

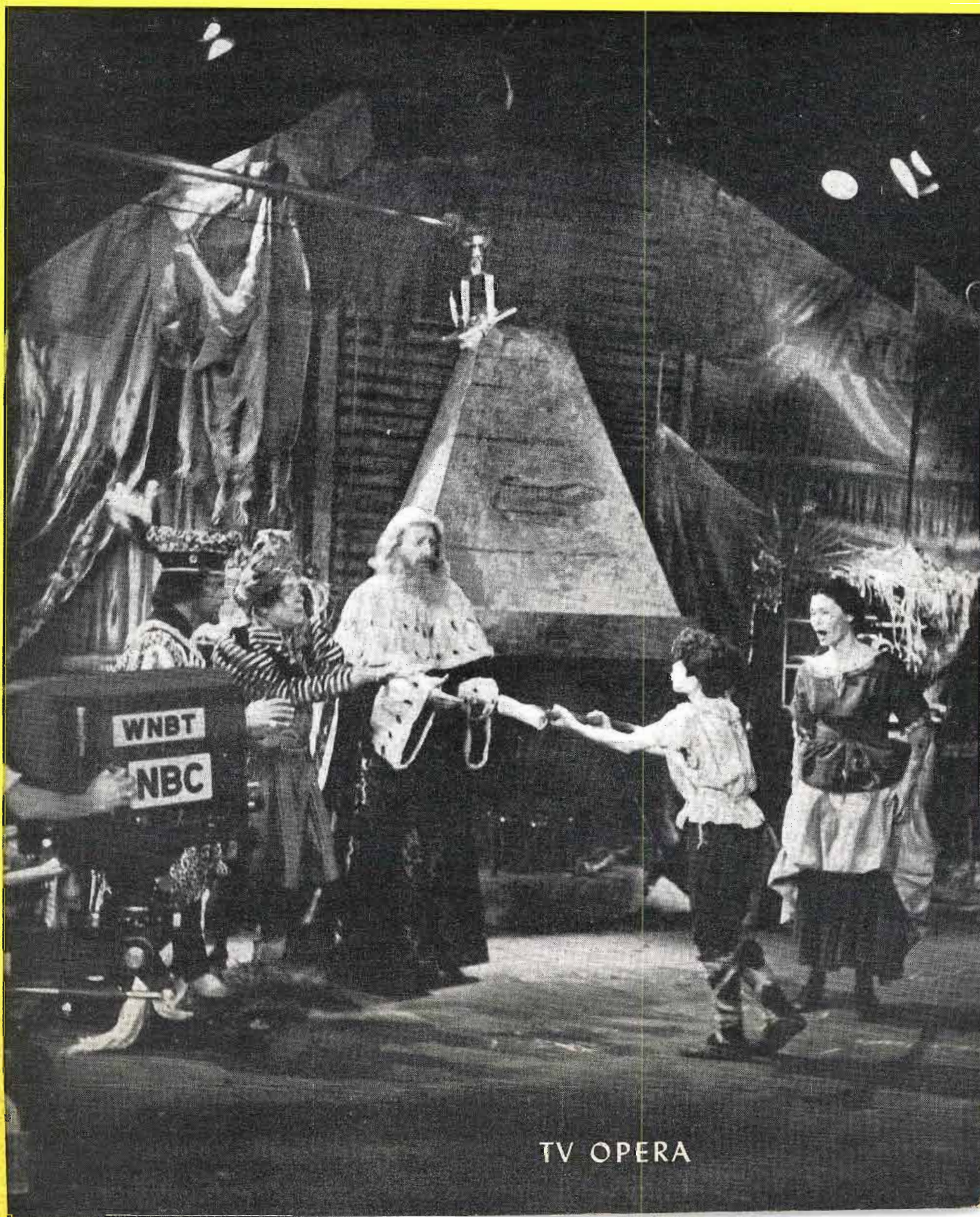
# RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



JANUARY

1952



TV OPERA

*Not a Mirage!*



## It's the 1000-mile Trans-Arabian Pipeline's desert marvel, TAPLINE . . . RCA radio equipped

From Persian Gulf to Mediterranean Sea . . . across more than a thousand miles of shifting sands and rugged desert . . . runs TAPLINE, one of the world's greatest oil-carrying systems, built by Trans-Arabian Pipeline Company.

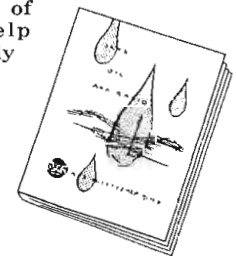
Tribute to the engineering resourcefulness of many organizations, TAPLINE takes its place as a marvel of modern vision and commercial achievement. RCA engineers were among the first in the field, in 1947 . . . to provide radio

communication as the oil line was built.

The great system, now in complete operation, is RCA radio equipped. Desert vehicles receive and transmit with mobile radio units of new design. Aviation radio directs air traffic serving TAPLINE. Marine radio aids tankers off shore. Fixed control and relay stations, that operate in all the weather of 1000 desert miles, keep up the flow of radio communication that is vital to the flow of oil.

