest period of opportunity and prosperity."

The 200 millionth 45-rpm record gets a joyful inspection from artists Perry Como and Roberta Peters, and RCA Victor Record Division sales manager Larry Kanoga.

RCA Introduces Its New Line of Home Instruments

Elliott Calls for an Active Merchandising Effort and Realistic View of Industry's Prospects; Emphasizes Role of Second TV Set in Home

RCA Victor will introduce in July a new line of television receivers designed to provide "the greatest values in the company's history," Henry G. Baker, Vice-President and General Manager of the RCA Victor Television Division, announced in mid-June. The line will include 20 basic models in three picture tube sizes —one 17-inch, thirteen 21-inch and six 24-inch receivers —with suggested retail prices ranging from $159.95 to $500.

With the announcement came disclosure by Jack M. Williams, Advertising and Sales Promotion Manager of the television division and the RCA Victor Radio and "Victrola" Phonograph Division, that sale of the new TV sets and the new radio and "Victrola" phonograph lines will be supported by the largest advertising campaign in RCA Victor history.

A few days earlier, Joseph B. Elliott, Executive Vice-President, Consumer Products, RCA, outlined what he called a realistic attitude toward the prospects and problems facing the radio-television industry—a position that lies between the "feast of an optimist and the famine of a pessimist." Speaking to a convention of the National Association of Electrical Distributors at Atlantic City, N. J., Mr. Elliott said:

"Today's business climate in the electronics field calls for level-headed thinking and action. It calls for work—and hard work—with the belief that the reward will be large. It calls for recognized brand merchandise of outstanding values and for a desire on the part of salesmen to demonstrate and establish these values firmly in the mind of the consumer."

Sees Demand for Second TV Set

Predicting that the public will be in a more receptive mood for television sales during the last quarter of the year, Mr. Elliott added:

"More and more it becomes evident that the day of the second TV receiver is with us. It will soon be a must that in a mixed household of adults and children one screen will not be enough. The football game will hold adult attention for 150 minutes, but most of the youngsters will keep on demanding their Westerns at the same time. Through persistent and productive merchandising and promotion, we can see that peace is maintained in the family circle."

The New Orthophonic High Fidelity "Victrola" Low-Boy phonograph, with 3-speed automotic record changer.

The 21-inch Pickford, with vertical tuning controls and two powerful 8-inch speakers behind slanted grille.

The Wister, 21-inch swivel-bosed console model whose upper portion can be turned to face different positions.

The new RCA television line announced subsequent to Mr. Elliott's speech was described by Mr. Baker as representing a positive course of action by RCA to maintain its television sales leadership in the changed market conditions of today. These four significant factors were involved in planning the line, he said:

1. An analysis of the market situation indicated that added values were desirable to maintain volume sales. Engineering, styling and design developments which had been in the planning stages were therefore accelerated to become available for the new line.

2. The analysis also indicated the desirability of planning the strongest merchandising program in the history of the company. To carry this out, all operations connected with the manufacture and sale of television receivers were separated from those of the radio and phonograph business. The new organization, the RCA Victor Television Division, will now concentrate its efforts solely on the television receiver line.

3. The increased activity in color television anticipated this fall called for greater consumer values in black-and-white sets to maintain a high level of sales. The new line reflects RCA's optimistic outlook for healthy black-and-white business ahead.

4. Consideration was also given the desirability of providing additional dealer incentive for selling up to higher priced models. As planned, the incorporation of special features, particularly the visible ones, makes possible easy, logical step-up from model to model, or from group to group. If these features are utilized fully by the dealer, Mr. Baker predicted, it will result in increased dollar volume and profits.

Features of the New Line

Engineering highlights of the new line include newly designed chassis incorporating circuit improvements, and a new high-speed UHF (ultra-high frequency) continuously variable tuner resulting in pin-point station selection and picture improvement in fringe areas.

Describing development of the new VHF-UHF tuner as an important contribution to the extension of UHF broadcasting service, Mr. Baker said that RCA Victor will continue to manufacture UHF-equipped receivers in sufficient quantities to satisfy consumer requirements. He remarked that almost 28 per cent of TV receivers produced by RCA this year were equipped with UHF tuners at the factory.

The new RCA Victor line consists of two series of models — the Super and the De Luxe — covering the 17-, 21- and 24-inch receivers. To re-enter the 17-inch field actively, Mr. Baker said, RCA Victor will offer for the first time a set at $159.95. Incorporating a newly designed chassis, this model (the Trent) is expected to find important application as a second set in TV homes. To promote this use, a "Roll-Around" stand with wheels will be available.

RCA Victor's basic plan to offer greater values in its new line also is indicated in a new group of swivel consolettes in the 21-inch Super series. This receiver is mounted on a matching swivel base so that the screen can be rotated to provide maximum convenience in set location and viewing angle. Named the Wister, it will be available in grained limed oak finish at $229.95. As a specialty, it will also be offered in decorator finishes of grained charcoal oak and grained natural walnut, both listed at $325.

The Eye that Sees One 10-Millionth of an Inch

A NEW type of electron microscope, twice as powerful as any now in use, will go to work this summer to help science probe more deeply than ever before into the nature of cancer.

The first of the new instruments, developed and built by RCA, made its public debut on May 11 at the United Nations, New York, in ceremonies at which it was turned over to the world-renowned Karolinska Institute of Stockholm, Sweden. The institute, one of the world's leading centers of research in cell structure, already has made extensive use of earlier RCA electron microscopes. It is receiving the powerful new instrument under a grant from the Rockefeller Foundation.

With the new microscope, scientists will be able to study particles smaller than one 10-millionth of an inch in diameter. Photographs taken by automatic cameras built into the slender pylon that houses the electron source and the lenses may be enlarged consistently up to 200,000 times the size of the specimen—a scale at which an ordinary dime would measure more than two miles across. By comparison, the previous type of electron microscope, with which the polio virus was first observed, normally provides useful photographic enlargements only up to 100,000 times, although far greater enlargements have been achieved by a relative handful of highly skilled microscopists.

Oscar Thorsing, right, Swedish delegate to the U. N., listens as T. A. Smith, Vice-President in Charge, RCA Engineering Products Division, explains operation of the new electron microscope.

Accepted by U. N. Delegate

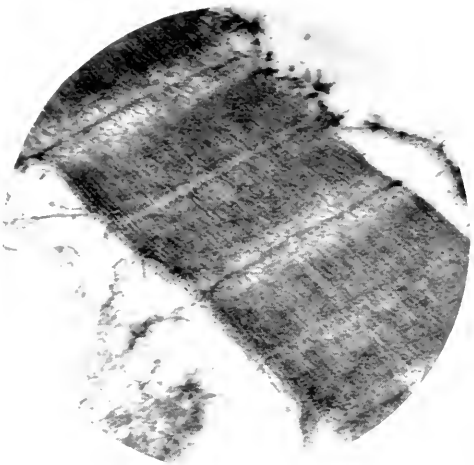
At the United Nations ceremony, the powerful microscope was accepted for the Karolinska Institute by Oscar Thorsing, Permanent Delegate to the U.N. from Sweden. Theodore A. Smith, Vice-President in Charge, RCA Engineering Products Division, presented the instrument to Mr. Thorsing, observing that its introduction coincided with the 15th anniversary of the development of the first electron microscope, produced by RCA in 1939 and since employed in nearly every branch of scientific and industrial research.

"We confidently believe that the many new features of this advanced instrument will pave the way to new knowledge to serve mankind everywhere," Mr. Smith said.

Mr. Thorsing, accepting the microscope, read a letter from Dr. Fritiof S. Sjostrand, head of the Karolinska Institute, in which the Swedish scientist described the electron microscope as one of "the most important technical instruments" in medical and biological research. Their use, he said, has helped to give scientists a fuller knowledge of the "most fundamental character of the life process."

Dr. Sjostrand indicated in his letter that the powerful new microscope will first be put to work to widen the scope of information about the construction of normal cells in order to shed greater light on the nature of those which develop abnormally, as in cancer.

"This work is now on foot and our earlier conceptions of the cell structure have already had to be greatly modified," he wrote. "Only when sufficient observations have been made regarding normal cells, e.g., cells of the



First micrograph made with the new microscope shows minute section of muscle fiber magnified 100,000 times.

nervous system, of the sense organs and the glands, can the study of pathologically transformed cells, such as the cancer cells, be expected to produce reliable results. There is hope that the analyses by electron microscopes will lead to discoveries which may cast light over the character of the cancerous process and thereby provide a clue to the understanding of the cancer disease."

Differs From Earlier Models

In appearance, the new microscope differs radically from earlier types. Two desk-type working surfaces, each backed by a sloping control panel, flank a slender 7½-foot vacuum column that forms the heart of the instrument. The desk and control panel units are joined to the column at a slight forward angle to place all controls within reach of the operator, seated on a chair in the center.

Built in the column at desk level is a viewing chamber equipped with windows on three sides to permit several persons to see the enlarged specimens at the same time. Magnification up to 30,000 times is obtained on the direct viewing screen, while enlargement up to 200,000 or more times is achieved from photographs taken by automatic plate and roll film cameras housed in the column.

The new microscope operates on the same principles as its less powerful predecessors. A concentrated beam of electrons, originating from an electron gun, is directed through the specimen to be observed. As the electrons pass through the specimen, they are affected in varying degrees according to the density and composition of its various parts. When the beam emerges from the far side, it bears the pattern or "image" of the specimen, which is then magnified by powerful magnetic lenses that act upon electron beams very much as glass lenses act upon light. The pattern finally is projected upon the viewing screen.

The ordinary optical microscope, using light to form the image of the specimen, is limited in its range by the wave-length of visible light. Objects appreciably smaller than this wave-length fail to interrupt or reflect the light in any visible fashion. The electron beam, however, has a wave-length only one 100-thousandth as great as that of visible light, with the result that it is interrupted or reflected by far smaller particles. When RCA first introduced the electron microscope, the immediate effect was to multiply by fifty times the range of human vision into the world of infinitely small organisms and particles—and the new microscope has now doubled that range.

Improved Features Listed

Dr. Robert G. Picard, Manager of Scientific Instruments Engineering, RCA Engineering Products Division, who designed the new instrument, told the U.N. audience that the basic objective of the new design was to make operation so simple that people without specialized training can operate it successfully. The improved features that have contributed to this objective are:

1. Push button control of practically all operations, including photography;

2. A 30 per cent increase in resolving power—the ability to distinguish separate particles clearly at the outer limits of magnification;

3. Provision of controls that allow the operator to correct astigmatism easily while watching the image—a process that has involved much time and manipulation in previous models;

4. A new power supply, producing either 50,000 or 100,000 volts, and giving the electrons higher energy to penetrate thick specimens;

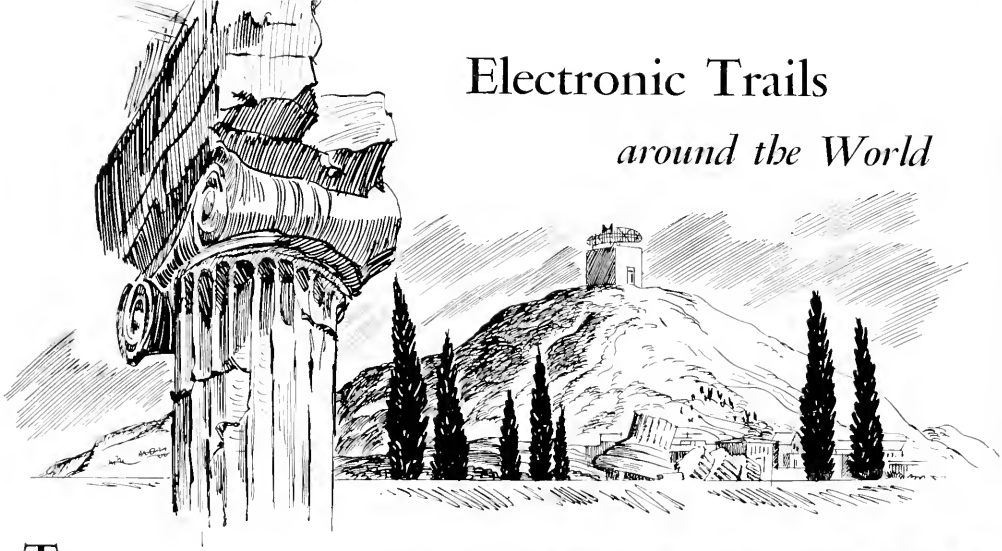
5. Stability in the electron gun, described by Dr. Picard as "an achievement which turned out to be the most difficult single engineering development in the new instrument."

When it is installed at the Karolinska Institute, the new instrument will be the eighth RCA electron microscope in use in Sweden. Others of the new type are being built on order.

More than 500 of the earlier electron microscopes already are in use on scientific and industrial research projects in the United States and 29 foreign countries.

Electronic Trails

around the World



THE Greek mountain of Parnassus, in legend the spiritual retreat of Apollo, the Muses, and the Corycian nymphs, is crowned today by a parabolic radar antenna of American make and design. The antenna rotates on a rectangular block of white marble which might, and by all poetic standards should, have come from Apollo's 3000-year-old temple on the southern flank of Parnassus

The temple, its foundation still standing, formed the heart of the Delphic precinct. Delphi was, figuratively speaking, home territory for the Muses, those female divinities who presided over science, poetry, and art. Their science, presumably, did not embrace radar; but some unknown Greek workmen, schooled in mythology, possibly saw a link between the two. In any event, the radar apparatus was joined to a chunk of marble once exposed to the oracular winds and volcanic gases that carried messages from the Muses.

The workmen might have reasoned that radar, like the Muses, opened a door to the unknown.

"I couldn't swear," says P. B. ("Pincky") Reed, Vice-President in Charge of the Radio Corporation of America's Government Service Department, "that the marble came from the old ruins. But that's what one of my Greek hosts told me. It wouldn't surprise me a bit if it did."

An Electronic Trail

Few things, indeed, would surprise Mr. Reed in the way of history, legend, or local custom. He has traveled well over 100,000 miles in the last three years. In one month alone, he logged 30,000 air miles hopping from New York to Alaska to Japan to Korea to Formosa to the Philippines to Guam to Hawaii and, finally, to California.

P. B. Reed, enjoying a rare pause on his global beat, inspects the Parthenon with a Greek guide.

Mr. Reed has a passing acquaintance with Ionic columns, Buddhist temples, Arctic shelters and Formosan cutlery. He acquired it simply by pursuing an electronic equipment trail around the globe. Wherever the American military establishment harnesses the electron, Mr. Reed can be counted upon, sooner or later, to pop up.

And if Mr. Reed isn't around, the odds are that one or more of his team of over 1,000 skilled electronic technicians is. They work with the armed services in 22 foreign countries, in the United States and in U. S. possessions. They train military technicians on the installation and service of radar, loran, shoran, two-way radio, guided missiles systems, microwave equipment, and the host of other RCA electronic devices in use by the Army, Navy and Air Force.

As a twin occupation, and at the behest of the Government's Mutual Defense Assistance Program, they teach. They teach the science of electronics and its specific military applications to Turks, Italians, Yugoslavs, Icelanders or whomever else the MDAP might designate. In this sense, they are de facto diplomatic representatives.

A New Language

Most of these electronic emissaries, working out of RCA Government Service Department headquarters on the shores of the Delaware River in Gloucester, N. J., are graduate engineers. They go abroad for a minimum one-year hitch. By the time they return, they are often skilled linguists and the possessors of fine photographic albums.

"One of the boys was just back from Italy," Mr. Reed recalls. "He didn't speak Italian when he went, but he certainly did when he returned. The trouble was, it was electronic Italian. He'd been lecturing to Italian technicians, and he had a beautiful electronic vocabulary. He was fretting about how he was going to use it here."

The electronic technicians are a relatively new breed of Americans abroad. They are an offspring of World War II when the armed services and American industry began adapting a vast array of electronic products to military use. The technician was put in uniform, attached to the staff of local commanders in different theaters, and charged with the responsibility of equipment maintenance, installation and technical instruction. He moved as close to the front as his equipment did. Next to the war correspondent, he probably witnessed more combat than any other American civilian.

Industry's Answer

The cold peace of the late Forties, and then Korea, saw the service expand. America's policy of communist containment hinged on military bases from the Aleutians to the Dardanelles to the South China Sea — and on shoring up the military establishments of allied nations. In both cases, electronic equipment was essential to the proper defensive posture. Civilian technicians who could train military personnel, who could fly anywhere, anytime, on emergency missions, who could serve as a direct information channel from industry on new equipment developments; they were the obvious, and most economical, answer to the military's needs.

So the RCA Service Company, formed originally to install and service radio and television sets, created the Government Service Department as a civilian adjunct of the armed services. The bulk of its men rotate around Zone of the Interior bases, but over 250 technicians are now stationed abroad and the foreign service is growing like ragweed. New teams are being shaped up at the present time for Far Eastern nations. And a special flying squad of 40 engineers has been set up to trouble-shoot on worldwide basis.

The foreign service is controlled by Thomas G. Whitney, who is field operations manager in Mr. Reed's department. In the security-conscious headquarters at Gloucester, his office resembles a military command post — except that Mr. Whitney dresses in the quiet grays of a banker. A wall-size map opposite his desk is punctured with colored pins, each representing an individual or a team of servicemen. The phone on his desk gives him quick contact with cities such as Frankfurt, Weisbaden and Tokyo.

This could be any of numerous airports where Mr. Reed has waited between planes: Rhein-Main, Frankfurt, Germany.

Business in Rome with Italian officers and two RCA technicians—Mr. Reed, center, John Basse and Harry Mills, right.

Another day, another country. A Portuguese Boy Scout talks with Mr. Reed during a ferry crossing at Lisbon.

"Speed and mobility are important in this business," Mr. Whitney explains. "When the armed services want a job done, they want it done fast. It's up to us to get hold of the right man and move him where he's needed. If we can't locate the man ourselves, we don't hesitate to ask our Embassies or military headquarters abroad to assist us. They're very helpful that way.

"For example, the Air Force recently wanted a special microwave survey made for a two-way radio installation at Fontainebleau in France. The man with the best technical background for the job happened to be in Tokyo. We got hold of him out there by telephone via Signal Corps headquarters. He hopped a plane and had his survey under way within a week in France.

The Flying Forty

"As a matter of fact, this type of thing is becoming so widespread that RCA's Engineering Products Division — which builds electronic equipment for the services — decided to help us with a flying Squad of Forty based in Camden, N. J. It's a mobile engineering reserve, each member ready to take off for Tibet or Tunisia just about as quickly as a local repairman can leave his shop to handle a job in your home."