RCA's experience in radio is worldwide. Its equipment is recognized as the standard for highest performance. The international facilities of RCA are ready to help industry or government in all fields of radio. Consult your RCA distributor or RCA International Division.

The interesting booklet "Sand, Oil and Radio," the story of TAPLINE, may help you. It is free. Simply write for it.



RCA INTERNATIONAL DIVISION

**RADIO CORPORATION of AMERICA**

RCA BUILDING

30 ROCKEFELLER PLAZA, NEW YORK, N.Y., U.S.A.

# Radio Age

RESEARCH • MANUFACTURING • COMMUNICATIONS  
BROADCASTING • TELEVISION

JANUARY 1952



## COVER

A dramatic scene from the premiere of "Amahl and the Night Visitors", an opera composed by Gian-Carlo Menotti and telecast by NBC on Christmas eve. (Story on page 9.)

## 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*  
LEWIS MacCONNACH, *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.



Dave Garroway (right) as "communicator" of "Today," NBC's new morning television program, will reach throughout the world for news items for his broadcasts from a special studio in the RCA Exhibition Hall, Radio City.

"Measured from the date of Marconi's first transatlantic wireless signal in 1901, radio in 1951 celebrated a Golden Anniversary," he recalled. "Throughout its half century of progress as a science, art and industry, it has met the tests of ups and downs in business. The constant invigoration of science has given radio a perennial vitality and versatility. Its Golden Age is still ahead."

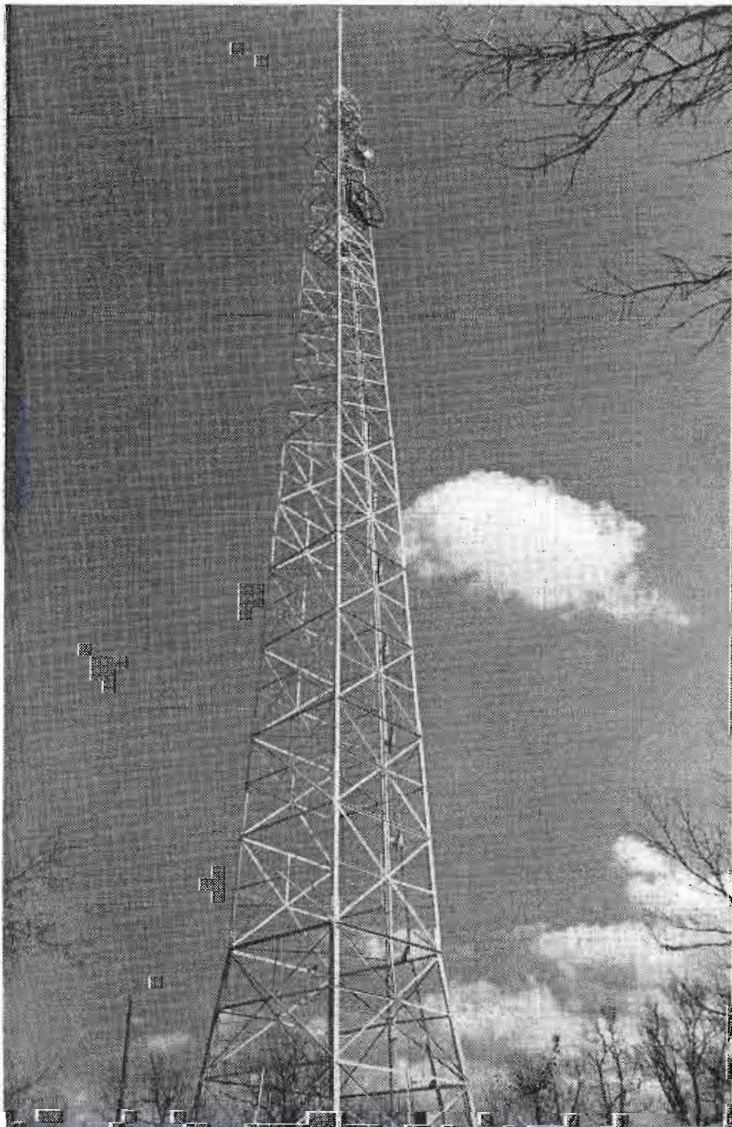
General Sarnoff said that the radio industry looks forward with confidence to each new year as one of increasing promise and progress. He continued:

"The year 1952 will be no exception; for the field of electronics — of which radio and television are a vital part — is on the threshold of many new developments. These include the harnessing of electrons in solids for useful work, instead of subjecting them to incandescent heat inside a vacuum tube.

"Tiny devices, known as transistors, have been developed for use as detectors, amplifiers and oscillators for radio, wire and cable communications. These use germanium crystals as small as a match head. They will play an important role in the future of many forms of communications.

"Today, communication is only one facet of the future of electronics, the roots of which are imbedded in radio and television. There are limitless possibilities also

**Tower of RCA-NBC experimental UHF television station at Bridgeport, Conn.**



for electronic inventions in new and broader fields, especially in the field of home appliances.