Most of the technicians, according to Mr. Whitney, have a sound electronics background before they're selected by RCA. They're given a fine-tooth security investigation and then assembled at Gloucester for a five-to-six week refresher and indoctrination course.

"In addition to the government security check, we do a pretty thorough screening job on our own," Mr. Whitney explains. "We look for fellows with tact, good personalities and stable backgrounds. We don't want the type of man who will go to India and make public wisecracks about cows. In other words, we try to get men who will be a credit to the country and to RCA when they're abroad."

Some of the foreign work is so highly classified, according to Mr. Whitney, that "we don't even know what many of our boys are working on." Once they report to the local commander, they are, in effect, on his staff.

"In this connection, we tell them pretty frankly about the hazards they might run. A few of our men have had tight squeezes in the past, and they might in the future. In the Korean War, one of our technicians stayed with his equipment in Seoul until the rear guard evacuated just minutes before the North Koreans entered. Another was in Teheran during the Mossadegh coup. He had to get out with the British oil men and he had a close shave in doing it."

The Old Appeal

Despite the hazards, Mr. Whitney says, many of the technicians take to life abroad. Some stay four or five years. Some, of course, follow the established G. I. custom of falling in love and marrying foreign women.

"I guess a half-dozen of our men from the Far East, for example, have married Japanese women. Some have returned to the States with their wives and are working for us here. That's fine as far as we're concerned."

There is a less glamorous side of the Government Service Department but one that is in every sense as vital as foreign service. A large staff, under Mr. Reed's direction, devotes itself to the preparation of technical manuals, equipment diagrams and digests of new information for government use. This material flows into the armed services in a steady stream. It keeps technicians in step with industrial electronic activities.

Then, too, there is the domestic service, larger in scope than the foreign. The home staffers work at air bases, Signal Corps installations, Naval electronic centers. They also give technical instruction, and they also work with highly classified experimental equipment. A typical example is the Air Force Missile Test Center at Cocoa, Fla., where one of Mr. Reed's groups has just tackled the job of maintaining and analyzing electronic guidance apparatus for the latest in Air Force missiles.

To maintain organizational unity, Mr. Reed twice a year brings in his top foreign technicians—his field managers as he calls them—for a meeting at Camden and Gloucester. Many of them come half-way around the world as casually as a Kiwanian would go from New York to Philadelphia for a Golden Rule session.

Like Mr. Reed, they are wedded to the idea that theirs is a world-wide business, and that time and distance are minor obstacles to accomplishment in this electronic age.

Tank obstacles in central Germany form a background for Mr. Reed and Ed Johnston, former RCA Service Company supervisor for the U. S. Armed Forces in Europe and now at the U. S. Air Force Airways and Air Communications Service in Washington.

The Maestro Retires

A small, white-haired man walked slowly off the stage in Carnegie Hall, New York, last April 4, his head bowed. It was Arturo Toscanini leaving for the last time after his farewell appearance with the NBC Symphony Orchestra.

Toscanini at 87 had decided to retire. He revealed the decision in a letter written to Brig. General David Sarnoff, Chairman of the Board of RCA, the man who founded the NBC Symphony 17 years ago as an instrument for the incomparable talents of the veteran conductor. At the end of the final concert, neither the orchestra itself nor the cheering audience in the hall knew that this was Toscanini's farewell — which was the way he wanted it. He left as he had always worked, simply and modestly.

The first Toscanini concert with the NBC Symphony took place on Christmas night, 1937. Except for one year when he was on leave (1941-42) and conducted only five Treasury concerts for Bond sales, he was regular conductor of the orchestra up to the end of the season just completed. His broadcast concerts with this group, according to music critics, were among the most exciting musical events in America.

During World War II, Toscanini directed the orchestra in many other War Bond concerts, raising large sums of money. He also conducted for the Red Cross. And although he had refused a quarter-million dollar offer to make a single film for Hollywood, he worked free for the United States government in making the film "Hymn of Nations" in 1944.

In 1950, at the age of 83, he took the NBC Symphony on a coast-to-coast tour of the United States, covering 20 cities in personal appearances before thousands who previously had enjoyed his music only over the air or through recordings.

33 Years of Recordings

Even in retirement from his 17-year association with NBC, Toscanini has left a rich musical heritage in the form of symphonic and operatic recordings made over the past 33 years — and others, already recorded by RCA Victor but not yet processed for distribution, are yet to come.

His recordings of the Beethoven Ninth Symphony, "Missa Solemnis" and "The Pines of Rome" and "The Fountains of Rome" were RCA Victors' sales leaders among all albums during February. The Beethoven Ninth, which has sold more than 140,000 albums since its 1952 release, has been the company's leading Red Seal album for the past two years.

Arturo Toscanini

Best-Selling Compositions

The variety of Toscanini's musical interests and appeal is illustrated by his best-selling recordings since 1921 — besides the compositions of Beethoven and Brahms, they have included the "Skaters' Waltz" and the "Grand Canyon Suite." The most popular of the Toscanini recordings was his collaboration with Vladimir Horowitz on the Tchaikovsky First Piano Concerto, of which 350,000 albums have been bought up to the present time.

His recorded versions of the operas "La Boheme," "La Traviata" and "Otello" have been hailed as definitive by the leading music critics, and the repertoire of opera is to be increased by the "Falstaff" and "Masked Ball" albums which RCA Victor hopes to release this fall.

An RCA research teom ot Rocky Point, L. I., uses this system to photograph the face of the sun. Sun's rays (1) strike clock-driven mirror which reflects them (2) directly at stationary mirror. The image then is directed (3) at six-inch telescope lens, which passes it in magnified form (4) along 40-foot pipe to camera plote holder in structure at rear.

They Explore the Face of the Sun

CONTEMPLATION of the sun, a pursuit of curious men since history began, is the task at RCA's Rocky Point, L. I., laboratories, of a physicist and two engineers who are confident that their venture into astronomy is harvesting down-to-earth knowledge of how radio waves behave.

With a simple telescope, the working elements of which are at the ends of a 40-foot section of glazed tile pipe, the Rocky Point solar research team has been taking a remarkable series of photographs which enable them to look at details of the sun's surface that have never been studied before.

Dr. William A. Miller, who has developed a deep aversion to clouds in the three years he has headed this unique sun-watching program, is convinced that the Rocky Point telescope, and the techniques that the tanned trio have mastered in using it, are already complementing the work of the world's great solar observatories.

At the same time, he is optimistic that their research can lead to more precise and simpler methods of predicting the solar-caused disturbances that play such havoc with long-distance radio communications.

Dr. William A. Miller examines clock-driven mirror with which the sun is tracked for the improvised telescope.

A Century-Long Quest

Over the past hundred years, astronomers, physicists, chemists and radio engineers have devised a number of ingenious ways of figuring out what is happening on the sun.

These scientists, for example, can split a sunbeam in a spectroscope's prism and learn of the sun's chemistry

Or they can apply theories of atomic and nuclear physics to mysteries of the solar furnace, an approach that has explained much in recent years. By charting the relationships between changes seen on the sun, such as sunspots, and unusual behavior of radio signals, other clues have been made available.

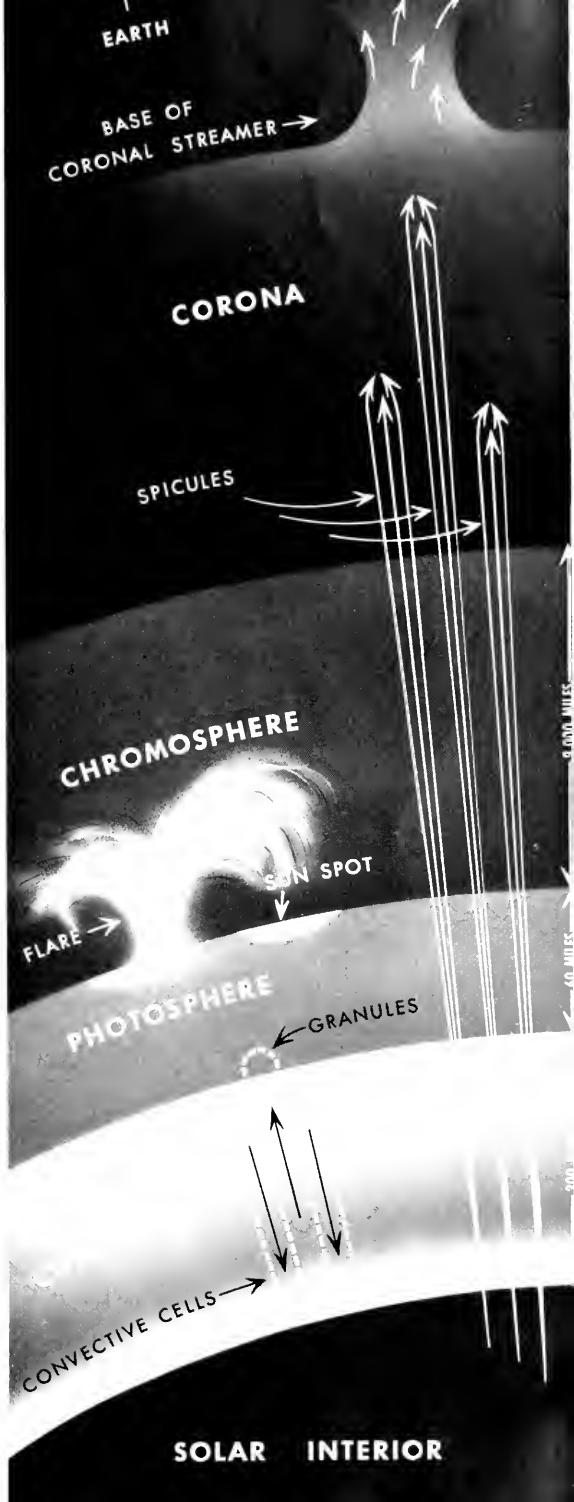
Among the most fruitful investigations have been those in which the sun's rim is photographed during an eclipse, producing spectacular and informative pictures of violent solar activity. With optically simulated eclipses (coronagraphs), astronomers have taken many more silhouettes of the sun's outer atmosphere.

A neglected approach, however, is examination of the sun "full-face," instead of in profile, and photographing sections of its surface in great detail. It is to this technique that the Rocky Point group is devoting so much of its effort.

"Head-on" examination of the sun's surface, though not new, is a method virtually dormant for seventy years. In the 1870's the famous French astronomer, Pierre Jules Cesar Janssen, took such pictures and was able to show, for the first time, the granular, cooked-cereal texture of the solar surface. Janssen's classic photographs have appeared in standard texts over the years as the best of their kind. But they were, in many ways, ahead of their time and raised as many astronomical questions as they answered.

Smooth Air Aids Observation

Speculating on the hiatus of detailed "full-face" solar photography since Janssen's time, Dr. Miller points out that most modern solar observatories have been perched at higher and higher altitudes to take advantage of the increased transparency of the earth's atmosphere. Though these mountaintop sites give many occasions of good viewing of the sun's outer atmosphere — the corona and chromosphere — they are usually the worst possible locations for seeing the solar disc in great detail. The sun heats the air around the mountain, violent updrafts form and the sun's image dances in an optical instrument.



In profile at various levels of the sun's atmosphere are some of the phenomena the Rocky Point group are observing in full-face studies of the solar disc (see photo on page 22). The photosphere is the layer visible to the eye; outer zones are more rarified. Both the eruptive flare and jet-like spicules are believed to be near the start of different chains of events that often disrupt long-distance radio communications on earth. Also under scrutiny are granules, which give sun's face a cooked-cereal texture in photographs.

Rocky Point, on the other hand, turns out to be one of the world's best spots for what Dr. Miller terms "optical tranquility." The flat terrain of Long Island usually allows a smooth flow of air, carried by the prevailing southerly winds, across the Rocky Point area and into Connecticut before turbulence and thunderstorms develop. Contrary to expectations, the frequent Long Island haze does not normally interfere with their solar photographs and is viewed by the Rocky Point group as a good omen indicating the atmosphere above them is quiet.

Getting their best results in the late spring, summer and early fall, the team has had over the past two years an average of 75 days when they made pictures whose detail was limited only by the resolving power of their 6-inch telescopic lens. (Janssen, it is interesting to note took only 25 to 30 comparable shots in a decade.) Twice as many additional days a year are suitable for taking valuable, if not perfect, pictures of the sun.

"Give us just two minutes' break in the clouds, and we'll get a shot," says Dr. Miller.

May Aid Radio Prediction

As their pictures pile up, the team sees emerge a definite pattern of details that may well form the basis of a valuable radio prediction service.

Radio engineers have realized for some time that long-range high-frequency communication is feasible because of layers of ionized gas lying in thick spherical shells around the earth's surface. The layers of the ionosphere (a zone lying 50 to 300 miles above us) act as mirrors reflecting radio waves back to the earth's surface.

If these layers were fixed in altitude and constant in their electrical reflecting properties, there would be no problem. But this is hardly the case. To circumvent the vagaries of the ionosphere, radio stations must constantly change frequencies or reroute circuits.

Fortunately, some of the variations in the ionosphere can be anticipated. Seasonal changes and nocturnal changes, for example, have been well charted simply by observing actual radio circuits year after year. But most of the changes are more elusive. Some appear to be completely random. Others may recur more or less regularly, but with unpredictable intensity. Dr. Miller's group is particularly anxious to pin down the latter disruptions because they cause the most distress.

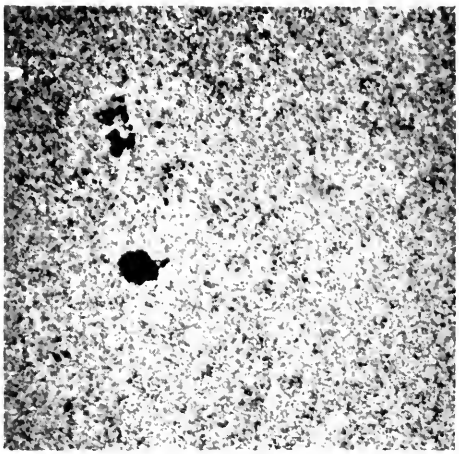
How the Sun Affects Ionosphere

As Dr. Miller explains it, there are two ways in which the sun can influence the ionosphere. First, by direct electromagnetic radiation — X-rays or ultraviolet rays — which travels at the speed of light from the sun to the ionosphere in 8 minutes. Such bursts of radiation from the sun appear to be the cause of sudden and often complete radio fadeouts called Dellinger fades. Fortunately, these last for only 20 or 30 minutes and never more than two or three hours.

The second way the sun is believed to alter the ionosphere is by sending out actual streams of ionized particles. Such solar bombardments travel more slowly than radiation, taking perhaps two or three days to make the 93 million-mile journey. They are considered a likely cause of the so-called great magnetic storms. These rare but violent disturbances, which may not be felt for years at a time, can knock out radio communications for days and can so disrupt the earth's magnetic field as to cripple wire and cable communications as well.

That both radiation and beams of particles can be agents of ionospheric caprices is evidenced by the fact that radiation as felt in a Dellinger fade is disruptive only on the sunny half of the earth. A great magnetic storm, on the other hand, will be felt simultaneously on the light and dark hemispheres, suggesting that the earth is passing through a great shower of particles which have been rapidly dispersed throughout the ionosphere by the earth's magnetic field.

Astronomers are fairly well agreed that both these types of disturbance spring from the same phenomenon — solar flares. These sudden, short-lived brightenings of small regions of the sun's surface are usually seen in the neighborhood of sunspots. Flares are often noticed at



Minute section of the sun's face, showing granular texture of the solar surface. Large black areas are sunspots: the tiny black dots are believed to be "spicules" — jets of heated material rising from interior of the sun.

the time of a Dellinger fade and they appear to project enough radiation to account for this phenomenon on the earth.

When great magnetic storms occur they follow by two or three days a Dellinger fade, which would suggest that they are the result of a properly directed beam of particles spewed out by the same flare that produced radiation for the Dellinger fade. In addition, both of these ionospheric upsets are more frequent during the peak years of the 23-year sunspot cycle, which is also the time of the greatest number of observed flares.

Another Cause Is Sought

It would simplify the propagation expert's life if the solar flare could be named the villain of all radio communication breakdown, not just the Dellinger fades and great magnetic storms. Unhappily, the flare, according to most theories, can be assigned only a relatively minor role. Flares are short-lived and erratic, while the ionospheric disturbances that yet elude full explanation — the somewhat regular ones known as M-region disturbances — appear to be caused by something that lives for many months on the sun, reappearing several times in rough synchronization with the sun's 27-day rotational period.

Gaining support from experts is the hypothesis that the sun's outer atmosphere, the corona, has at all times a number of invisible long arms that sweep out millions of miles into space. Some of these coronal streamers would be aimed, as it were, to intercept the earth in its orbit. Unlike the flare-caused beams of particles, coronal streamers would be semi-permanent projections of the corona, lasting for several cycles of the sun's 27-day rotational period. The Rocky Point trio is working with other solar observers to check the validity of this theory.

A goal of Dr. Miller's current studies is to establish beyond a doubt what it is on the sun's surface that can build up the corona to such an extent that a streamer will be cast out into space. The Rocky Point photographs are, as he puts it, "not in disagreement with modern theories of the corona and the formation of streamers."

The detailed "full-face" photographs do not reveal the whispy streamers themselves but they do show a generous sprinkling of black dots which have never been "isolated" before. These dots, Dr. Miller explains, are probably a bird's-eye view of solar spicules, a short-lived but common activity of the sun first discovered, on the sun's rim, only 14 years ago. They may well be long narrow jets of heated material from the interior of the sun that pop right through the sun's surface, spewing new matter up into the corona.

The research team lines up sun's image on screen before exposing film in the comera plate halder. Left to right are A. B. Moulton, Ralph E. Franklin, and Dr. Miller.

How Streamers May Be Born

Normally, the theory goes, spicules reinforce the corona at a steady rate. But when an above-average number of spicules are clustered in a particular region on the sun, and if, at the same time, there are "favorable" distortions of the sun's magnetic field in that area, the corona bulges and a streamer is born.

That the spicules seen as dots in the Rocky Point photographs are the same things seen as long thin spikes in coronagraphs, has been the subject of considerable checking at Rocky Point. Dr. Miller is now optimistic that this correlation can soon be established: the black dots have roughly the same lifetime (3-4 minutes), the same size (5-6000 miles in diameter, miniscule by solar standards) and the same population density as the spicules seen by others in profile photographs.