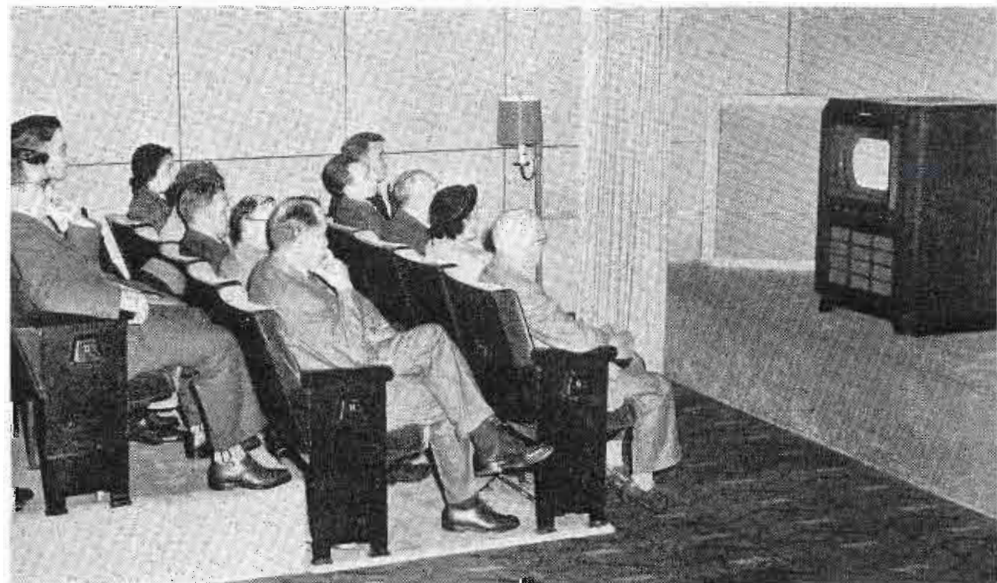
"On the threshold of 1952, it is difficult to imagine a world without radio, or homes without broadcast receivers and television sets. This record of accomplishment and public service is the result of the freedom we enjoy in America to research, invent, develop and progress under a democratic system of competitive private enterprise that surpasses in achievement any other system in the world."

### Seven Radiomarine Employees Join Quarter Century Club

Seven employees of the Radiomarine Corporation of America, a service of RCA, have become new members of the Radiomarine Quarter Century Club, it was announced by Thomas P. Wynkoop, President of Radiomarine. In recognition of their 25 years of service, completed with the Corporation in 1951, the veteran employees received gold watches and honor scrolls. The Radiomarine Quarter Century Club, organized in 1948, now has a membership of 50.

The new members are: Miss Dorothy R. Boller, Secretary to the Vice President and Treasurer; George P. Shandy, Great Lakes Regional Sales Manager; William M. Uhler, Philadelphia Sales and Service Manager; Edmund B. Burgess, Coast Station Manager of WOE, Lake Worth, Fla.; Frank Geisel, Coast Station Manager of KPH, Point Reyes, Calif.; Robert C. Steadman, Radio Operator at WCC-WIM, Chatham, Mass.; and A. Arthur Karas, Personnel Manager. Miss Boller is the first woman to become a member of the Quarter Century Club.

**One of the viewing rooms, installed at Center Theatre, New York, where thousands watched public showings of RCA's compatible color television system.**



# Outlook for Radio-TV Industry

*President of RCA Reports Facilities Available to Meet Increasing Military and Civilian Demands—Foresees Continuing High Level of Radio and TV Sales*



By Frank M. Folsom  
President,  
Radio Corporation of America

**A**S THE radio-television industry enters 1952, it has an all-time peak production capacity available for the Nation's rapidly increasing demands for military, as well as domestic production and service, Frank M. Folsom, President of the Radio Corporation of America, announced in a year-end statement.

Mr. Folsom said that to meet this dual production requirement of the national emergency, RCA — as one of the industry's major producers — continued during 1951 a multi-million dollar plant expansion program. He reported that new manufacturing facilities, plus those established in earlier postwar years under the impetus of television, give RCA the greatest production potential of its 32-year history.

"Throughout 1951," he declared, "RCA accepted a rapidly increasing number of Government contracts for scientific research, engineering development, and production of military equipment in the radio-electronics field. This volume of work, substantial in 1951, is expected to be three to four times greater in 1952, and will reach record levels during 1953. Next year's military output

will probably equal in dollar volume the 1942 rate, when RCA plants were devoted 100 per cent to war production.

"Military equipment produced by RCA in 1951 included various types of radio communication instruments, 'walkie-talkies,' radar and sonar equipment, range-finding and navigational instruments, audio and radio devices for airplanes, and numerous types of electron tubes. Radio-electronic instruments currently required by the Nation's military forces are far more complex than those used in World War II. For this reason a large and increasing number of RCA engineers is engaged in research and engineering development work on Government projects."