Riding herd on spicules along with Dr. Miller are A. B. Moulton and Ralph E. Franklin. Both have been engaged in communications and research engineering with RCA for nearly thirty-five years, and both boast years of experience as backyard astronomers.

To help in analysis and interpretation of their pictures, the Rocky Point trio are receiving the assistance of Dr. Walter Orr Roberts, Dr. Joseph N. Rush, and other solar experts of the High Altitude Observatory of Harvard and Colorado Universities, at Climax, Colorado, under a contract with RCA Laboratories. The superlative coronagraphic results obtained at Climax are available for continuing comparison with the "full-face" observations of Rocky Point.

One of the two trucks of NBC's Color Mobile Unit in New York before storting its tour.

NBC Takes to the Road with Color TV

Color television's first studio on wheels—the two-truck Color Mobile Unit of the National Broadcasting Company—focussed its cameras on the famed Busch estate in St. Louis on June 9, beginning a 10-city tour that will take it through the midwestern and eastern United States for a series of outdoor color features for the NBC network.

By the end of June, the NBC color cameras had televised scenes from Milwaukee's Whitnall Park, the color and activity of life on a modern farm near Chicago, and the Ohio Governor's mansion at Columbus. Ahead on the schedule were visits to Cleveland, Washington, Baltimore, Philadelphia, Boston and New York, with a colorful aspect of local life planned for presentation from each city.

The features picked up by the mobile unit are being presented on the "Home" and "Today" shows over the NBC network. In every city where either or both programs are seen, local NBC stations and RCA dealers, as well as one or more leading department stores, have been equipped with RCA color TV sets on which the public is able to view the live pick-ups from the field in their natural color. Thanks to the compatibility of RCA color television, the colorcasts from the mobile unit will be seen in black-and-white on monochrome TV sets.

The Color Mobile Unit, consisting of two trucks of 20 tons capacity each, is the only one of its kind in existence. Designed by NBC engineers under the supervision of O. B. Hanson, former NBC Vice-President and Chief Engineer, recently elected Vice-President, Operations Engineering, RCA, the unit made its network debut last January 1 when it covered the Tournament of Roses parade in Pasadena, California.

NBC Color "Spectaculars"

With the unit on the road for its series of outdoor features, NBC continued preparation for an ambitious schedule of precedent-shattering color "spectaculars" beginning in early autumn. Three distinct series of spectaculars have been planned, each consisting of thirteen 90-minute shows designed to range across the colorful panorama of show business, with participation by the most celebrated stars and directors in existing and original musical comedies, operettas, contemporary and classical drama, circuses, aquacades and ice shows.

Two of the series will be produced by Max Liebman,

producer of "Your Show of Shows," while the third is to be produced by Leland Hayward. Each series will be presented at the rate of one show a month—the Liebman productions scheduled for 10:30 to midnight on Saturdays and 7:30 to 9 p.m. on Sundays, and the Hayward productions from 8 to 9:30 p.m. on Mondays. The first will go on the air from 7:30 to 9 p.m. on Sunday, September 12, featuring film star Betty Hutton in a special musical comedy written for her. This program also will inaugurate color TV broadcasting from the huge new NBC television studio in Brooklyn, N. Y.

New Color Equipment

The step-up in color broadcasting activity is being accompanied by other RCA advances in color equipment engineering and servicing, and in receiver manufacture.

Joseph B. Elliott, Executive Vice-President, Consumer Products, RCA, disclosed on June 10 that RCA Victor color television receivers to be introduced in the fall will employ the new and very latest RCA shadow mask 19-inch tube, using the full area of the tube face and providing larger and brighter color pictures of approximately 205 square inches.

"The new tri-color tube will incorporate a recently developed 3-gun assembly, shorter and with higher efficiency, producing outstanding brilliance and picture quality with increased stability," he said. "The new tube does not require any change whatsoever in the circuitry of the color receiver."

In the field of color equipment, a new "3-V" camera developed by the RCA Engineering Products Division for telecasting color motion pictures made its debut on June 25, when NBC broadcast 35-mm film in color publicly for the first time in television history. Previously only 16-mm film had been shown publicly in color television, and the new development was hailed by the press as a major forward stride in color TV and a vast improvement over all earlier color film presentations.

The new camera employs three RCA Vidicon pickup tubes and a light-splitting optical system comprising two dichroic mirrors placed at angles in front of the projector. The first of the mirrors reflects the blue portions of the projected image to one of the Vidicons, permitting the red and green portions to pass through to the second mirror. The second mirror reflects the red portions to the second Vidicon and allows the green portions to pass through to the third Vidicon. Each of the Vidicon units generates a signal for broadcast representing its own color portion of the original image.

The development of new equipment to speed installation and maintenance of color receivers was announced by E. C. Cahill, President of the RCA Service Company. The equipment features a "color stripe generator" de-

The versatility of color television was demonstrated by NBC during the spring with a colorcast from the Metropolitan Museum of Art.

signed by the Service Company to transmit a video signal that will enable a service technician to determine whether a color TV set installed in a home is actually receiving color signals.

Mr. Cahill said that the system, costing about $500, can be installed easily by TV broadcasting stations already equipped to carry network color programs, and in other stations when they modify equipment to handle color. The test signal transmitted by the equipment consists of a narrow vertical yellow-green bar visible at the edge of the viewing screen on color sets, but practically invisible on the screen of a black-and-white set.

Arias Sung and Acted

Opera lovers long accustomed to listening to words they don't understand can now break through the language barrier by means of RCA Victor's new series of records titled "Arias Sung and Acted."

The unusual twin packaging of the spoken word and song, conceived by George R. Marek, Director of Artists and Repertoire, RCA Victor Record Division, has resulted in a new album of famous arias acted in English by players of the legitimate stage and then sung in their original language by famous stars of the Metropolitan Opera.

The acting and singing versions of the arias are portrayed in the new album by Judith Anderson and Risë Stevens, who are cast as "Carmen," Dennis King and Leonard Warren as "Rigoletto" and "Tonio;" Deborah Kerr and Licia Albanese portraying Mimi from "La Boheme" and Violetta from "La Traviata;" Dennis King and Robert Merrill as the Germont père of "La Traviata," and Geraldine Brooks and Joseph Cotton with Zinka Milanov and Jussi Bjoerling as "Aida" and "Radamès."

New Daylight Viewing Screen for Radar Can Hold an Image for Minutes

A RADAR viewing screen capable of retaining for several minutes a picture so bright that it can be clearly seen even in brilliant sunlight may result from a new electron picture tube developed by a research team at the David Sarnoff Research Center of RCA at Princeton, N. J.

The tube has been designed as a simple electronic tool for the direct daylight viewing of radar in an airplane cockpit or on the bridge of a ship. Today, airborne or marine radar screens are hooded to prevent daylight from obscuring the relatively dim images that appear, and even under a hood that cuts out all daylight the viewer may have to wait for 2 or 3 minutes before his eyes adapt themselves to the low light level of the radar image.

Fine details of test pattern on the new picture tube are examined by H. O. Hook, of the development team.

A distant cousin of the television kinescope, the new tube was developed by RCA scientists under a United States Army Signal Corps contract. The development team included Dr. Max Knoll, H. O. Hook and Dr. R. P. Stone, all of the Princeton laboratories staff.

Far Brighter than Standard TV Picture

The tube is able to present pictures five to ten times brighter than those on a standard television kinescope, or picture tube, and to retain a half-tone image on the screen for some 30 seconds without any deterioration, or up to several minutes in useable form. In radar scanning reproduction, the viewing duration needs only to be about ten seconds before a new picture is to be displayed.

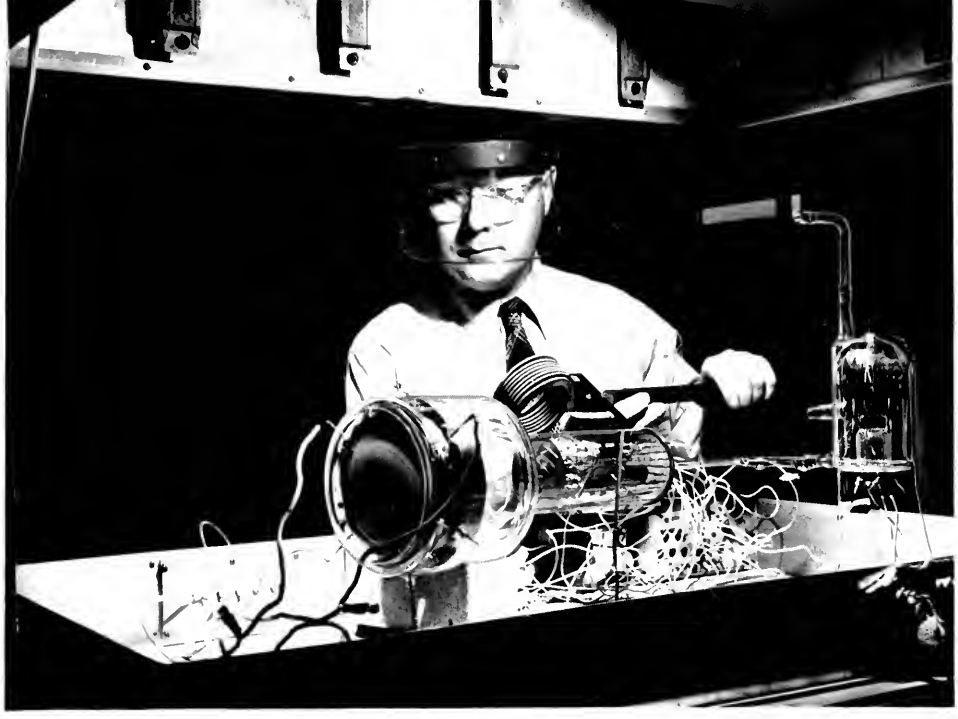
In other applications where half-tone reproductions are not required, such as the display on an airplane instrument panel of continuous visual instructions from a ground station, a single black-and-white image can be held on the tube for an hour or longer. The RCA research team said these characteristics of the tube point to possible use in airborne facsimile systems, oscilloscopes, and wherever a bright electronic picture of transient data needs to be held over extended periods for viewing or photographing.

In appearance and operation, the developmental tube is a small approximation of the standard television picture tube. Like the latter type, it uses controlled streams of electrons to paint a picture on a phosphor-coated screen on the face of the tube. However, to present exceedingly bright pictures and to retain them on the tube face for minutes or longer, a number of different techniques were developed.

Three Electron Guns

In the neck of the tube are three electron guns, each producing an independent stream of electrons directed toward the tube face. One of these, similar to the electron gun in a standard kinescope, "writes in" the picture. The second gun floods the viewing area with a continuous shower of electrons, producing the picture seen on the phosphor screen. The third "erases" the retained picture when it has served its purpose.

In a standard television picture tube, the writing beam directly scans the phosphors on the viewing screen,



Dr. R. P. Stone, another of the development team, puts final touches on the new tube before testing.

making them glow in a pattern that creates the picture. In the new storage tube, however, the writing beam does not produce the picture directly — it scans a special storage grid mounted about one-tenth of an inch behind the phosphor-coated screen. The grid is a fine-mesh screen (160,000 openings per square inch) supporting a thin insulating film. As the writing beam scans the insulating film, it builds up local electrical charges whose intensity varies with the pattern of the picture signal.

As the picture is thus built up on the grid, the continuous shower of electrons from the second gun passes through the charged openings of the grid, acquiring as it passes the pattern built up at these openings by the writing beam. The shower, or "flooding beam", then strikes the phosphor coating of the viewing screen, creating the picture for the observer.

The Erasing Beam

Because the flooding beam continues to pass through the charges built up on the grid, the picture remains for some time on the screen. The erasing beam, controlled either by the viewer or automatically by associated circuits, may be brought into play at any time to clear the tube face for a new picture. It does this by altering the charges on the storage grid in such a way that the flooding beam is blocked at all points, preventing the shower of electrons from striking the phosphors of the tube face.

A non-electronic analogy to the process can be found in coating a window screen with heavy paint and holding it above a table in the sunlight. If a pattern is traced on the screen with turpentine, clearing paint from some of the holes, sunlight may pass through and create an image of the pattern on the table surface. Repainting the screen will cause the image to disappear. In this analogy, the table represents the phosphor-coated viewing screen, the window screen represents the storage grid, the action of the turpentine compares to the action of the writing beam, the sunlight to the flooding beam, and the repainting to the erasing process.

In its present form for radar application, the tube has a viewing screen 4 inches in diameter, capable of presenting an image of hundreds of foot lamberts of brightness in its high-lighted portions. To produce this brightness, the tube requires considerably less anode voltage than does the standard television picture tube, largely because of the tube's ability to light every spot on the viewing screen continuously with the flooding beam rather than intermittently, as is the case in the TV kinescope.

Dr. Elmer W. Engstrom

Ewen C. Anderson

Dr. Irving Wolff

Dr. D. H. Ewing

O. B. Hanson

Five Executive Promotions Announced by RCA

Promotion of five executives to new positions of responsibility was announced last month by Brig. General David Sarnoff, Chairman of the Board of RCA — four of them named at a meeting of the Board of Directors on June 4.

Dr. Elmer W. Engstrom, Executive Vice-President, RCA Laboratories, was elected Executive Vice-President, Research and Engineering, continuing at the same time as head of RCA Laboratories. In his new position, Dr. Engstrom has been given broad responsibility for all research and engineering activities of RCA.

Ewen C. Anderson, Vice-President, Commercial Department of RCA, was elected Executive Vice-President, Commercial Department, with responsibility for all patent license matters for RCA. Both Dr. Engstrom and Mr. Anderson will have their headquarters in the RCA Executive Offices in Radio City, New York.

Dr. Irving Wolff, previously Director of Research, was appointed Vice-President, Research, RCA Laboratories, Princeton, N. J. Dr. D. H. Ewing, who had been director of the RCA Physical and Chemical Research Laboratory, was appointed Administrative Director, RCA Laboratories.

O. B. Hanson, previously Vice-President and Chief Engineer of the National Broadcasting Company, was elected to the RCA staff as Vice-President, Operations Engineering. In his new position, he has been given responsibility for engineering matters pertaining to broadcast and communications operations and for directing the activities of the RCA Frequency Bureau.

The promotions of Drs. Engstrom, Wolff and Ewing and Mr. Hanson were designed to coordinate the research and engineering activities of the RCA organization as part of an over-all plan adopted earlier this year to meet the needs of the Corporation's steadily expanding business.

RCA Stockholders listen to the Chairman's Report at the Annual Meeting on May 4.

New First-Quarter Sales Record is Set by RCA

BUSINESS volume of the Radio Corporation of America for the first three months of 1954 was the largest of any first quarter period in the history of the Corporation, Brig. General David Sarnoff, Chairman of the Board of RCA, announced on May 4 at the 35th Annual Meeting of RCA Stockholders in a studio of the National Broadcasting Company in Radio City, New York.

"Our present inventories are well balanced with current sales and we foresee a good volume of business for the year 1954 as a whole," declared General Sarnoff. "We believe that color television will speed the day when the volume of RCA business will reach and exceed a billion dollars a year.

"The youngest child in the electronics industry—color television—offers the greatest stimulus for progress and the surest promise for prosperity. In our new, rapidly developing and fast changing art and industry, it is only natural to find growing pains and constant need for appraisal and adjustment. However, these symptoms of youth respond to intelligent treatment with much greater promise for a healthy future than do the ailments of old age.

"We look forward to the future of this promising industry and the maintenance of RCA's recognized position of leadership with complete confidence."

Sales For First Quarter

General Sarnoff said first-quarter sales of RCA products and services amounted to $226,609,000, an increase of 9 per cent over the first quarter of 1953. Profits, before Federal taxes, amounted to $20,470,000. After providing $10,404,000 for these taxes, the net profit for the quarter amounted to $10,066,000. This is an increase of 8 per cent over the profits earned in the first quarter of last year.

After Preferred dividends, the Common stock earned 66 cents a share compared with 61 cents a share in the first quarter of 1953.

Significant Developments In Television

Significant developments in black-and-white and color television were listed by General Sarnoff as follows:

Television continues to expand as a medium of entertainment, news and education. As a new service in commerce and industry, it has become a major factor in the Nation's business. In RCA, television accounted for 50 per cent of the total volume of business over the past seven years and it reached 54 per cent in 1953.

RCA's steadfast faith and confidence in the ultimate triumph of the compatible color television system which it advocated was completely vindicated when the Federal Communications Commission in December, 1953, approved compatible signal standards for commercial operation of color television.

RCA, intensifying efforts to bring this great advance to the American people, has helped and encouraged others in the industry to do likewise. Progress continues in development of the RCA tricolor tube, and RCA expects to improve its performance, increase the picture size and reduce the cost. Since February, tricolor tubes

have been produced at the rate of 2,000 a month. RCA has made and delivered four thousand 15-inch color television sets.

By the end of this year, NBC will be colorcasting two programs a week from New York and a third from Burbank, California. In addition, NBC is planning a series of especially produced 90-minute shows, "Spectaculars in Color," to begin in September. NBC expects to have 60 stations on its network equipped to transmit color programs by the end of 1954, covering 60 per cent of all homes in the United States.

During this year and next, RCA believes the demand for color sets will exceed the supply. According to these estimates the industry should be able to sell about 50,000 sets in 1954, several hundred thousand in 1955, and a progressively increasing number each year thereafter, adding up to a total of approximately 10 million color sets in use five years from now.

Government Orders

RCA sales and services to the Government were reported at $55 million in the first quarter of 1954. This was approximately 24 per cent of RCA's total volume of business for the quarter. Shipments to the Government for the full year of 1954 are expected to be substantially more than last year.

RCA international business continues to increase in volume and profits, said General Sarnoff, adding:

"The results for the first quarter of 1954 exceeded those of the first quarter of last year and the outlook is bright for continued improvement. Overseas, RCA products and engineering are helping to strengthen the security and economy of nations friendly to the United States.

"We continue to be the leader in supplying television equipment in the world markets. For example, in Latin America RCA has supplied 60 per cent of all the TV broadcasting stations now in commercial operations."

Home Appliances

RCA's recent entry into the manufacture and sale of home appliances, by adding air conditioners and home ranges to the line, has proved to be a sound financial move for the Corporation as well as for distributors and dealers, General Sarnoff reported. He said that this business was profitable in 1953, and that for the first quarter of 1954 RCA sales of these home appliances were 75 per cent greater than for the first quarter last year.

In discussing research and invention, General Sarnoff said:

"Since its earliest days in 1919, the Radio Corporation of America has followed a continuing policy of carrying on scientific research and development. The inventions and improvements resulting from this work have been made available to competitors and to industry in general. This is done on a uniform basis through patent licenses that are liberal in scope and at very low royalty rates compared with the value of these inventions. The royalty rates are less than one per cent of the usual retail price.

"RCA has previously granted to others several hundred patent licenses and the majority of them run to the end of 1954. By mutual agreement, these licenses can be extended for a further period of years. A substantial number of these license agreements have been signed and extended for a period of five years beyond 1954. In view of the great value to our licensees of their right to use the inventions covered by these licenses, we feel confident that by the end of this year substantially all of the remainder will also extend their agreements."

There are few, if any, industries in America as highly competitive as the radio-television industry, General Sarnoff declared.

"Three thousand radio broadcasting stations now are on the air, and by mid-year 400 television stations will be in operation," he said.

"In many of the principal cities of our country already there are more radio and television stations than newspapers. For example, New York City has twenty-eight radio stations, seven television stations and only nine English-language daily newspapers. Chicago has twenty-six radio stations, six television stations and only four daily newspapers. Los Angeles has twenty-one radio stations, eight television stations and only five daily newspapers. Even in Washington, D. C.—the Capital of our Nation—there are only three daily newspapers, while there are sixteen radio stations and four television stations.

"The number of manufacturing companies in our industry is also most impressive. Manufacturers of radio sets, 110; television sets, 75; electron tubes, 60; phonograph records, 200.

"There are about 2,000 wholesale distributors; 100,000 retail dealers, and 20,000 service shops handling these products.

"In this young and vigorously competitive industry approximately one million people are now employed.

"Here is an outstanding example of how the American system of free enterprise provides opportunity for small as well as big business to prosper and to grow. In this, as in other industries, the organizations most likely to succeed are those which have efficient management, maintain good relations with their employees, operate on a sound financial basis, manufacture good quality products at the lowest cost, sell them at reasonable prices, and render the best service to the public."

Open House at Princeton

The staff of RCA Laboratories was host to some 4,000 friends and neighbors at an open house at the David Sarnoff Research Center in Princeton, N. J., on the evenings of May 5-7. These pictures present a glimpse of some of the fifty different activities examined by the visitors.

Dr. E. G. Linder explains transistor oscillator producing tone from light falling on silicon junction of type used in RCA Atomic Battery.

John E. McCool, supervisor of glass room, demonstrates his art to an interested visitor.

Young guest peers through microscope at an experimental RCA transistor.

Robert Anderson shows device used to chart path of electrons in a tube.

Stanley Forgue explains cloud chamber for observing radioactive particle tracks.

The magnetic memory is explained by its developer, Dr. J. A. Rajchman.

Souvenir ashtrays were made for the guests by William E. Carpenter.

RCA news in brief

Happy Birthday

An RCA broadcast tube recently celebrated its fourteenth birthday with a normal day's work at radio station KPOJ in Portland, Oregon. The venerable tube, of the type known as a forced-air-cooled triode, was installed in KPOJ's modulator circuit in March, 1940, and is showing no signs of its advanced age, according to the station's chief engineer. Experts of the RCA Tube Division believe this is the longest life recorded yet for a large power tube, with more than 91,000 operating hours—the equivalent of 25 months of continuous operation.

Electronic Allergy

A phototube described by its makers as "allergic" to spots before its "eyes" has been added to its commercial line by the RCA Tube Division for a wide range of industrial applications, including production-line inspection of soft drinks, medical solutions and similar translucent liquids. The tube, previously produced only on a custom-order basis, reacts only to pulses of light caused by particles in motion, so the bottled liquids to be inspected are rotated swiftly and suddenly stopped, causing the contents to swirl around in the bottle as they pass before the electronic "eye." Transparent bits of foreign matter that may have been bottled inadvertently cause the phototube to react sufficiently to trigger an electronic reject system.

High Eye

The television camera has now been moved up to the ceiling to cover NBC's "Home" show from the end of a telescoping arm. Operated by remote control, the camera can be moved easily and quickly to any point on the circular set—the most elaborate and advanced yet constructed for a television program. The camera itself is mounted at the end of its boom by means of a so-called "cradle and yoke," converted from the device that holds the gun turrets of a B-29 bomber. The arrangement was conceived and its construction supervised by Sol Cornberg, NBC's supervisor of plant facilities and development, who also designed the "Home" set itself.

It Still Marches On

The March of Time Film Library, considered by the trade to be the outstanding source of news and special events films unduplicated anywhere else, was taken over on May 1 for sales and distribution by the NBC Film Division in the largest transaction for film footage in television history. The transaction swelled to over 30 million feet the amount of footage contained in the NBC Film Library, which already ranked as the world's largest collection of stock footage shot exclusively for TV. Addition of the March of Time film extends the historical range of the film library's inventory back to 1934.

More Juice

The swing toward 12-volt automobile batteries has encouraged RCA engineers to work up new two-way mobile radio equipment that can be converted easily to operate on either the larger battery or the 6-volt variety. The new RCA "Fleetfone" units, shown for the first time recently at the Dallas convention and show of the Petroleum Industry Electrical Association and the Petroleum Electrical Supply Association, can be ordered for either voltage and for use in adjacent channels with either 20 or 40 kilocycle separation. Whichever is specified, the equipment can be readily converted at any time these requirements change.

Awards Department

Honors descending upon the National Broadcasting Company during the second quarter of the year included top honors in the George Foster Peabody Awards competition for 1953, and plaques and citations from "Variety" for a number of NBC programs, divisions and affiliates. The Peabody awards went to the NBC Television Opera Theatre in the television music category; to the "Television Playhouse" and its producer, Fred Coe, as top television entertainment; to Imogene Coca, star of "Show of Shows," in entertainment, and to "Mr. Wizard" in the category of television programs for children and youth. Among the "Variety" awards were a special citation to the NBC Television Opera Theater and a "Variety" TV Film Award to the NBC Film Division for "sparking a drive that pumped life into the floundering economics of the TV-film industry."

3,000 islands . . . welded together by radio

How 100 million people on 3,000 islands form a unified nation . . . with the aid of a vast radio network

INDONESIA, one of the newest and largest nations of the modern world, is a strong union of original art forms and tremendous natural resources; of ancient cultures and alert progressive world responsibility. Its nearly 100 million people live on a vast chain of 3,000 islands spanning 3,000 miles across the subtropics.

Early in the new nation's existence it became evident that such a far-flung structure required a communications setup of unique scope and flexibility.

Government and military leaders acted quickly . . . and soon a highly mobile fleet of RCA radio-equipped vehicles began operation. The isolated land areas acquired ears and voices. The Indonesian armed forces equipped vehicles, planes and boats with radio for personnel training and national security.

Not long afterwards a centralized radio broadcast network began a long-range program of education and enlightenment for all the people. Progress has been so rapid that today there is no spot in the huge republic beyond the reach of this alert and intelligent voice.

Through the development and installation phases of the huge project RCA field engineers worked with Indonesian authorities . . . teamwork which is now bearing fruit in the highly successful operation of the entire communications system.

RCA products and services are available in all world markets open to trade, through RCA distributors and associated companies. The new book "Communications, Key to Progress" tells the inspiring story of radio at work in many countries. Simply write to RCA International Division, 30 Rockefeller Plaza, New York, U.S.A. "Marcas Registradas"

RCA INTERNATIONAL DIVISION
RADIO CORPORATION of AMERICA
RCA BUILDING
30 ROCKEFELLER PLAZA, NEW YORK, N.Y., U.S.A.

World leader in radio, first in recorded music, first in television

Celebrating the 5th birthday of "45 Victrolas" and records.

Crowning achievement of the "45" system is the *Extended Play Record* which brings you great music for 40% less than you used to pay

Just 5 years ago RCA Victor introduced the "45" RPM system and gave you a reward of new listening pleasure.

With the touch of a button you could sit back and enjoy nearly two hours of your favorite music. There were no changes to make . . . no bulky albums to tote and store . . . and you were rewarded with music that was richer, truer—with all the brilliance of "live" performance.

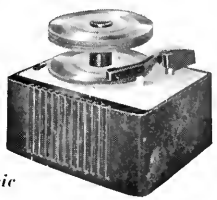
Moreover, the "45" became the *only* system that played every kind of recorded music—and played them all automatically, selectively.

Today, with the new RCA Victor 45 Extended Play records, you have all these advances—plus one happy financial return: *more music for less money.*

These extraordinary little records bring you the same amount of great music as two 12" old-style records, yet cost little more than half as much.

RCA's continuing program of research in other fields of home entertainment—radio, television, tape-recording, and high fidelity, brings happy returns for millions of Americans.

RCA pioneered and developed compatible color television



Radio Corporation of America

World leader in radio—first in television—first in recorded music

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

OCTOBER 1954

Another *of the international communications projects successfully engineered by RCA International Division*

How a radio-directed engineering marvel provided "happy motoring" for the citizens of Bogotá, Colombia . . . 8,600 feet up in the Andes

In spite of government and industry efforts to make gasoline available in Bogotá, Colombia, often it was scarce. Deliveries by road and railway were often interrupted by flash floods along the rugged routes climbing to the mile-and-a-half-high capital.

The Department of Cundinamarca, the State in which the City of Bogotá is located, had an idea—a direct 150-kilometer pipeline from the oil tank farm, across jungle and stream, up the great Andean walls to Bogotá. A magnificent engineering concept, it presented great obstacles. But it was done—through co-operation of petroleum, construction and radio organizations.

RCA radio is the nerve system of **this engineering triumph. The VHF-FM radio relay system provides instant 2-way voice and Teletype communication between the tank farm and Bogotá, and intermediate points.**

RCA International Division's world-wide organization functioned here as it does on similar assignments. RCA engineers, working with Williams Brothers Corp., international builders, designed and supervised the radio installations for "oil well in the sky."

It's happy motoring now in Bogotá. Oil, gasoline and kerosene flow swiftly, economically, and surely up the ridges, dispatched by dependable RCA radio . . . the aid of industry and government, the friend of the family everywhere.

RCA products and services are available in all world markets open to trade, through RCA distributors and associated companies. The new book "Communications, Key to Progress" tells the inspiring story of radio at work in many countries. Simply write to RCA International Division, 30 Rockefeller Plaza, N. Y., U.S.A.

World leader in radio, first in recorded music, first in television

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Radio Age

EARCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

OCTOBER 1954

COVER

Gen. Matthew B. Ridgway, Army Chief of Staff, tries out RCA combat TV camera in "command post of future" with Brig. Gen. David Sarnoff, Chairman of the Board of RCA (left) and Maj. Gen. George I. Back, Chief Signal Officer. (Story on p. 15)

NOTICE

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CONTENTS

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*

The new RCA 21-inch simplified color TV receiver.

RCA Demonstrates Three Major Advances in Color TV

THREE new major developments in color television were demonstrated by the Radio Corporation of America on September 15 at Princeton, N. J., opening the way to early mass production of color television sets at costs within the reach of the consuming public.

Described as milestones in the march toward commercial color television, the three new developments were:

1. A new 21-inch RCA color picture tube with 250 square inches of viewing area — 22% more than any other color tube yet produced;

2. A magnetic field equalizer called the "Color Equalizer." This is a significant new RCA invention, not previously announced, which guarantees improved color set performance and makes possible a reduction in manufacturing costs;

3. A new, simplified color television receiver, which reduces circuitry by one-third and permits a substantial reduction in production costs.

Each of these developments represents "years of scientific and engineering endeavor telescoped into a memorable few months," according to E. C. Anderson, Executive Vice-President, RCA Commercial Department, in remarks at the demonstration, held at the David Sarnoff Research Center of RCA.

RCA Timetable for Production of Tubes and Sets

"The RCA timetable," Mr. Anderson continued, "calls for industry sampling of the 21-inch color tube starting November 1, and for the appearance in the market of our first 21-inch color sets before the end of this year, with production in quantity by early 1955.

"While we have not yet established a suggested retail price for our 21-inch color set, I can tell you, today, that it will be between $800 and $900."

At a special press showing, which preceded demonstrations for representatives of virtually the entire television manufacturing industry, Dr. Elmer W. Engstrom, Executive Vice-President, RCA Research and Engineering, said:

"Again, RCA is following the policy of sharing with its competitors its advances in color television so as to encourage early production of improved equipment on the widest scale."

Reporting on plans for color broadcasting, Robert W. Sarnoff, Executive Vice-President of the National Broadcasting Company, said that "provision of color programming in volume, on a national basis . . . will create audience excitement beyond anything else available on the air. NBC's contributions to color development during this past year have established for it a position of leadership in the field. Our color operation during the coming year will advance that position further, and the entire industry will benefit from it."

Mr. Anderson, in reviewing RCA progress in color television, said:

"When RCA first tackled color television, we were aware of the importance of creating an entire system, not just isolated elements of one. A color service, as we saw it, required every part to mesh smoothly with the others. As a result, we moved ahead simultaneously in the broadcasting, the picture tube, the receiving set, and the circuitry fields. Now, we are ready to demonstrate, as well as to discuss, these advances.

The 21-Inch Color Tube

"The 21-inch tube, which holds the spotlight today, was — only 8 short months ago — in our development laboratories. But the progress we had made with it was so good, that we determined not to go ahead with our 19-inch tube. We concentrated our efforts on a 21-inch color tube — the preferred size — without introducing any intermediate smaller sizes.

"This advance, from the first commercial color tube of the 15-inch size to the preferred tube of the 21-inch size, required only a few months; but they have been months crowded with sustained effort and achievement. In black-and-white television, a similar evolution took several years.

"It is our opinion that the 21-inch color tube you are seeing today is a practical large-screen color television tube that enables immediate commercial production. This is the tube upon which RCA is planning its own commercial program, and we are going forward with full confidence. We expect to produce and sell this tube at a price that should advance the sale of color receivers to the public.

Receiver Circuitry Is Simplified

"We have also given much attention to reducing the cost and increasing the stability of color receiver cir-

RCA's new 21-inch color TV tube is shown here in comparison with the earlier 15-inch color tube introduced by RCA in its first commercially-produced color television sets.

cuitry and components. Approximately a one-third reduction in receiver circuitry has been achieved, without any loss of performance. Substantial cost savings are inherent in the results of this work.

"This simplified circuitry has been used to construct two of the receivers demonstrated to you today. The other two receivers contain the 19-inch chassis previously described to you and modified to work with the 21-inch tube.

"While the simplified circuit receiver uses 11 tubes less than the modified receiver, nevertheless, their performance is the same."

Dr. Engstrom said that RCA's three new developments — the 21-inch color tube, the "Color Equalizer," and the new simplified receiver — have advanced large-screen color television to the practical stage of quantity production.

New RCA "Color Equalizer"

Regarding RCA's new "Color Equalizer," Dr. Engstrom pointed out that, previously, the performance of color tubes was affected by magnetic fields such as the earth's field or local sources.

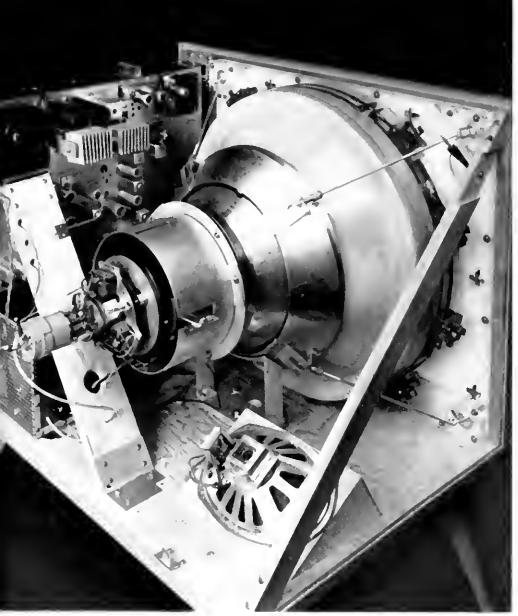
"To minimize such disturbances," Dr. Engstrom said, "tubes have been protected up to now with a conical magnetic shield which was effective in shielding the small end of the tube cone, but relatively less effective near the tube face. We have also used a rim coil in the form of a loop placed near the plane of the phosphor plate, in addition to the magnetic shield.

"Our new 'Color Equalizer' performs the function of the rim coil, but unlike the rim coil, its effects may be controlled at various points around the circumference of the color tube face. It makes unnecessary either a magnetic shield or the rim coil. The net result is a better, more positive effect and a reduction in cost of the receiver.

Will Save Consumer At Least $20

"The magnetic shield has been an item of relatively high cost in a color receiver even though we have carried on an active cost reduction development. We now propose to use the new RCA 'Color Equalizer' in place of the magnetic shield and the rim coil formerly used. By doing so a saving will be effected in the cost of manufacturing our new 21-inch color receiver. In indicating this saving we are comparing the use of the lowest cost magnetic shield we have been able to develop for our 19-inch glass envelope color tube together with a rim coil, and the 'Color Equalizer' for use with our 21-inch metal envelope color tube. The saving *on this item alone* represents a saving to the consumer of at least $20."

In commenting on RCA's new 21-inch color picture tube, Dr. Engstrom said that it "provides excellent



Rear view of the new RCA 21-inch simplified color TV set shows how circuitry has been reduced.

color; with size, picture brightness, picture quality and contrast comparable to present popular black-and-white tubes. There are several important new features embodied in this tube which contribute to high performance, lower cost and ease of production."

Among the features of the new tube listed by Dr Engstrom were: 1) considerably lighter weight; 2) a new and shorter electron gun and a wider deflection angle, making for more compact color sets; and 3) an improved shadow mask and mounting system that ensure an excellent picture out to the edges of the tube and a brightness comparable to black-and-white.

"We believe that the simplified construction of this 21-inch tube," Dr. Engstrom continued, "will allow it to be manufactured at reasonable cost in large quantities."

New RCA Color Receiver Has 28 Tubes

In describing the development of RCA's new, simplified color receiver, Dr. Engstrom said:

"This new receiver is the result of our experience with the 15-inch RCA color set, and of lengthy trial by our engineers of many forms of simplified circuitry. This receiver has reduced by one-third the circuitry required for color television sets. It employs 28 tubes counting the picture tube and draws less than 300 watts from the power line. It is interesting to note that RCA's original model 630TS — the first large-scale black-and-white production receiver produced by RCA — used 30 tubes and drew about 300 watts.

"Our simplified receiver covers all TV channels — both UHF and VHF — and there is more than ample reserve capacity in all circuits to accommodate low limit tubes and low line voltage."

NBC's Color Program Plans

Mr. Sarnoff, in reviewing NBC's color program plans, said that "nobody can doubt" that color television will be the major broadcast medium of the future.