Mr. Folsom revealed that one of RCA's outstanding engineering contributions is the "miniaturization" of equipment, an excellent example being the Signal Corps' new "walkie-talkie" which is half the size but twice as powerful as the one used in the last war. Similarly, it is now possible to get far more electronic control equipment into airplanes than ever before.

In addition to RCA's military development and production projects, he said more than 600 engineers and

Simple converter designed by RCA Victor to enable owners of standard television sets to receive UHF stations.



technicians of the RCA Service Company are working with the U. S. armed forces in 20 different countries, assisting in the training of military personnel, as well as servicing radio-electronic equipment.

He noted that in response to military demands, activities in connection with RCA's "Premium" electron tubes — designed and manufactured to meet stringent military requirements — were intensified, with twice as many new types of "Premiums" planned for production during 1952, as compared with the past year.

### *High Production Levels Maintained*

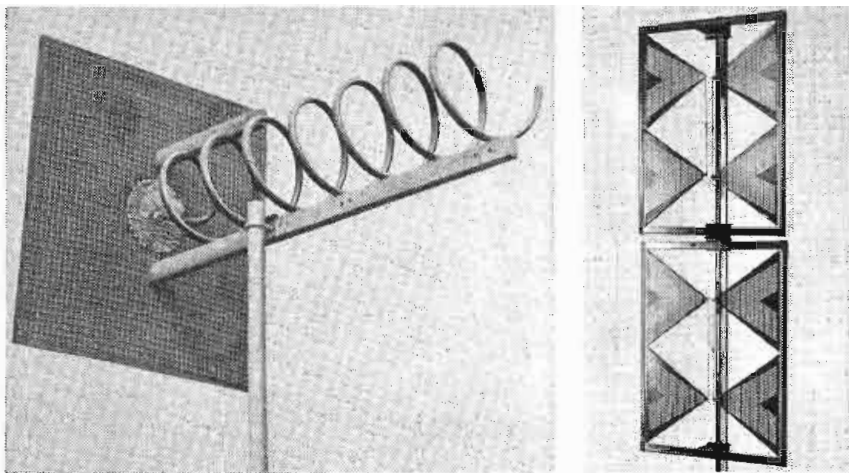
Mr. Folsom reported that in the domestic field, RCA and other leading manufacturers in the industry maintained relatively high levels of production of television and radio sets, as well as phonograph records during 1951. Purchases of TV receivers by the American public during the year reached approximately 5,000,000, bringing the total in use throughout the Nation to more than 15,000,000 sets, he reported. He declared that these sales, plus new installation and servicing, added more than \$1,500,000,000 to the national income.

Increases in transmitting power and improvement in TV receiver design were cited as contributing to the widening receiver distribution potentials in areas presently served by television.

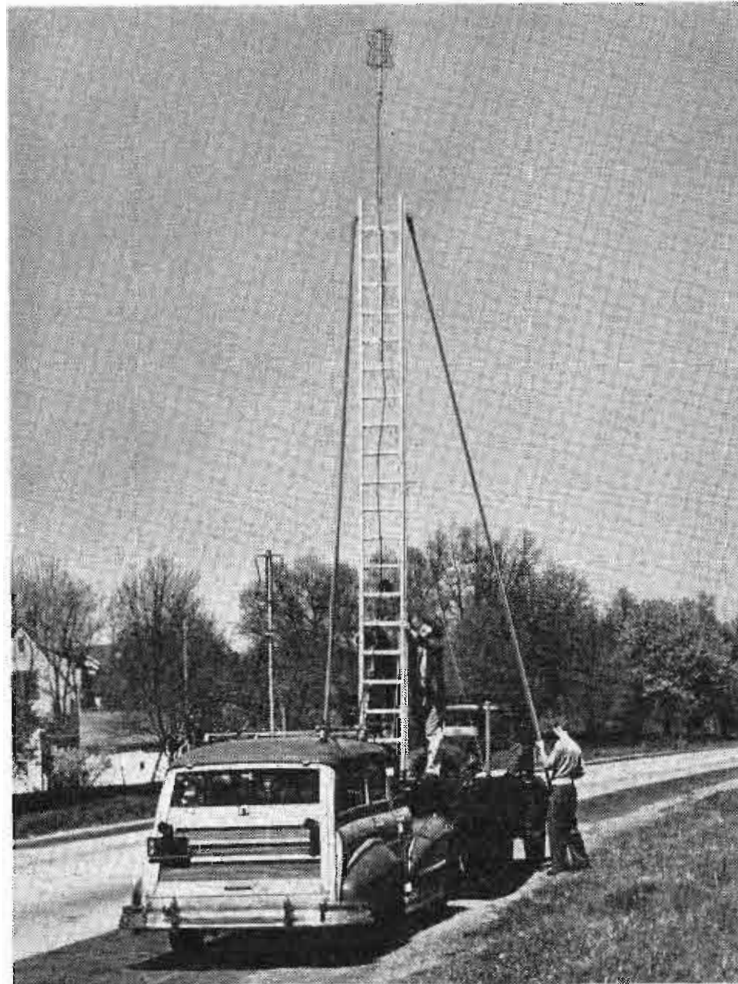
"Numerous sections of large cities, as well as rural communities, where reception has been either impossible or of marginal value, are now getting excellent television pictures for the first time," said Mr. Folsom.