"At NBC, we have just concluded our Introductory Year of color broadcasting," Mr. Sarnoff continued. "During this past year, we have produced and broadcast over 50 different programs in color. About 90% of our production staff has had on-the-job color training in connection with these shows. As a result, we are now opening the commercial phase of color broadcasting. Color has become an integrated part of our regular operation.

"A number of individual stations throughout the country have already equipped themselves to originate color programs locally and several more are about to do so. Local origination of color programming will add a further stimulus to the growth of color circulation in the areas served by these stations.

"By January 1, we expect that at least 82 stations on the NBC network will be color inter-connected and equipped to transmit network programs in color. At that time, about 87% of all television families in the country will be within range of the NBC color service.

"With a national color circulation potential covering 87% of the present television sets, with high appeal NBC color programs scheduled on a regular basis — plus the color programming of other organizations and with 21-inch color sets on the way — with all these new developments — the stage is set for rapid growth in the color medium during the coming year — and for accelerated growth in the following years.

"I believe that a year from now, we will be looking back on a record of progress that will surpass present predictions. That has been the experience of our industry in the past — and we believe it holds true for the future."

The 15-minute color program seen during the demonstration was transmitted via microwave relay to the David Sarnoff Research Center from NBC's Colonial Theatre color studio in New York.

Produced by Barry Wood, NBC Executive Producer in Charge of Color Coordination, the telecast featured André Eglevsky and Diane Adams in a ballet selection, singer Connie Russell in two vocal numbers, and an excerpt from the color film "The African Queen."

Aspects of Broadcasting, Present and Future

Sarnoff, at NBC TV Affiliates Meeting, Discusses Color TV, Radio Networks, Future TV Sets, and Editorializing by Networks

Brig. General David Sarnoff, Chairman of the Boards of RCA and the National Broadcasting Company, addressed the NBC Television Affiliates Meeting in Chicago on August 31. Following are excerpts from his remarks:

Color Television

At the present time we are passing through a very interesting and important transition. It is the transition that marks the difference between publicity and performance. As we are now entering the area of performance, I think you need no advice from me on how to evaluate claims and predictions made by almost everyone in this business. And if you want to include us, that is all right, too. Just keep your eye on performance, and don't pay to much attention to publicity.

Over the past two years we have all heard of color tubes that were being produced at such a rapid rate that the facilities were just inadequate to catch up with the orders. Yet, in some instances those claims, repeated frequently, have been so unfounded that we were not able to get even a sample of such tubes.

Again, we have heard of startling developments that were just around the corner. They would be out tomorrow; but tomorrow has come and gone, without a sign of such developments.

It is not necessary to argue one's case if one has a color tube, a color set, and a color program. All you have to do — all anybody has to do from here on — is just watch the performance of the tube. Watch the performance of the set. Watch the quality of the program. Then you will know as much as anybody in the manufacturing or broadcasting business knows — and I suspect a little bit more than some of the top executives in the broadcasting and manufacturing business know. . . .

Radio Networks

I have had the thought for some time that there was only one direction, incomewise, for radio networks to go, and that is down instead of up. I was challenged in that view, and I had hoped right along that I might be wrong. I would rather be proved wrong than right in that one.

But what are the facts today? Every now and again you hear about some national advertiser canceling his programs on radio networks, daytime as well as nighttime. If a business keeps going down, it is very difficult to arrest the decline. And it is not so easy to readjust your appetite to the dwindling victuals on your plate.

We do have this advantage in the NBC. We have been dieting for the last few years on the radio network, and we have slenderized. Our figures are trimmed in that branch of the business. While some of our radio network competitors have been more fortunate in the last two or three years, they have still to learn how to get along on the reduced rations of a radio network diet. I hope that the rate of their radio decline will not be so violent or rapid as to interfere with the health of their remaining organisms.

Doing Well Through Local Business

While radio network revenue declines, some independent radio stations as well as affiliated stations have been doing very well. They have been doing well through local business, through spot business, through all the names that you gentlemen invent from day to day that even I can't keep up with — station breaks and other kinds of breaks. But that hasn't helped the radio network to grow and remain healthy. It may be that in radio, perhaps you can get along fairly well without a network because of the recorded programs and revenue you derive from local and other sources.

If this be so, and if the radio network declines to a point where it no longer has sufficient energy to sustain its body, you know what happens under those conditions. If you think that a radio station, particularly an important radio station in an important center, can remain prosperous regardless of whether it has a national network or not, if you believe that, then, of course, you will have no interest in the continued life of a radio network.

On the other hand, if present radio networks should cease to exist, I believe you would find that the importance of a radio network as an instrument of national service and national defense, would demand such a service in one form or another. In times of national emergency or national disaster, it is of the utmost importance to our national defense and national security that we be able to make instantaneous contact with all of the people of our nation, wherever they may be, in millions of automobiles or elsewhere. This is especially vital in the atomic age in which we live.

I don't say that radio networks must die. Every effort is being made and will continue to be made to find new patterns, new selling arrangements and new types of programs that may arrest the declining revenues It may yet be possible to eke out a poor existence for radio networks — but I don't know.

New Forms of Competition

Let me also raise a word of caution about the future of TV networks. Here too, new forms of competition are under way and anything that adversely affects the healthy and profitable development of a TV network, will also affect the welfare of a TV station affiliated with it. The magnetic tape recorder is on the way. I expect by the end of this year the National Broadcasting Company will be in a position to experiment with it in actual service. This new development is coming along and reaching the commercial stage. The TV tape recorder will furnish a type of network competition that may prove to be of great importance.

I recognize the difference between TV networks and radio networks, the difference in complexity and in programming. I recognize the difference between live programming and recorded programming, but in this fast moving art and industry, complacency is dangerous

It may be true that some live programs simply cannot be substituted by recordings. But is is a question of percentages. The revenue remaining to the TV network must be sufficient to support an organization that must make heavy capital and other commitments of a long term nature. All these benefit the affiliated stations as well as the network. Their future is interdependent.

Those are problems, gentlemen, that I suggest for your own earnest and serious consideration. . . .

Tubeless Television Sets

I believe that at some time in the future — I will hazard a guess and say five years from now — no tubes will be needed in a television set — not even the picture tube. Then all the debates about one-gun and three-gun tubes, rectangular and round, glass and metal, shadow-mask and focus-mask, and other kinds of masks, will belong to the language of the past.

By Electro-Luminescence we shall have a screen on the wall of whatever size you wish to make it — small or large — and that screen will be connected directly by a small cable, with a little television box — about the size of an average cigar box that can be placed anywhere in the room. No cabinet will be required: and if desired, screens can be placed in every room of the house.

The television box will contain the tuning and volume controls, and the station selector. It will also have a remote control knob enabling one to make the picture of any desired size; to have it either in black-and-white or in color; and to make it brighter or dimmer. All these features will be easily adjustable by the viewer, to suit his individual taste.

Transistors will replace the present small tubes, and an electro-luminescent screen will take the place of the present cathode-ray tube. . . .

Editorializing by Networks

I believe that radio and television should have the same rights as the press. But when that request for permission is confused with the broader subject of editorializing by networks, when that proper request in a specific case is merged with a general principle, and is labeled "editorial," it creates unnecessary confusion and raises many questions to which there are no clear answers at this time.

What is a network editorial? Is an editorial only an editorial when it talks about the interest of the network, or is an editorial an editorial when it talks about any public question that may be controversial and vital? If it be the latter — and I assume it must be included in the definition — then I want to distinguish between the right of a network to editorialize, which I think it should have, and the execution of that right, which is a matter of policy, of wisdom, of importance and circumstances at a particular time. A policeman should certainly have the right to carry a loaded pistol, but the execution, the firing of that pistol, is quite another matter as distinguished from his right to carry it.

Special Circumstances Must be Considered

If a network is to editorialize only when its own interests are involved, then I think the special circumstances of the case must be considered. It is not speaking in its own interests only when it raises its voice in protection of the freedom of broadcasting. It is serving the public's interest as well. But if it is editorializing on other public questions or on partisan or political subjects, it is quite a different matter.

It is not enough to say that it will give "the other side" an opportunity to answer because the question is: what is the other side? How many sides are there to an important controversy? When I have an argument with my wife, I think there can be only one side to that argument. But when she answers me, she seems to have many sides to her reply, and some I never thought about before! There isn't any such thing as just one side or one answer to a controversy.

And who is to select the exponent of the other side? And how often will that right to editorialize be exercised by a network? Will it be a daily editorial as in a newspaper? And if so, is it practical to give "the other

(Continued on page 32)

Mayor Robert F. Wagner of New York cuts the tape to open NBC's new color TV studio in Brooklyn. Assisting are Betty Hutton and, at right, NBC President Sylvester L. Weaver, Jr., and Robert W. Sarnoff, Executive Vice President.

World's Largest TV Studio Opened by NBC for Color

A ONE-TIME motion picture studio in Brooklyn, N.Y., has reopened for business as the world's largest and most moderen television studio, completely equipped for programming for the new era of color.

The studio is the National Broadcasting Company's new color production center, acquired from Warner Brothers and converted at a cost of $3,500,000 to handle NBC's unprecedented series of thirty-three "spectaculars" — ninety-minute color programs of a scope never before presented on a regular basis.

Formal dedication of the vast studio took place on September 9, when Mayor Robert F. Wagner of New York cut the ceremonial ribbon and described the new center as "a fine new showcase for the best New York has to offer in the theatre arts." Participating with Mayor Wagner in the ceremony were Sylvester L. Weaver, Jr., President of NBC, Robert W. Sarnoff, NBC's Executive Vice-President, and actress Betty Hutton, who starred on September 12 in the first of the new "spectaculars."

The opening of the Brooklyn production center widens further the margin of NBC leadership in color programming facilities. These already include the Colonial Theatre in New York, the world's first fully-equipped studio for compatible color; Studio 3-H in Radio City, used for smaller productions, commercials, and research in staging, lighting, costuming and make-up; a mobile color unit, the only one of its kind in existence, used for outdoor coverage of special events remote from studios, and RCA three Vidicon multiple film projectors capable of handling 35- and 16-millimeter color film and slides. By the end of the year, the present facilities will be augmented by another large studio being equipped by NBC in Burbank, Calif., to tap the reservoir of Hollywood talent for "spectaculars" and other color programs.

Number of Unique Features

Several unique features have been built by NBC into the huge Brooklyn center, among them the most elaborate lighting system in the industry — 900 circuits with a capacity of 960,000 watts, or enough to light a community of 3,000 homes.

The lighting is arranged in a grid system whose components can be raised or lowered by electric hoists controlled remotely from a lighting "bridge." There are 126 such hoists, capable of handling 75,000 pounds of lighting equipment. This push-button hoist arrangement was developed by NBC engineers. It permits individual height adjustment of 63 groups of lights and the pre-setting of heights for 10 scenes.

At the heart of the system is a newly-perfected "Lumi-Tron" lighting board, a complex arrangement of some 2,000 controls — twice the maximum of any lighting board previously used in television programming.

To convert the lighting system for color, the light capacity had to be increased seven and one-half times, which in turn meant a heavy reinforcement of the overhead girders to handle the substantially greater weight.

Large-Screen Projector

For the studio audience of 360, the center has been equipped with a large-screen color projector, newly developed by RCA, which permits viewing of the performance on a movie-size 15-by-20-foot screen. The audience is accommodated in a new type of demountable seating arrangement.

In addition to the main studio, 178 feet long and 88 feet wide, a smaller studio will be built in what is now a rehearsal hall to one side. The smaller studio, full-sized by usual standards, will be used for commercials, and it will be able to handle products as large as automobiles, which can be wheeled in through large doors leading in from the street.

The center also includes a carpentry shop that can build complete sets for any major production. Other facilities include an artists' lounge, remodelled dressing rooms, makeup rooms and storage space for props and equipment. A Quonset hut measuring 40 by 60 feet also is being built as additional storage space.

RCA Color Caravan

As NBC opened its new home for color programming in Brooklyn, RCA started a nation-wide tour with a new "color television caravan" equipped to produce on-the-spot programs to introduce color TV to audiences at fairs, expositions and other large public gatherings.

The unit made its public debut on September 25 at the Mid-South Fair in Memphis, Tennessee. After its Memphis stand, it prepared for an extensive tour that will involve appearances at other expositions and at special showings for conventions, department stores, and business and service organizations.

In employing a mobile unit to promote the nation-wide introduction of color, RCA is following the precedent set in 1947, when another RCA caravan toured more than 50,000 miles over the country introducing black-and-white television.

The heart of the RCA color caravan is a specially-designed 32-foot trailer containing a complete control room and technical equipment to originate any type of program, either "live" or film. The equipment includes a number of RCA Victor color TV receivers, two RCA color cameras, a color film-scanner and microwave apparatus. Like the new NBC studio in Brooklyn, the unit has been equipped also with the new RCA color TV projector capable of showing color programs on a 15-by-20-foot screen.

For the most part, the caravan will originate programs to be carried over a closed circuit to its receivers via cable. However, its equipment permits the feeding of programs to commercial television broadcasting stations or to a network whenever the occasion may require it.

A complete staff of engineers, technicians and program production experts has been assigned to the unit, which is under the supervision of Richard H. Hooper, Manager of RCA Shows and Exhibits, with headquarters in Camden, N. J.

At the "Lumi-Tron" lighting board, 2,000 lighting controls are within reach of the technician.

TV's most elaborate lighting system hangs over the vast studio, formerly a film sound stage.

Folsom Predicts...
$12 Billion Electronic Sales in '55

SALES approaching twelve billion dollars annually for the electronics industry by 1957 were forecast by Frank M. Folsom, President of RCA, in a talk on September 23 in Chicago discussing the outlook of color television and other promising components of what he described as an "utterly amazing industry."

Mr. Folsom, addressing a meeting of the Investment Analysts Society of Chicago, reported on the results of a survey covering sales and estimated sales of electronic products over a twelve-year period beginning in the postwar year of 1946.

"Total annual sales of the electronics industry," he said, "grew from $1.6 billion in 1946 to $8.4 billion in 1953. Further growth is projected, as follows—1954, $8.8 billion; 1955, $9.5 billion; 1956, $10.9 billion; 1957, $11.8 billion."

The domain of electronics is so vast and so rapid is its rate of development that it seems hard to believe that eight years ago the industry was only one-fifth its present size, Mr. Folsom declared, adding:

"In those eight years, electronics has assumed a stature that commands high respect in all branches of finance, trade and industry. It is the vital factor in all forms of modern communications; all modern means of mass entertainment depend upon it—radio, television, talking movies, tape sound systems, and phonograph recording and reproduction; modern transportation must have its controls and communications; the military uses it in myriad ways; and even atomic devices depend on it."

Study Covers Principal Components

Mr. Folsom said that the study of the industry took into consideration the principal components, as follows:

Home and Portable Radios—This field once represented the chief source of revenue in our business. Today, because of television and changing habits of the people, sales are declining gradually—from a postwar peak of $600 million in 1947 to an estimated $109 million in 1956.

Auto Radios—Relatively stable sales somewhat in excess of $100 million annually.

Frank M. Folsom, center, President of RCA, chats with Fred J. Stock, President of the New York Board of Trade, and Henry L. Lambert, Chairman of the Mercantile Section of the board, at meeting addressed by Mr. Folsom in New York last month.

Black-and-White Television — Postwar growth was spectacular, with sales increasing from $1 million in 1946 to $1.4 billion in 1950. Sales in 1953 totaled $1.2 billion, and nearly $1 billion is expected in 1954. A drop to $388 million is projected by 1957, due to the shifting of the mass market from black-and-white TV to color.

Color Television—Following commercial introduction in 1954, increased volume is expected to more than offset reduced sales of black-and-white television, reaching $264 million in 1955, $767 million in 1956, and $952 million in 1957. This would mean a total of nearly $2 billion (at factory prices) during color television's first three years.

Repair Parts (chiefly renewal tubes)—Steady growth is expected to continue in support of increased receivers in service. Volume amounted to $217 million in 1953, and is estimated at $454 million by 1957.

Servicing and Installation—This important element has grown from $145 million to 1946 to

$1.4 billion in 1953. Continued growth to $2.7 billion by 1957 is indicated.

Industrial and Commercial Equipment—Steady growth is also indicated here, from $50 million in 1946 to $267 million in 1953, and a projection of $520 million by 1957.

Government Electronics Expenditures—Volume totaled $2.5 billion in 1953 (30% of total electronics industry sales). During the four years 1954-1957, government electronics expenditures are estimated at $2.7 to $2.8 billion annually.

Electricity—Total electricity costs to operate TV and radio instruments are estimated at $49 million in 1946, $354 million in 1953 and $634 million in 1957.

Broadcasting and Communications—Total revenues in 1946 were $404 million, or 25% of the total sales by the electronics industry. Revenues increased to $1.1 billion in 1953. By 1957, total revenues of $1.5 billion are estimated. Nearly all of this growth is due to TV broadcasting revenue, with radio and communications revenues showing only modest gains.

Prospects for Color TV Growth

Mr. Folsom said that he looked upon color television both as a technical marvel and one of the most significant advances in the history of electronics, and added:

"Its prospects are brighter than the prospects of black-and-white television were eight years ago. We will see a day when virtually every American home will have a color TV set.

"During the rest of this year and next year, it is estimated that more than 350,000 color sets will be produced and sold by the industry.

"During 1956, unit sales should reach 1,780,000; during 1957, 3,000,000; in 1958, about 5,000,000.

"These annual sales add up to the very satisfactory estimate of more than 10,000,000 color sets in American homes by 1959."

Commenting on RCA's expansion and improvement of its manufacturing facilities, Mr. Folsom told the Chicago group:

"With the advent of color television — to say nothing of a long list of other new electronic products and services, including industrial television, microwave radio relay systems, theatre television, new types of radar, electronic computers and transistors — RCA plant facilities are undergoing the required expansion and modifications.

"Our expenditure on facilities this year alone is expected to be in excess of $30 million. This will bring RCA's outlay on plant expansion and improvement to more than $200 million since 1946."

History will record 1954 as a good year for the radio-television and electronics industry, according to Mr. Folsom. He declared:

"Business has been much better during the first 9 months than was generally anticipated earlier in the year.

"As you know, sales of products and services of the Radio Corporation of America and subsidiaries attained an all-time record volume of $444,369,000 during the first six months of 1954. After Federal Taxes, our net profit for the half year amounted to $19,268,000, an increase of $1,083,000, or 6% over the 1953 period. During July and August our business volume has been better than 5% over the same months of 1953. We foresee excellent sales prospects for RCA and the industry as a whole during the remainder of the year.

"Beyond this period, as I have stated, the outlook is equally bright for the electronics business. We are far from realizing the full potentialities of this remarkable industry, and RCA is well equipped to meet the challenges and the opportunities ahead. RCA can be counted upon to continue its pioneering and leadership, in research and engineering, manufacturing and broadcasting. We have complete confidence in the future of electronics as a science, art and industry."

Talks to New York Group

In a talk given earlier before the Mercantile Section of the New York Board of Trade in New York, Mr. Folsom pointed out that from the standpoint of economic gain, the production of color receivers will require "a mountain of raw materials."

"Our experts in such matters have informed me," he said, "that 10,000,000 color sets would use more than 350,000 tons of wood, 175,000 tons of steel, 5,000 tons of brass, 3,500 tons of solder, 3,000 tons of copper, 2,500 tons of zinc, and enough glass, plastics and miscellaneous materials to bring the total well over 1,000,000 tons — or two billion pounds."

NBC Announces Promotions

The election of three new vice-presidents of the National Broadcasting Company was recently announced by Sylvester L. Weaver, Jr., President of NBC. Kenneth W. Bilby was named Vice-President for Public Relations; Davidson Taylor was named Vice-President in Charge of Public Affairs, and Richard A. R. Pinkham was named Vice-President in Charge of Participating Programs Department.

Hill Reiskind, right, manager of the engineering division at the RCA Victor Indianapolis plant, points out the features of the new RCA Victor "Gruve-Gard" record to Emanuel Sacks, Vice-President and General Manager, RCA Victor Records. Revolutionary design of "Gruve-Gard" protects playing surfaces of long-playing discs.

Advances In High Fidelity Recording

by Emanuel Sacks
Vice President and General Manager, RCA Victor Records

RISING public interest in high fidelity recordings is expected to provide the greatest impetus to the sale of records and "Victrola" phonographs since the introduction of the 45-rpm speed in 1949.

Record sales alone should jump from an annual $225 million to more than $300 million because of the concentrated attention being given to high fidelity. A corresponding increase in instrument sales also is expected, especially since addition to the RCA line of the new 45 high fidelity record player to be marketed at $69.95.

Anticipating the potentialities of high fidelity, RCA engineers and scientists for many years have been working in sound laboratories to capture sound and reproduce it faithfully on all RCA Victor records and "Victrola" phonographs. And the man in the street who once was puzzled by such hi-fi jargon as "woofers," "tweeters" and "frequency response" will soon find these terms as familiar as the most enthusiastic high fidelity "bug."

The far-reaching effects of the new hi-fi trend will be felt in several important areas.

These will include:

(a) A new standard of listening enjoyment for the American home.

(b) The placement of high fidelity equipment in twice as many American homes.

(c) Classical works which previously have had limited appeal, finding new audiences because of their high fidelity reproduction.

(d) The development of additional hi-fi improvements such as the new "Gruve-Gard" protective device which will give even greater listening perfection to long-playing discs.

High fidelity has been defined as the nearest possible approach to perfect fidelity. It leaves with the listener an impression of being present at a live musical performance.

Delicate Balance Required

RCA Victor's "New Orthophonic" sound techniques require a delicate balance between engineer and musi-

cian, between musician and microphone and instrument placement. The technique of recording within the studio, as well as the process of manufacture, has changed tremendously within the past few seasons. New studios, new equipment and new innovations in recording, as well as a greater awareness of the importance of high fidelity sound on the part of the artist, all have contributed to the uptrend in audio listening.

Until recently, high fidelity was the special property of the broadcast industry, great musical artists and the electronics technician who made an expensive hobby of seeking perfection in recorded sound by "assembling" various component parts. Now, however, "hi-fi" is being packaged for the average American home and it means a new era of recorded music pleasure for the family.

Because of high fidelity, more and more of America's "middle-brow" families soon will be listening to — and liking — all types of music. Music tastes will broaden because the greater listening range of records and phonographs are offering the average American, young or old, an entirely new concept of quality in recorded music.

"Hearing Is Believing"

In order to illustrate vividly what high fidelity means to the average listener, RCA Victor has just released an unusual demonstration disc called "Hearing Is Believing." One side of the record is a dramatic demonstration of the difference between old sound and "New Orthophonic" High Fidelity illustrated by old and new recordings.

The coupling contains selections from new classical, pop and jazz records which illustrate the finest in the new sound. The record sells for only $1.00 as a long-playing record and thirty-five cents as an EP 45-rpm recording. Anyone who still wonders what high fidelity is will certainly understand after listening to the "old" and the "new." In order to get as many of these records as possible into consumers' homes, this record is being offered as a special consumer service without profit to RCA, dealers, distributors or artists.

For the more advanced audiophile, RCA Victor also has released a definitive treatise in both sound and text on the subject with the new album titled "Adventure in High Fidelity." Robert Russell Bennett, renowned Broadway arranger and composer, whose album of the "Victory at Sea" score was widely acclaimed for its remarkable sound, was commissioned to write a special symphonic work for this album. Notes by Robert D. Darrell, noted authority on phonograph records, outline in a booklet enclosed with the album the meaning of the many hi-fi technical terms and what may be expected from high fidelity as a listening experience. Charts graphically illustrate the range of common instrumental and vocal fundamentals and the audible frequency range for music, speech and noise; there is a musical test for one's own high fidelity or average phonograph equipment, and illustrations of how the human voice sounds in high fidelity as well as examples of the unusual sound in new pop recordings.

"An Adventure in High Fidelity" is an impressive tribute to the growth and importance of "hi-fi" sound.

Special Recording Techniques

High fidelity records, as evidenced in RCA Victor's "New Orthophonic" release of the Berlioz "Damnation of Faust," not only have wide frequency range but involve special recording techniques which sharpen the identity of the separate instruments and seem to project vocalists in front of the accompaniment.

But high fidelity should not mean sound for sound's sake alone. We refer to the cult of "hi-fi-natics" who concentrate on moments of spectacular isolated sounds at the expense of musical content. True high fidelity is the complete fulfillment of the musical content without exaggerated emphasis on the more sensational possibilities.

The latest advance in high fidelity is the multiple track recording, in which two separate sound tracks are recorded to reproduce music binaurally. This has been successfully accomplished on many new recordings which now await only further developments to make binaural or stereophonic sound practical for home use.

In line with its forward-looking policy in research and the advancement of recording techniques, RCA Victor has pioneered in the pre-recorded tape field. A library of high fidelity tape recordings was marketed on 17 reels this June, offering more than 11 hours of recorded music. Each of these reels provides approximately the same amount of music as is offered on a 12-inch long-playing record. Introduction of pre-recorded tape is in line with RCA's policy of continuing research, looking toward development of the finest recording and reproducing systems and techniques.

With these new technological developments and the brilliant sound captured in such current RCA Victor releases as the "Damnation of Faust" performed by Charles Munch and the Boston Symphony, or the interpretation by Fritz Reiner and the Chicago Symphony of "Richard Strauss in High Fidelity," the prophetic words of Leopold Stokowski quoted recently in an interview on his vast experience in the realm of sound reproduction, rings prophetically true.

"I am convinced," stated Stokowski, "that in days to come, recorded music will have further developments than those I have just mentioned. We cannot foresee those yet. The potentialities are infinite; so is the inventive power of the human mind."

RADAR for Canada's Navy

By Bruce Lanskail

Manager, Government Contracts Division
Engineering Products Dept.
RCA Victor Company, Ltd.

DURING World War II, Canadians took to the water as they had taken to the air in the first World War and a great Canadian naval tradition was born.

Since the war, the Royal Canadian Navy has become an important part of the nation's defense force and to step up its defense efficiency the Navy recently purchased from RCA Victor Company, Ltd., Montreal, the largest and most powerful air search radar equipment ever produced in Canada.

The new equipment was demonstrated to top Navy officers, Department of Defense Production officials and the Canadian press at RCA Victor headquarters. Two Sea Fury fighter aircraft served as aerial targets for the test demonstration and were picked up on the radar screen as they approached Montreal. Simultaneously, the movements of the 90-foot antenna, mounted on top of one of the RCA Victor buildings, were shown on a television screen so that naval officers, production officials and the press had a complete picture of all the equipment in action throughout the test.

Set up in an enclosed section of the company's engineering products department, the equipment was operated by a naval operator under conditions simulating those which would be found on shipboard. The demonstration was completely successful with the results exceeding the expectations of naval officers, Commodore H. N. Lay, OBE, CD, RCN, Assistant Chief Naval Staff (Warfare), declared following the final day's tests.

Examining the screen of Canada's newest and most powerful radar at the RCA Victor plant in Montreal are, left to right, Commodore H. N. Lay, Assistant Chief Naval Staff (Warfare); Commodore W. L. M. Brown, Assistant Chief Naval Staff (Air) and Commodore (L) W. H. G. Roger, Electrical Engineer-in-Chief.

Designed to detect enemy aircraft at long ranges, the new radar equipment will greatly strengthen the defense effectiveness of Canada's Atlantic and Pacific fleets. Sets are being installed in destroyer escorts and in the aircraft carrier now being built for the Royal Canadian Navy.

Weighing more than two tons, the complete equipment includes a stainless steel antenna which will be mounted high on the warships' superstructures, a transmitter, a modulator and several smaller parts. The antenna rotates continuously, sweeping the sky with a radio beam shaped like a fan on edge. The bearing and distance of an aircraft more than 100 miles distant are revealed at the instant it intercepts the radio beam. This information is then displayed instantaneously on the television-like screen of the plan position indicator unit.

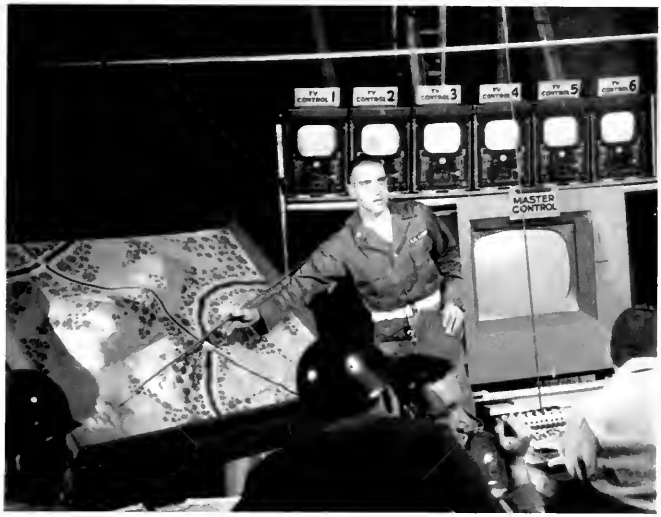
The equipment's output is several hundred thousand watts and can be increased to several million watts, making it one of the most powerful naval aircraft search radars in the world.

Commenting on the success of the Montreal demonstration, Commodore Lay emphasized that the new radar could be of tremendous value to Canada in an emergency. He pointed out that the equipment was being manufactured in Canada so that the navy could be assured of production in that country. RCA Victor Company, he said, was to be congratulated for the efficiency with which it had produced the first set to be delivered and for the manner in which the demonstration had been so successfully staged.

Commodore (L) W. H. G. Riger, OBS, CD, RCN, electrical engineer in chief, declared that the harmony of engineering entailed in its construction was obvious when it was realized that it had to be both highly sensitive and extremely rugged. The equipment has been designed to withstand Arctic and equatorial temperatures and also to be shock-proof at all times.

The naval contract, a vitally important one in the Canadian defense program, amounted to $3,500,000. RCA Victor Company, Ltd. was selected for the work because of its extensive research and production facilities and its long record in supplying communication and detection equipment to Canada's armed forces.

Combat Television



In the "command post of the future" at Fort Meade, Md., the briefing officer explains moneuver to be covered by TV on the battlefield.

On August 11, 1954, an attacking force of United States Army soldiers swarmed ashore in amphibious personnel carriers after a lake crossing at Fort George G. Meade, Maryland, to assault a simulated enemy stronghold. With the first wave of troops rode the herald of a new era in battlefield communications — a combat soldier equipped with a hand-carried Vidicon television camera that flashed back to regimental headquarters an instantaneous picture of the critical beachhead action.

The regimental commander, at his command post in the field, used the eyes of television to direct the action. swiftly adapting his original battle plan to new circumstances conveyed to him by Vidicon cameras in the battle area and by larger television cameras mounted in a reconnaissance plane circling over the enemy's supply and assembly points.

This was combat television, demonstrated publicly for the first time on the twentieth anniversary of the concept of television for military use, first proposed to the Armed Services by Brig. General David Sarnoff, Chairman of the Board of RCA. It was in 1934, when the art of television itself was in its infancy, that General Sarnoff initiated discussions with representatives of the services in Washington on applying the extended and instantaneous electronic sight of television to warfare. From those early discussions stemmed the subsequent development of television equipment and techniques for combat use in air and at sea — and now on land.

An audience of top-ranking military and industrial leaders and representatives of the nation's press watched the Fort Meade demonstration in a "command post of the future." Observing the demonstration, and participating in a national network color telecast of portions of the event, were General Matthew B. Ridgway, Army

Before the "eye" of a combat TV camera, troops assault a position after the lake crossing at Fort Meade.

Chief of Staff; Major General George W. Smythe, Deputy Commander of the United States Second Army; Major General George I. Back, Chief Signal Officer, and General Sarnoff.

Commander Sees and Controls the Battle Action

In the simulated command post, the role of television in ground combat took dramatic shape in an exercise presented jointly by the United States Second Army, the Signal Corps, and RCA.

The regimental commander and his staff, facing a large television screen, called for instantaneous pictures from cameras in the field and in an observation plane over the battle area as the action progressed.

A new type of enemy tank was shown on the screen and its details rapidly noted by the staff intelligence officer. An enemy prisoner, interviewed before a Vidicon camera immediately after his capture at the front, disclosed the nature of the enemy forces opposing the assault. A map found on the prisoner and held up to the camera divulged an enemy scheme of counterattack; the plan was confirmed by the airborne television unit, which located an assembly of hostile forces, and the commander rapidly altered his plans to break up the counterattack before it could be mounted. With the help of another Vidicon camera close to the front, helicopters were directed for speedy evacuation of the wounded.

Through the entire action, the commander was able, through the eyes of television, to see and control his battle situation.

The nationwide color telecast, covered by the color television cameras of RCA and the National Broadcasting Company and broadcast over the NBC television network, emphasized the future role of color in conveying more complete information for the commander and his staff, such as the color distinction between different types of terrain and foliage, natural and camouflaged objects, and the variety of colored markings and smoke signals used by friendly and enemy forces.

Viewed on color receivers in the Pentagon, at the White House, and at military headquarters across the country, the color network program demonstrated another role of television as a future means of communication between a theatre of operations and headquarters in Washington or elsewhere.

Future Importance of Combat TV

In their comments on the demonstration, Generals Ridgway, Back and Sarnoff were unanimous in emphasiz-

Airborne TV cameras in a reconnaissance plane provided air view of enemy territary for the commander.

An "enemy" prisoner, captured at the front, is examined before a combat TV camera far rapid intelligence study.

ing the important part that television is destined to play in future operations on the battlefield.

"Television has a great military potential, and it seems to me that our nation is making fine progress in developing this potential," General Ridgway said. "After its possibilities are thoroughly tested, television, as a means of military communication, can take its place beside the atomic cannon, the Skysweeper antiaircraft gun, the NIKE and Corporal guided missiles, and the Honest John rocket as part of our modern Army."

General Ridgway also paid tribute to General Sarnoff for his role in encouraging the development of television for military use, saying:

"I doubt that any individual man has contributed more in this vitally important field than you, General Sarnoff, through your vision, your energy and your persistent patriotism."

General Back said:

"The further development of these electronic eyes you have just seen will provide the battlefield commander of the future with a visual means of observing and controlling his own troops as well as providing him with a vigilant eye against surprise enemy attacks. Increased combat effectiveness and a substantial saving of soldiers' lives will be the result of this added visual facility."

General Sarnoff called the demonstration "concrete evidence that a new era in tactical communications has opened," and he pointed to the future development of combat television by saying:

"The demonstration we are witnessing today indicates that combat television units consisting of miniature color cameras and transmitters can be carried in action by one man, or fixed in positions that will enable a constant eye to be kept on critical areas."

An elevated platform helps an NBC color camera to cover the battlefield during the nationwide colorcast.

He added:

"I foresee the extensive use of military television not only as a tactical system for use in combat, but also for communications between the center of command in Washington or elsewhere, and theatres of operation across the seas."

"Operation Threshold"

The Fort Meade television maneuver, executed by troops of the famed 3d Armored Cavalry Regiment, was divided into two segments: 1) a demonstration of the Army Signal Corps Interim Tactical Television System, on a black-and-white closed-circuit system feeding to monitors and the commander's TV screen in the command post tent, and 2) an assault carried out before the color cameras for broadcast over the NBC network, and

Mounted on an amphibious vehicle, a color camera focusses on troops in action for the colorcast.

Signal Corps combat TV cameraman, in a foxhole, flashes back a picture of frontline action.

Above, TV combined with the Army's new long-range lens may give instantaneous view of distant objectives. At right, combat TV camera mounted an amphibious vehicle covers start of mock assault across lake at Fort Meade.

viewed in the command post on RCA color television sets.

The Signal Corps television unit, attached to the regiment for the exercise, comprised three rugged, compact RCA Vidicon cameras carried by combat cameramen with the troops, and two larger RCA cameras mounted in an L-20 reconnaissance plane. The ground cameras were linked by cable to truck-borne transmitters which relayed the pictures by microwave to a receiving unit and small preview monitors in the command post. From the airborne cameras, signals were sent directly to headquarters by microwave relay and appeared on a fourth monitor.

The closed-circuit demonstration showed the ability of today's experimental battlefield equipment to accomplish these tasks:

1) Location, evaluation and designation of artillery targets; 2) adjustment and control of artillery fire; 3) transmission of data from the combat area to headquarters; 4) reconnaissance of enemy territory to detect supply points, assembly areas and movement of forces; 5) intelligence reporting, such as examination of captured personnel and equipment; 6) briefing of tactical commanders before an action; 7) observation and control of friendly troops in action and behind the lines.

The color demonstration provided a glimpse of the ultimate goal—a combat TV system that will give the commander a continuous view of the situation and terrain as they actually appear.

Predicted in 1927

While 1954 marks the twentieth year of active cooperation between RCA and the services in developing television for military use, the concept itself originated at an even earlier date, in a statement by General Sarnoff in 1927. Speaking that year before the Army War College in Washington, General Sarnoff said:

"Perhaps it would be too fantastic to consider the part that may be played by direct television in the war of the future, but it is not too early to consider the direction which laboratory research should take in its application to military uses. It is conceivable that a radio-television transmitter installed in an airplane might be useful in transmitting a direct image of the enemy's terrain, thus enabling greater accuracy in gunfire."