"As a contribution to this development, RCA Victor introduced, in the fall of 1951, a line of 'super-powered' television receivers with two to three times greater selectivity, picture stability, and freedom from noise interference in sound reception. Among numerous communities to benefit from receivers of this type are

Two types of experimental UHF antennas created by RCA for field tests of UHF programs.



This "Walkie-Talkie" developed for the Signal Corps is one of RCA's contributions to the Nation's defense.



Television engineers raise a portable antenna to check the strength of UHF signals transmitted by the RCA-NBC station at Bridgeport, Conn.

Trenton, N. J., certain areas in Eastern and South Eastern Pennsylvania, and several towns within a 100-mile radius of Atlanta, Ga.”

In the important field of ultra-high-frequency (UHF) television, hailed as the means of supplementing the present very-high-frequency (VHF) television to bring about a truly nationwide television service, the various divisions and departments of RCA showed marked progress during the past year in adding to their pioneering work, he continued.

“New developments in tubes, receivers, converters, antennas and transmitters contributed to a high order of quality and reliability in recent demonstrations of UHF television,” he reported. “These demonstrations centered about the RCA-NBC UHF television transmitter near Bridgeport, Conn., the first and only experimental UHF transmitter operating on a regular schedule. Receivers installed in the surrounding homes by the RCA Service Company provided ‘listening posts’ from which much valuable data were obtained.”

#### *Radio-Phonograph Business in Healthy State*

Mr. Folsom, pointing out that “the glamour of television sometimes overshadows the fact that the radio and phonograph businesses also are in a very healthy condition,” revealed that the production of radio receivers and radio-phonograph combinations during 1951 was approximately 12,000,000 units — more than double the number of TV set sales. This raised the number of radio sets in use throughout the country to more than 100,000,000, or an average of more than two sets per family, he said.

Plans of RCA Victor to enter the room air conditioning field in the coming year were reported to have been completed.

Sales of recorded music rose sharply in 1951, establishing a trend that Mr. Folsom said is expected to continue throughout the next year, with the increasing popularity of both the RCA Victor 45 and 33 1/3 systems.

Discussing the future production outlook, Mr. Folsom declared:

“With a sharp increase in military deliveries scheduled, domestic production in 1952 is expected to be somewhat lower than in 1951. It is probable, however, that the industry as a whole will produce between 4 and 4 1/2 million television receivers and 9 to 10 million radio sets and radio-phonograph combinations.

#### *Limiting Factors in Production*

“The limiting factor in domestic production will be, of course, the availability of raw materials and component parts. Curtailment of supplies for non-military production is expected to be felt most during the first half of 1952. This condition may improve to some extent in the second half, as the expanded production of suppliers begins to reach manufacturers.”

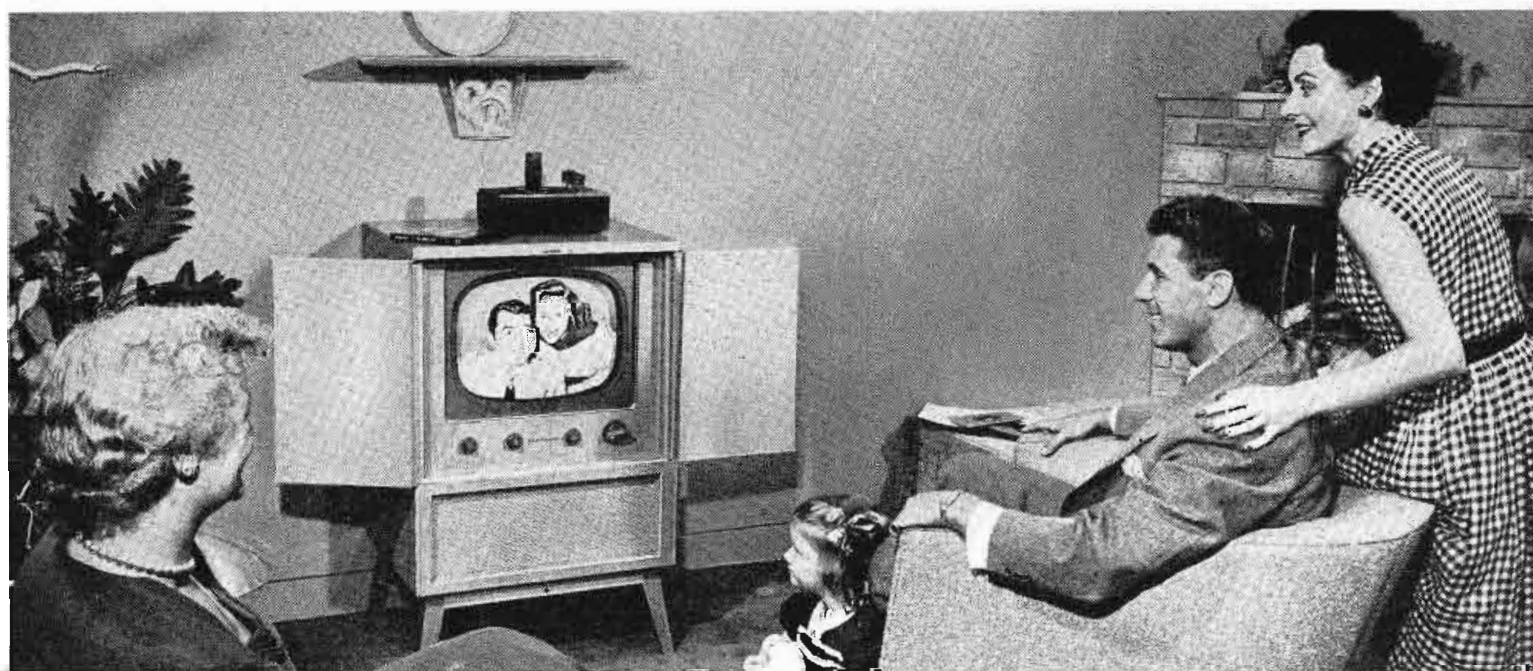
RCA achieved high levels of production and service in 1951 through the outstanding teamwork and cooperation of its employees and the thousands of independently-owned companies that supplied raw materials, component parts, and various types of special services, said Mr. Folsom, adding:

“As one dramatic example of this teamwork and cooperation, RCA was able to begin deliveries of the new ‘walkie-talkie’ it developed for the U.S. Signal Corps sixty days ahead of a super-rush deadline.

“Another example of the importance of RCA suppliers is seen in the cooperation of 560 different companies on just three of the Corporation’s Air Force production contracts.

“These are but two instances of American team-play operating in the best interests of the Nation. They are clear proof, however, that the products and services of modern American industry come from no single self-sufficient source, but from a wide range of interests welded together by a common purpose—the national welfare.”

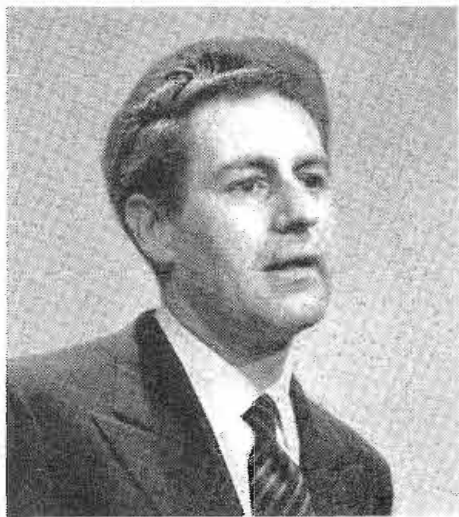
More than 15,000,000 American homes now enjoy television program service.





# First TV Opera Widely Acclaimed

Menotti's "Amahl and the Night Visitors," Composed for Television, Wins Enthusiastic Praise from Press and Public



Gian-Carlo Menotti, composer of the television opera "Amahl and the Night Visitors."

**M**ORE than two years ago, Samuel Chotzinoff, NBC's General Music Director, acting on behalf of the company, commissioned Gian-Carlo Menotti to write an opera especially for television production. The NBC television opera project was in its first year and already had indicated from several productions that it was capable of taking on the presentation of an entirely new work.

NBC had confidence that Menotti would produce an opera which would be good television and a fine work of art at the same time. Its confidence was based upon its own previous experience with Menotti, who had been commissioned to write the first radio opera in America in 1937. This opera, "The Old Maid and the Thief," made a signal success on radio and has since been performed in opera houses throughout the world. Menotti has won great acclaim in opera and on the Broadway stage with his "The Medium," "Amelia Goes to the Ball" and most recently "The Consul." To insure the success of this television presentation, NBC also arranged to have Menotti stage his own opera.

At the time Menotti was commissioned, he was given carte blanche as to subject matter and all other details of the opera. After two years, Menotti submitted the opening pages of the music and the libretto for "Amahl and the Night Visitors." NBC agreed to put the opera into production for Christmas Eve presentation.

Scheduling an opera before the score and libretto had

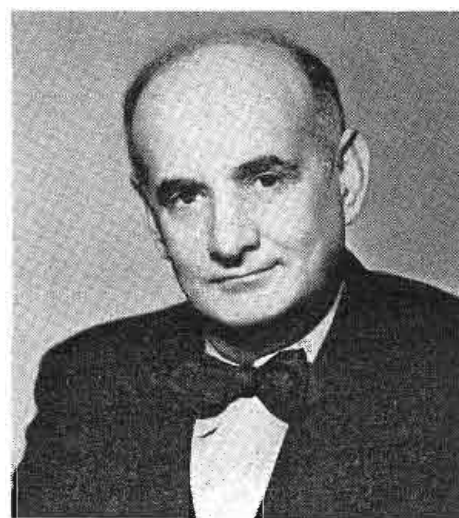
been completed might have seemed a foolhardy thing to do, but Chotzinoff's experience with Menotti had indicated that Menotti would come through with colors flying, which he did. The triumphant reception that the opera has had from press and public alike has been virtually unequalled in music or in television.