General Sarnoff's vision of the future began to take concrete form in 1934 when Dr. V. K. Zworykin of RCA Laboratories suggested the specific application of television in aerial bombs—pilotless missiles with electronic eyes—as an American alternative to the use of suicide pilots even then being discussed by the Japanese. General Sarnoff immediately approved the suggestion and initiated discussions with the Armed Services in Washington. Encouraged by the reaction of the military leaders, he established a research program under which RCA scientists and engineers were assigned to pioneer and build suitable equipment.

Initially, the development work was concentrated in the field of airborne TV equipment, with the result that Army and Navy Air Forces were able to carry out experimental attacks during World War II with the now-famous RCA BLOCK equipment. This equipment was demonstrated publicly in 1946 at the Anacostia Naval Air Station and was later used by the services at the Bikini atom bomb tests in drone aircraft flown through the atomic mushroom.

RCA Elects Director, Promotes 4 Executives

Election of a new director and the promotion of four key executives has been announced by RCA.

Dr. Elmer W. Engstrom, Executive Vice-President, RCA Research and Engineering, was elected a member of the RCA Board of Directors on October 1, filling a vacancy caused by retirement from the Board of Walter A. Buck.

The executive promotions included election of Robert A. Seidel as Executive Vice-President, RCA Consumer Products; Paul A. Barkmeier as President of RCA Estate Appliance Corporation; Douglas Y. Smith as Vice-President and General Manager, RCA Tube Division, and Albert F. Watters as Vice-President and Operating Manager, RCA International Division.

Dr. Engstrom, who became Executive Vice-President, Research and Engineering, on June 4, 1954, has broad responsibility for all research and engineering activities of RCA. In addition, he is head of RCA Laboratories and a member of the Board of Directors of RCA Victor Company, Ltd., Canada.

Associated with Industry Since 1923

Associated with the electronics industry since his graduation from the University of Minnesota in 1923, Dr. Engstrom joined RCA in 1930. First as an engineer and then as a research administrator, he has had a pioneering role in the development of radio, sound motion picture apparatus, the general science of electronics, and both black-and-white and color television.

Mr. Seidel joined RCA in 1949 and served until recently as Vice-President of RCA's Sales and Services subsidiaries. Prior to his association with RCA, he had been Vice-President and Controller of the W. T. Grant Company.

Mr. Barkmeier, who joined RCA in 1948, has been Vice-President, Distribution, of RCA. Previously he had been Vice-President and General Manager of the RCA Victor Record Division.

Mr. Smith, who joined RCA in 1930, had been General Marketing Manager of the Tube Division. Previously, he had served as manager of RCA tube plants in Harrison, N. J., and Lancaster, Pa., and as Tube Merchandise Manager and Manager of Tube Sales Operations. In 1951, he received the Company's highest employee honor, the RCA Victor Award of Merit.

Mr. Watters, previously the Director of Associated Company Operations for the RCA International Division, joined RCA in 1935 and has served in various administrative posts in personnel and manufacturing.

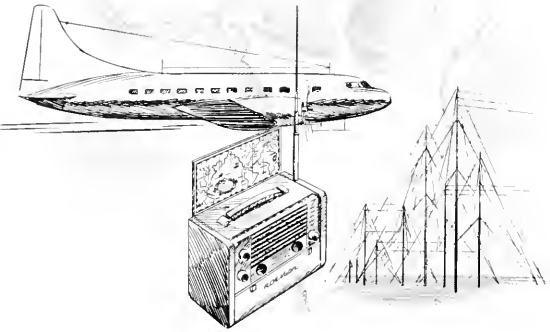
Dr. Elmer W. Engstram

Robert A. Seidel

Paul A. Barkmeier

Douglas Y. Smith

Albert F. Watters



RCA in Africa

By B. F. Moore, Jr.

Manager, Off Shore Procurement
RCA International Division

An impression of tremendous growth and progress greets the visitor in present-day Africa. Its world of witchcraft, forbidding jungles and tribal drums is giving way to vast industrial development and modernization.

Everywhere there are signs that the great continent has been undergoing remarkable changes. Modern communications systems now connect African cities; metropolitan offices are air-conditioned, and police cars are radio-equipped. Ships, plying between ports, have the latest navigational aids; natives are forsaking canoes for modern passenger planes. Behind much of the change is the electronic technician who is helping the "land of the lion" to telescope 50 years of Western technology into a single decade.

Playing an important role in the building of a new Africa is the Radio Corporation of America. RCA is bringing to Africa some of the skilled technical aid which is so essential if the area's incredible potential is ever to be realized. Vital to its development are vast communications projects, electronic aids to conquer desert and jungle, lofty broadcasting towers to speak, not only to Africa, but to the world.

Equipment in Belgian Congo

Typical examples of the work being done by RCA in Africa may be found in Elizabethville, capital of Katanga in the Belgian Congo. This is a fabulously wealthy section where copper and other important minerals are mined and where RCA equipment is doing a variety of jobs. A case in point is a mobile communications unit which keeps the local headquarters of the Union Miniére du Haut Katanga in constant touch with the foreman and working crews seven miles away and over a hill.

The efficient policing of the area is another task done by RCA Mobile Radio units. With the assistance of radio-equipped cars, the central station at Elizabethville found that a large area could be guarded with only a handful of men whose patrol cars are always in communication with the central station.

The BCK railroad in Katanga is using RCA mobile radio equipment to control all locomotive switching operations. Ninety miles away, at Jadotville, this same railroad has put RCA 16mm projectors on day and night shifts. During the day, training films are shown, while at night the projectors are utilized for recreational films for the railroad employees.

Leopoldville, the capital of Belgian Congo, recently celebrated the completion of ten years of shortwave broadcasting. Two RCA short-wave transmitters, one

An RCA customer makes her selection of a radio in Leopoldville, Belgian Congo — one of many African centers served by RCA International Division.

Radar on the Congo — the antenna of an RCA radar set installed on one of the steamers plying the great river between Leopoldville and other centers.

RCA Strato-World portable radio provided only source of outside news on African safari for Barney Berlinger, Pennsylvania gear manufacturer, and his son, Barney, Jr.

50 kw and one 7½ kw, have enabled the local station to fulfill day and night broadcasting schedules for the last decade.

Just across the river in French Equatorial Africa, Brazzaville has also been broadcasting for 10 years with an RCA 50 kw transmitter. In addition, Brazzaville is equipped with RCA Transmitter-Receiver units, and RCA Telephone and Telegraph Transmitters and Receivers.

Helps to Guide Planes

In the city of Usumbura, commercial center of Ruanda-Urundi, a United Nations Trust Territory administered by Belgium, an RCA Telephone and Telegraph Transmitter and Receiver helps to guide planes into the city's airport. For over a year this unit has been providing essential communication with incoming planes and neighboring airports. The city has no regular theater, but movies are shown at the two leading hotels with RCA 16mm units, whose performance has been unaffected by the difficult climatic conditions of high temperatures and humidity.

Because the Belgian Congo encompasses a tremendous area, and because it is so important to world commerce, two of its greatest problems have been transportation and communication. Electronics is now helping to solve the problems. Navigation of the Congo River has been speeded up by the addition of RCA Marine Radar equipment on river steamers. Prior to the addition of this equipment, it was necessary to tie up the boats every night because of the difficulties of navigating in a constantly changing channel.

RCA Radar equipment has also been installed on many lake steamers, helping them to provide faster service. In addition, RCA Diversity Receivers and Communication Receivers are rendering dependable service on most of the international communication circuits that come into Leopoldville.

Both RCA home radios and air conditioners have won high praise from residents of the Belgian Congo for their trouble-free performances despite climatic obstacles.

In the Sahara Desert

Another area in which RCA equipment is rendering invaluable service is in the Sahara Desert, an area of some 3,000,000 square miles. The Dakar-Niger Railroad runs between Dakar and Bamako and represents a tiny beachhead of progress in this hitherto unmechanized world of sand and searing sun. Installed at both ends of the 800-mile line and at a point near the center are RCA Transmitters and Fixed Receivers. They not only furnish communication between the two offices, but safeguard the operation of the line.

In Liberia, RCA helps in the efficient operation of the government. When President Tubman tours the interior of the country, an RCA Transmitter-Receiver goes along so that he can keep in touch with his government offices in Monrovia. The Liberian Posts and Telegraphs Administration utilizes the services of RCA Transmitters and Receivers which enable Liberia to communicate with the outside world.

The RCA International Division entered Africa many years ago and has built up strong distributing organizations for the sale of RCA products. These organizations, in all regions of Africa, from Tangier to Cape Town, are part of the new Africa. RCA forms an electronic bridge that links Africa to the rest of the world — a bridge that will enable this productive continent to prosper and grow.

UHF *Booster Station Tested at Vicksburg*

RCA scientists and engineers have helped television to climb over a range of hills into Vicksburg, Miss., in a successful test of the world's first "booster" station designed for ultra high frequency (UHF) TV operation.

For six weeks during the summer, TV viewers in a major part of Vicksburg were able for the first time to receive clearly the programs telecast by station WJTV, Channel 25, in Jackson, Miss. Although Jackson is only some 35 miles east of Vicksburg, most of Vicksburg is shielded from the station by a ridge of hills which has interfered with UHF reception.

The problem made Vicksburg a suitable test area for RCA scientists, who have been engaged for some time in a program to find methods of increasing the strength of UHF signals under these conditions. Geography has created similar difficulties for UHF broadcasters and viewers in a number of areas throughout the country, and the Vicksburg test, on which a report has now been filed with the Federal Communications Commission, indicates that a feasible solution has been found.

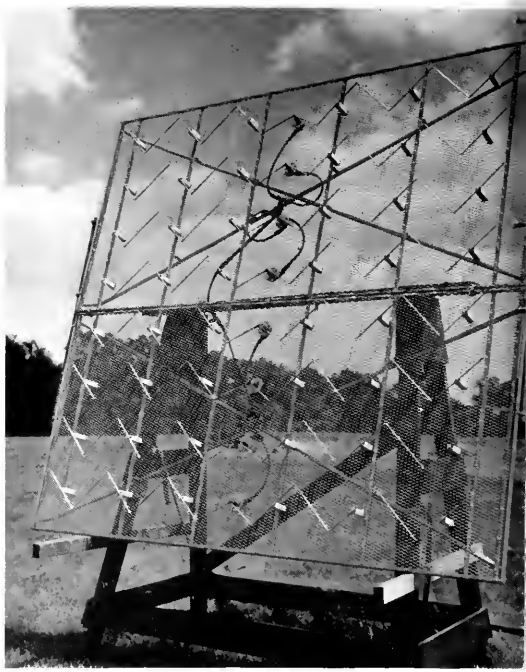
The project was carried out during June and July by a special RCA research team under the supervision of Dr. George H. Brown, director of the Systems Research Laboratory, RCA Laboratories, at the David Sarnoff Research Center in Princeton, N. J.

Operating under temporary authorization from the FCC, the RCA team conducted the tests after surveying the area to determine the most suitable location for the specially-designed UHF booster equipment. The booster operates by picking up the signal from the broadcasting station on a receiving antenna, amplifying the signal, and retransmitting it on the same channel by means of an antenna directed toward the required area. The concept is not new, but it has not been done previously with equipment capable of handling UHF signals.

The field tests, made under actual operating conditions, showed:

1. That station WJTV received an effective increase in its power by 200 times in the "shadowed" area of Vicksburg through the coverage provided by the booster system;

2. That the experimental RCA UHF booster transmitter, with power of only about 10 watts, provided acceptable service in an area partially shadowed by intervening terrain;



Receiving antenna of the RCA experimental UHF booster station, shown at Princeton before shipment to Vicksburg for the successful six-weeks trial.

3. That a good engineering estimate of the effective radiated power needed to establish a given grade of UHF service can be made once the topography of a specific television service area is known.

The Vicksburg test area, the RCA scientists found, needed an effective radiated power of 1000 watts for adequate coverage. The required power was obtained by use of a special transmitting antenna with a gain of 100 and a booster power of 10 watts.

The RCA UHF booster system is built around a low-power auxiliary transmitter, a highly directional receiving antenna system, and amplifying equipment. The equipment used in the test was constructed at Princeton, where it was operated experimentally before its shipment to Vicksburg. At the test location, the receiving antenna was mounted on a water tower about 110 feet above the ground, and the transmitting antenna, directed into the shielded area of the city, was set on a wooden tower 100 feet away.

Historic Radio Tower Razed at Chatham...

A RENOWNED American landmark vanished from the scene on August 27 at 11:37 a.m., leaving behind memories of the great pioneering days of radio. After 40 years of service, the lofty 365-foot radio tower of marine coastal station WCC at Chatham, Massachusetts, was razed.

The structure, part of the network of marine coastal stations operated by the Radiomarine Corporation of America, a subsidiary of RCA, had served throughout an entire epoch of radio communication. The position of the tower atop of a hill placed it a 447 feet above sea level and its flashing lights had been seen by captains 40 miles at sea. Originally erected for receiving signals from Europe, it was later used to support antennas which received messages from ships afloat on all waters of the world.

The leveling of the tower marks another advance in the rapid growth of electronics. In the infant days of radio such structures were necessary; but as the art of communications advanced, smaller and more powerful equipment was created and proved equally effective. Today's methods of communications have rendered the tower unnecessary.

Built in 1914

Historically as well as visually, the tubular steel structure served as a landmark, having its wellspring directly in the beginnings of radio communications. The weighty mast was built in 1914 by the J. G. White Engineering Company for the Marconi Wireless Company of America. It was part of the Chatham station which had supplanted the original Marconi station situated at Wellfleet, Mass., 23 miles north of Chatham.

The Chatham station, WCC, which the tower shadowed, maintains a safety watch on distress radio frequencies 24 hours a day, transmits weather reports periodically, gives free medical advice to ships which carry no doctors, sends press reports to large passenger ships which publish daily papers on board, and receives and transmits thousands of business and social radiotelegrams to and from ships and shore.

Aside from playing a vital role in the regular day-to-day communications business of WCC, the tower had

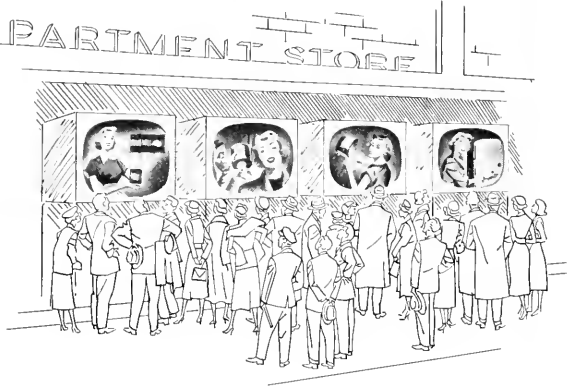
After 40 years of service, the historic tower of Radiomarine station WCC at Chatham, Mass., crashes ta the ground. Above, the mast buckles at start of its fall; below, the shattered structure lies on the ground.

been involved in many of the most exciting dramas lived by man. If it could have talked, it might have told the history it made working with famed pilots, bold explorers and daring seamen, noted ships and planes.

It could have told of maintaining communications with the Byrd expeditions to the South Pole; the lighter-than-air craft, "Graf Zeppelin"; the ill-fated "Hindenburg"; of having provided the weather information that Lindbergh relied on during his celebrated flight.

When the last guy wire was seared and the giant had tumbled, it was more than just a fallen tower, for its going signified a nostalgic farewell to a bygone era.

TV EYE
for Commerce and Industry



by M. S. Klinedinst
Manager, Distributed Products
RCA Engineering Products Division

TELEVISION may have helped to produce the watch you are wearing, saved you a few minutes at your bank this morning, or attracted you recently to an exhibit or an advertising display. It may be protecting your business property or helping to train you and your fellow workers in sales and production techniques.

These jobs, and many more, already are being handled by the workhorse variety of television — the closed-circuit system that provides sight as well as sound communication in the factory, the office and the store.

The widening scope of applications in business and industry in the past year alone suggests that television already is working a revolution in the field of business comparable to that wrought by broadcast TV in mass communication.

Just a year ago, RCA introduced the "TV Eye," a rugged, compact and inexpensive system consisting of a Vidicon camera weighing less than five pounds, and a camera-control unit. Connected to any standard home television receiver, the camera and control provide closed-circuit communications within a range of 1200 feet on any television channel from 2 to 6. With its suggested retail price of $995, the system is one of the most inexpensive available.

Hundreds of installations of the "TV Eye" have been

The "TV Eye" helps RCA workers to meet an assembly deadline. Assemblers, above, follow through television the technique and instructions of specialist, left, in the complicated assembly of an intricate device.

made, with a range of industrial and commercial applications extending from production control to remote observation of processes too hazardous for human surveillance. About 80 percent of these installations have gone into industry; 10 percent have been placed in banks, and the remainder have been applied to miscellaneous tasks such as product demonstrations, property protection, merchandising and sales promotion activities, and accommodation of overflow crowds.

New "Eyes" for Boston's Oldest Bank

The most extensive system yet installed is cutting costs and improving service in Boston's oldest bank — the Provident Institution for Savings in the Town of Boston. *The American Banker,* the daily newspaper of the banking profession, credits "TV Eye" with having "streamlined the bank's procedure, simplified and speeded up teller operations, and provided swift, efficient service for over 100,000 depositors."

The Provident installation includes four cameras in the bank's signature section, four in the balance section, and an individual receiver in each of the 17 teller booths. Its use has reduced the process of withdrawals to a matter of seconds, since tellers can now verify signatures and balances without leaving their booths. Instead, each teller is able to call directly to both balance and signature files over a microphone and loudspeaker system. The file clerk locates the proper card and places it before the lens of the camera. An indicator box, with buttons corresponding to each receiver position, enables the clerk to direct the information only to the teller concerned, who views the balance information or the signature on a television screen mounted below the counter level and is not visible to the depositor.

Besides saving valuable floor space in the bank by eliminating files in the banking area, the installation has substantially increased the number of transactions each teller can make and has permitted the Provident bank to accommodate thousands of new depositors.

Saving Time for the Watchmakers

Another "TV Eye" installation, at the Providence, R. I., plant of the Bulova Watch Company, is providing visual communication between engineering and production sections that are located in different buildings.