In the *New York Times*, Olin Downes wrote: "Mr. Menotti, with rare art, has produced a work that few indeed could have seen and heard last night save through blurred eyes and with emotions that were not easy to conceal. It might be said at once that if nothing else had been accomplished by this work, television, operatically speaking, has come of age.

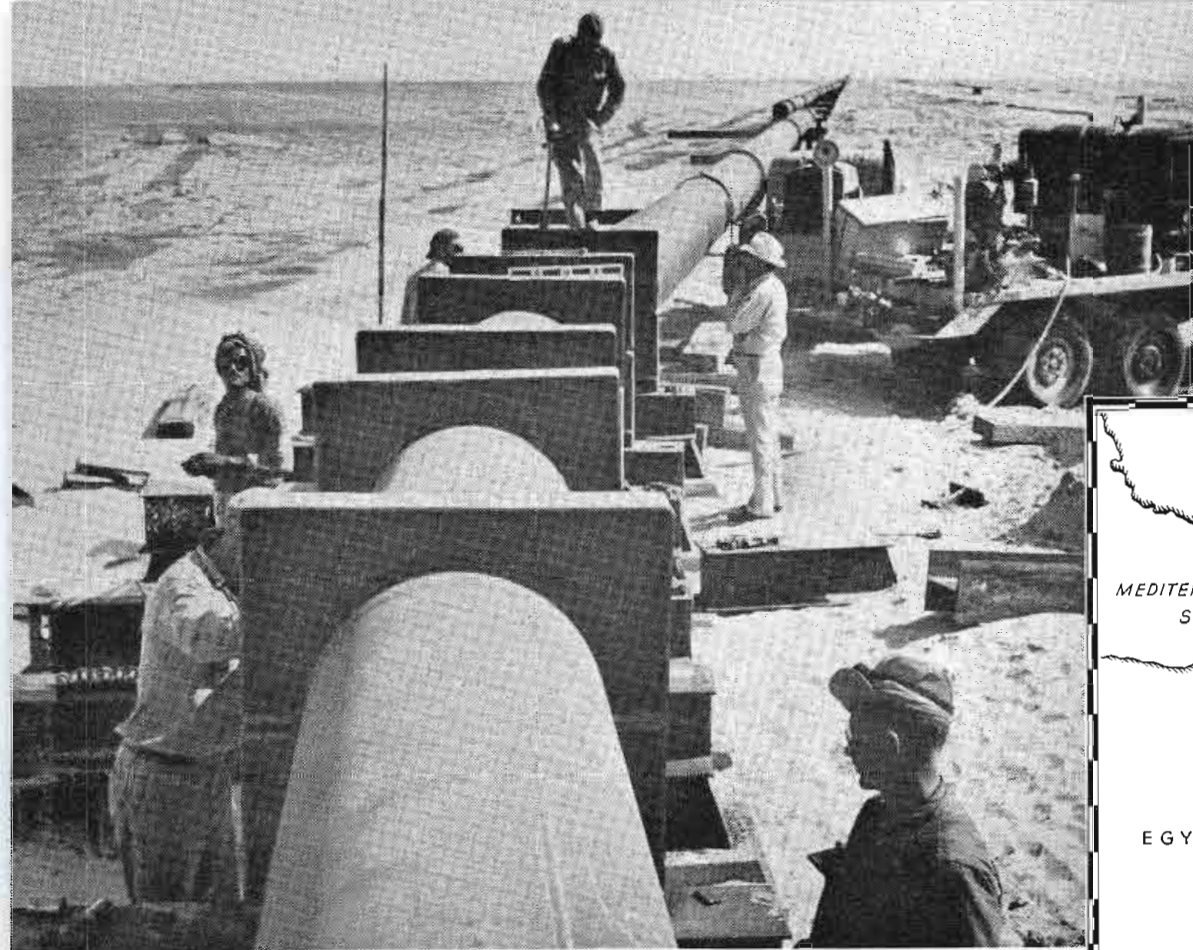
John Crosby in his syndicated column said: "Menotti's music, so powerful in 'The Consul,' was marked here, I thought, by a rare melodic sweetness completely in harmony with the breathless sweetness of the tale he unfolded. Besides the boy (Chet Allen), a low bow is due also to Rosemary Kuhlmann for her performance and singing as the mother, to Samuel Chotzinoff who produced it, to NBC who commissioned it and who, I hope, will revive it many times."