Before the system was installed, Bulova's engineering-production problems had to be handled by telephone or by personal traveling between the two buildings to check parts or blueprints. Now, with the use of one "TV Eye" unit and a standard home receiver in each of the two buildings, production and engineering personnel can compare notes and check their parts and blueprints visually without leaving their desks.

The result has been a saving of hundreds of man-hours for executives and skilled personnel, greater efficiency, and less time away from the job.

Largest installation yet of "TV Eye" helps to speed banking operotions at the Provident Institution for Savings in Boston. File clerk, above, holds signoture cord before the camera for viewing by teller, right.

At the Bulova Watch Company in Providence, R. I., "TV Eye" permits visual communication between engineers, left, and production section, right, in separate buildings.

The RCA Engineering Products Division, which manufactures the "TV Eye," has itself gleaned benefits through use of the system. Recently, the Division was faced with a rush order for a key electronic component used in its "Stereoscope" theatre sound equipment. With ten theatres calling for the equipment for the opening date of Cinemascope feature, a quick and accurate multiple assembly line operation was necessary to meet the deadline. This is how it was done:

A "TV Eye" camera was mounted in position over a work bench where a specialist assembled the component. The camera picked up every movement of his hands and his tools as he assembled the intricate device. Simultaneously, a close-up, step-by-step picture of the assembly operation was transmitted to six television receivers placed at production benches on the floor. In front of each set, an assembler watched the screen and followed the movements of the leader, completing the components in time to make the deadline.

Uses Virtually Unlimited

These are three varied examples from a list of "TV Eye" uses that appears virtually unlimited.

Another bank — the new Industrial National Bank of Dallas, Tex., — has installed a system that links four outside teller windows with signature and record rooms deep within the bank itself, permitting rapid drive-in banking service for its clients.

A number of companies are making effective use of "TV Eye" for promotional purposes. The Parker Pen Company, for example, employs a system in its sales promotion campaign with a "see yourself" application.

The system also has been applied to department store operations. The L. W. Ayres Company in Indianapolis has used "TV Eye" to televise fashion and style shows within the store for passers-by outside, to promote special sales with "see yourself on television" as an added attraction for customers, and, in a more technical application, to test and check television sets.

In every installation, "TV Eye" has either improved productive or commercial operations, or increased the effectiveness of a promotional campaign. In its industrial applications, it is proving the ideal means of extending human vision to remote points, with resulting improvements in quality, total production, or safety — or perhaps all of these things.

For particular and special industrial uses, RCA has devised and built accessories to adapt the system to a variety of working conditions. These include such features as remote optical focus, permitting the camera lens to be adjusted remotely from the control unit; weatherproof housing, to protect the camera in outdoor applications, and explosion-proof housing for operation in atmosphere containing gasoline, petroleum, naphtha, natural gas and other explosive elements or compounds

A number of installations requiring these accessories already have been made, and the list is expanding steadily as progressive managements become aware of the vital contribution which television can make to the improvement of many industrial operations.

Dr. Zworykin Elected Honorary Vice-President of RCA

Dr. Vlodimir K. Zworykin, with historic TV tubes he has helped to develop.

DR. VLADIMIR K. ZWORYKIN, who conceived and developed the iconoscope, television's electronic "eye," pioneered in development of the television picture tube, and contributed to many other aspects of modern television, retired on August 1, 1954, as Vice-President and Technical Consultant, RCA Laboratories, and on August 6 was elected by the RCA Board of Directors to the first Honorary Vice-Presidency in RCA history.

In a tribute to Dr. Zworykin's many contributions to electronic science, leading scientists, educators and industrialists met in Princeton, N. J., on September 18 for a scientific seminar and a dinner given by RCA in his honor. The seminar, covering developments of the past thirty years in synthetic materials, aeronautics, nuclear physics and medical electronics, included talks by Dean Hugh Taylor of the Graduate School, Princeton University; Dr. I. I. Rabi, Nobel Prize winner and Professor of Physics at Columbia University; Dr. Jerome C. Hunsaker, retired head of the Department of Aeronautical Engineering, Massachusetts Institute of Technology, and Dr. James Hillier, Director of the Research Department of Melpar, Inc.

Brig. General David Sarnoff, Chairman of the Board of RCA, was the principal speaker at the dinner, held at the David Sarnoff Research Center of RCA. In a talk paying high tribute to Dr. Zworykin, General Sarnoff said:

"When you add to the genius of a Zworykin the freedom and opportunities provided by America, you really nourish the divine spirit and ignite the divine spark of achievement."

Dr. E. W. Engstrom, Executive Vice-President, RCA Research and Engineering, who served as toastmaster at the dinner, emphasized that Dr. Zworykin will continue to serve as a consultant to RCA.

"While there has been a formal change on the records coincident with retirement, we will continue to have his counsel," Dr. Engstrom said. "He will continue to share his days with us in the laboratory to the extent that he wishes to do this."

RCA Service Company

Consumer Service

One of the fleet — the familiar truck of the RCA serviceman.

by D. H. Kunsman

Vice President, Consumer Products Service Division, RCA Service Company, Inc.

On the last day of August this year, a vicious hurricane, deceptively called "Carol," swept New England, wreaking havoc with lives and property. Phone facilities were disrupted, electric power failed. In Boston, the 650-foot tower that serves the NBC affiliate, WBZ-TV, collapsed. Antennas atop countless homes were ripped from their moorings and destroyed.

Within hours, New England branch offices of the Consumer Products Service Division of the RCA Service Company, Inc., were flooded with calls, telegrams, letters and personal visits. RCA Service Company technicians worked ten to twelve hours a day trying to bring some order out of the chaos. Telephone poles, trees and debris blocked roads, making the work even more difficult.

The only bright aspect of the story was the almost miraculous speed with which the RCA technicians executed their tasks. WBZ-TV went back on the air, with a temporary antenna, the same day that the hurricane struck. New antennas were installed on the roofs of homes as soon as possible after each loss had been reported to the Service Company branch office. Often it meant arduous travel over rough detours for the technicians—clearing away debris as they went, or helping with any emergency that they might meet. But, despite almost impossible conditions, the RCA technicians did arrive and were able to bring the situation under control in unexpectedly short time.

The files of the RCA Service Company are filled with letters praising the RCA technician who serves the average customer so well—often far beyond the call of duty. One such customer wrote, "I wonder if you ever stop to consider what a goodwill ambassador your serviceman is. Do you realize he is the only connection we as customers have with RCA? I think they are a fine group of men, and their work is above reproach."

Thousands of Contacts Each Week

Unexpected and even dramatic occurrences are actually "par for the course" for the more than 3,000 representatives of the Consumer Products Service Division. In addition to their routine duties of installing and correcting RCA Victor television, radio and phonograph sets and servicing RCA Air Conditioners and RCA Estate Ranges, they are often called upon for much more.

Many thousands of contacts with RCA customers are made every week by these carefully-selected, well-trained specialists. And in the home, where the RCA Service Company technician spends most of his working hours, his activity is inevitably expanded beyond repairing and installing RCA Victor instruments.

For instance, a branch manager recently received in the mail the keys to the home of a customer of many years standing. An accompanying note asked that the air conditioner be serviced while the family was on vacation. Also enclosed was a diagram of the house indicating the location of all plants, with the request that, if it wouldn't be too much trouble, the service man water them while he was there. Note: The request was cheerfully granted.

Meets Unusual Situations

This is a mild example of the many unusual circumstances with which the RCA technician may be confronted. There have been instances when, but for his quick thinking, catastrophe might have resulted.

Not long ago, an RCA technician was installing an antenna in a New York suburb when a heavy rainstorm hit the area. After the storm had subsided, the technician returned to the job, but he noticed that the flat roof of the adjoining building was flooded with more than 18 inches of water.

Knowing that water enclosed on a flat roof can sometimes cause the roof to collapse, the technician crossed over and drilled holes in the necessary places so that the water could drain off. The building was a store, and the crowd of people inside remained unaware that a possible major tragedy had been averted. When the technician and the store manager inspected the premises soon afterward, they found that several beams had cracked and pulled away from the side of the building

A basic task for the RCA service man — adjusting a newly-installed TV set in the home.

In a matter of minutes, the roof would have caved in, with tragic results.

An appreciative letter on file tells of two RCA Service Company technicians who, on Christmas Eve, worked until after 9 p.m. erecting an antenna, so that Santa Claus could get due credit for a new TV set. The grateful customer added, "Working on a cold night, missing a Christmas party, and being pleasant about it is almost unbelievable. . . ."

The high caliber of the Service Company representatives is not "almost unbelievable" when their training and qualifications are considered. Each technician is required to have above average technical background, either in the form of technical education or practical experience, or both, in order to qualify for the job. After joining the Service Company he must complete

Installation of mobile two-way radio systems is an important RCA Service Company job.

Home Study Courses that last 42 months while he serves as an apprentice technician.

In addition to this, a Training Coordinator in each of the eleven districts supervises continuous training of all representatives to keep them abreast of latest developments and techniques in service work. Many technicians supplement their knowledge by taking advantage of a company-sponsored tuition loan refund plan that enables them to take approved correspondence courses or attend local schools and colleges.

An indication that the public has faith in these superior standards is manifest in the hundreds of thousands of RCA Victor television owners who buy the RCA technician's services on a yearly contract basis through the RCA Victor Factory Service Contract.

History of Service Company

The RCA Service Company, Inc., is RCA's own service organization. From its beginning as an RCA Victor Service Division installing and maintaining Photophone equipment, the RCA Service Company expanded with the advent of television and was formally organized as a wholly-owned subsidiary of the Radio Corporation of America in 1942, with headquarters in Camden, N. J.

The first RCA Service Company branch was opened in 1945 in Long Island City, N. Y. Today, Service Company specialists operate in every state in the Union and in 34 overseas locations. Within the Service Company there are several divisions other than the Consumer Products Service Division which have as their special tasks installing and servicing such diversified equipment as radio and television broadcast, mobile communications, theatre sound and projection, industrial electronic and many types of military electronic equipment.

In the field of mobile and microwave communications, the RCA technician is on the job for pipeline companies, transport and taxi companies, and industrial firms throughout the nation, maintaining the equipment that make rapid economical radio communications possible.

New Plans Inaugurated

The Service Company is frequently inaugurating new plans designed to improve its already high standards. Sales programs, with special emphasis on the role of technician, a modernized fleet of service trucks, worthwhile incentive programs for branch management and technicians are such recent innovations.

In view of their training, background, and scope of activities, it is not surprising that the engineers and technicians who comprise the Service Company have made outstanding contributions to the television industry. In the area of UHF, for example, RCA Service Company technicians and engineers aided in the development of several UHF antennas and other installation accessories now in use. Their contributions in field testing activities paved the way for successful UHF broadcasting.

These men played a major part in the introduction of color television to the American public, setting up and conducting demonstrations from coast to coast. Participation in the early phases of color development and field tests prepared the RCA Service Company technician for his later role as instructor among other field groups and for conducting color TV service clinics throughout the country.

The Radio Corporation of America is proud of the manifold achievements of the RCA Service Company technician who is seen daily on the streets and roads of innumerable towns, driving the familiar truck of the RCA Service Company. To vast numbers of potential and actual RCA Victor customers, he is "Mr. RCA."

RCA news in brief

Cosmopolite

J. Fred Muggs, who, via television, has become something of a legend in the past year, made a triumphal entry on the *Today* set in August, five weeks after leaving New York on a trip around the world. The famous chimpanzee, during his global trek, danced for the customers in a Beirut night club, rode a camel in Cairo, made an appearance on Nippon TV, and frolicked among the pineapples in Honolulu. The trip wasn't solely without hitches, however. Muggs caused the Middle East Airlines people some confusion when they found he was listed neither as cargo nor passenger. One of his NBC travelling companions resolved the difficulty by buying him an infant's ticket. Then, too, in Hong Kong, Muggs and his party forgot to tell their police escort that they were going out shopping one day. Getting to the store presented no problem, but after word of Muggs' whereabouts spread throughout the city, it took a riot squad to get them out. All in all, Muggs' good-will tour was highly successful and gives him the distinction of being the most cosmopolitan simian in the world.

Eyes Front

A new invention, undetectable to TV viewers, permitting a performer to be prompted and still look straight into the camera lens, has been successfully demonstrated by WNBT on a closed circuit. The prompting attachment, called the "Gerard Eyeline Monitor," is attached in front of the lens of either a live or a motion picture camera. In addition to allowing the performer to look directly into the eyes of his audience, a further advantage of the "Eyeline Monitor" is that the sets of lenses on the live television camera can be used at any position desired, not tying up one by making it necessary to keep a particular lens in use.

Hospital TV

More and more of the nation's hospitals are installing television receivers in patients' rooms to help make hours and days of recuperation pass more rapidly and enjoyably. One of the latest and most modern installations has been completed in private and semi-private rooms and solariums at the Albany Hospital, Albany, New York. A total of 225 RCA Victor receivers, all of them with 17-inch or larger screens, now are in use there. Special glasses, with prismatic lenses, make it possible for patients who must not move from a prone or supine position to see the screen. Each receiver is equipped with a small, flat speaker for sound reception which is placed under a patient's pillow. A remote control switch permits patients to turn the sets on or off from the bed.

Royal Tour

"The Royal Tour of Queen Elizabeth," the film documentary of the tour of Queen Elizabeth II and the Duke of Edinburgh, marks the first CinemaScope film made and processed outside the United States with full Stereophonic Sound on four magnetic tracks. The Sterophonic Recording was done by RCA Photophone Limited, RCA associate company in England, at the Tower Studio in Hammersmith, London, for the producer, British Movietone News. The picture was released by 20th Century Fox.

Home Tuneup

A consumer-aimed promotion campaign designed to help television service dealers alert owners of home TV receivers to the benefits of periodic "tuneups" has been initiated by the RCA Tube Division. The campaign is utilizing national radio and television advertising, point-of-service advertising and display material, and direct-mail literature to spotlight a Fall TV Tuneup Special to be offered by thousands of service dealers from coast to coast.

Choice of the Voice

The Voice of America has selected "Princeton '54," WNBT's educational television series presented last Spring in cooperation with Princeton University, for telecast to nations throughout the world. The nine half-hour television programs represent the results of discussions and studies extending over a period of 18 months on the part of Princeton and WNBT. The programs explored the techniques and methods by which the resources of a university such as Princeton could best be made available to television. The series which dealt with the arts and sciences, was a result of a grant made to Princeton by WNBT in the fall of 1952.

Aspects of Broadcasting

(Continued from page 7)

side" an equal opportunity to answer daily?

If the right to editorialize is not confined to the interest of the network itself or the interests of the radio art and industry, in which the network or its owner also has an interest, but is extended to other public or political questions — that is, if the network is to have the same right as the newspaper has to editorialize — it follows that it must have the same political rights. Thus a network could be a Republican network or a Democratic network, or the network of some other legally recognized political faith. It so happens that now there are only four TV networks, and it is conceivable that all four networks could become Republican, or all four might become Democratic networks. Surely this cannot be anyone's intention, for such a condition would be highly undesirable.

Impractical Solution

Therefore, if one takes the position that a network should editorialize as freely as a newspaper, he might also do it as frequently. Thus, there may be a daily network editorial as well as a daily newspaper editorial. Well, if a network broadcasts one editorial a day on some important subject, is it going to give the other side or sides an opportunity, every day, to answer that editorial in the same time? That would seem to me to be impractical for many reasons.

And if it does not furnish such equal opportunity to reply, the network might fail to meet the requirements of the Federal Communications Commission.

Because of the complex and serious nature of this problem, I think that while Dr. Stanton picked the right issue in demanding that radio and television be accorded the same rights as the press to broadcast the McCarthy hearings or any other public hearings, I regret exceedingly that he has confused a specific case with a general principle, by adding the word "editorial" on the TV screen. Whether a network should or should not editorialize, raises a fundamental question that calls for the most careful study and consideration.

I am not saying that networks should not have the right to do it. I think they should have that right. Whether they should exercise that right — and under which circumstances — calls for clearer definition than Dr. Stanton has given in the statement which he made on the air.

As I have said, I am in agreement with him as far as concerns the immediate case of the right of radio and television to report on, and to broadcast the hearings now going on in Washington.

So far as the National Broadcasting Company's network is concerned, we have not engaged in editorializing; not since we have been in the broadcasting business. And we are not ready to abandon our policy. Of course, we shall watch the new developments as they go along and study the reactions they produce.

Government Licensing of Networks

As you know, the question of government licensing of networks has recently been raised in Washington. I am certainly not in favor of requiring networks to be licensed because I do not regard network operations — as distinguished from individual broadcasting stations — a business that should be licensed or regulated by the Government. But the licensing question may be viewed differently when the problem of general editorializing by a network is considered. It raises the question of licensing networks in an atmosphere that changed when the word "editorial" was flashed on the TV screen by CBS.

I recognize the distinction between a network and a broadcasting station. Insofar as individual stations are concerned, I believe they should have not only the right to editorialize, but that they might well exercise that right in their local communities.

The circumstances surrounding stations are certainly different from those surrounding networks. For example, in New York City there are more radio and television stations than there are newspapers. I can visualize an independent station being frankly partisan, just as there are newspapers that are frankly partisan. But, when it comes to the network imposing its editorial views on a public or controversial question upon its affiliated stations, it is quite a different matter. It is not a sufficient answer for a network to say that a station could reject that editorial if it did not share the network's opinion and views. There are practical limitations of program scheduling, etc., which must be taken into account by stations as well as by networks.

Change in NBC Call Letters

The call letters of three of the National Broadcasting Company's company-owned stations will be changed at midnight, Sunday, October 17. The changes affect NBC's radio and television stations in New York, and its TV stations in Los Angeles and Washington, D.C.

The NBC New York stations, which are currently WNBC, WNBC-FM, and WNBT, will become WRCA, WRCA-FM, and WRCA-TV. The company's Los Angeles television station will become KRCA instead of KNBH, while the Washington NBC television station, now WNBW, will become WRC-TV.

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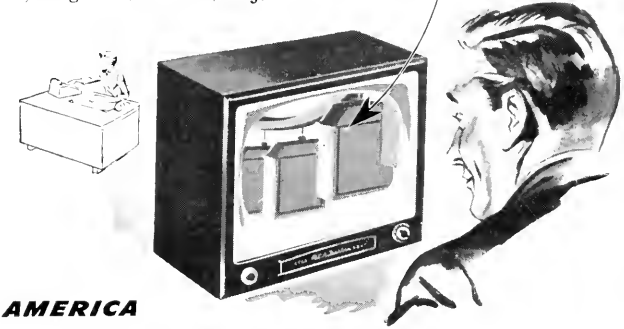

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