These sentiments were repeated by newspapers, magazines, syndicated columns and wire services all over the country. Not only was Menotti singled out for praise, and NBC for commissioning the opera, but all of the singers and particularly the 12-year-old boy, Chet

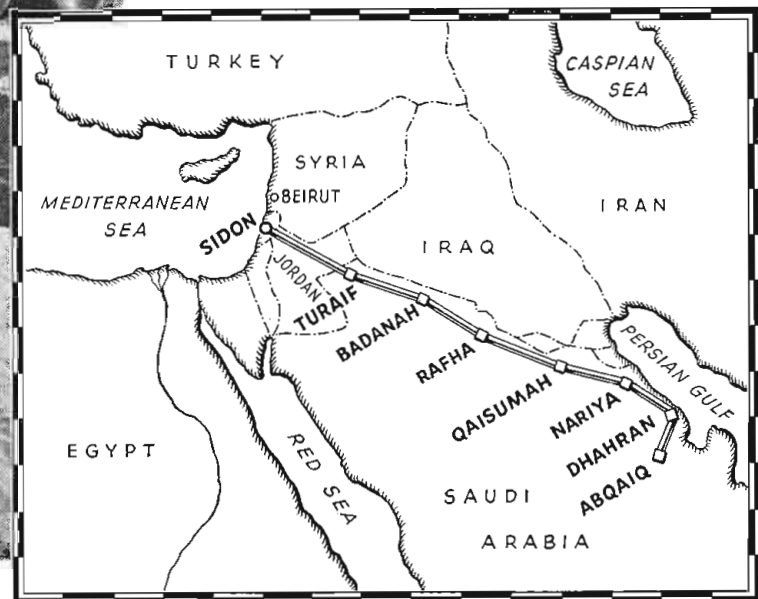
*(Continued on page 31)*



Samuel Chotzinoff, General Music Director of NBC, who has directed the network's opera project.



Left: Section of Tapline conduit which carries daily flow of 300,000 barrels of oil over 1,000 mile route shown below.



# Radio Speeds Work on World's Largest Pipe Line

By H. C. Edgar,

*Merchandising Director,  
RCA International Division*

CONSTRUCTION and operation of the world's largest oil pipe line across more than a thousand miles of desert wasteland from the Persian Gulf to the Mediterranean Sea represents a modern wonder achieved by a combination of radio and petroleum engineering. Successful 24-hour operation of the mighty oil highway, which traverses four countries—Saudi Arabia, Jordan, Syria and Lebanon—depends upon instantaneous, reliable radio communications. RCA was entrusted to design and install a radio system between terminal points and the six pumping stations that control the daily flow of 300,000 barrels of oil.

Tapline, the abbreviated name commonly used to identify this project, was built by the Trans-Arabian Pipe Line Company and the Arabian American Oil Company. It cost more than 200 million dollars to build and required more than 265,000 tons of steel pipe. Completion of the project involved three years of work and more than five billion ton-miles of freight shipments. Most of all it involved vision.

Actually, the history of Tapline starts with the dis-

covery of oil in commercial quantities in Saudi Arabia. The oil there is close to the Persian Gulf, but by tanker route it would have to be carried 3,500 miles to the Mediterranean, by way of the Indian Ocean, the Red Sea and through the Suez Canal. Looking at their maps, oilmen saw that tremendous savings in time and money could be made by piping the oil across the sands and gravelly plains of the Arabian Peninsula. After extensive planning and study, construction on the pipe line was begun in the summer of 1947.

Communications engineers of the RCA International Division were among the first to go into the field. These engineers were organized into two groups for the Tapline project. The field team was composed originally of eight engineers but later was expanded to 20. The other group, at the New York home office, was made up of from three to eight draftsmen and engineers. While the field force was erecting temporary radio facilities, the New York group was busy on blueprints of the permanent system of communications.

The initial step in designing an integrated radio system for Tapline was to investigate the best method to use under the prevailing geographic and physical conditions. RCA technicians made detailed ionospheric propagation studies and then developed a frequency

allocation plan for the many services that would be required. The problems of obtaining radio station licenses and frequency assignments from the four countries were finally solved. Preliminary studies revealed that special antennas would have to be designed in order to reduce static interference from desert sandstorms which had previously obliterated radio reception.

### *Radio Circuit Completed in Month*

Installation of a radio circuit between Tapline's main office in Beirut on the Mediterranean and Ras el Mishaab on the Persian Gulf was the first major task. In one month, this circuit was completed and was carrying executive telephone and teletype traffic. To insure efficient handling of messages over the circuit, two expert operators were furnished by RCA Communications, Inc. When the temporary stations at Beirut and Ras el Mishaab were replaced by permanent stations, the changeover was accomplished without loss of operating time. The direct circuit between these terminals has been in continuous operation, day and night, since service was inaugurated.

As work progressed along the pipe line, RCA engineers provided communications for field construction units, camps, motor caravans, supervisors and survey parties. At all times, field personnel was in constant radio contact with either Ras el Mishaab or Beirut.

As radio engineers and pipe line construction crews advanced from opposite ends of the 1,000-mile course, they encountered one of the world's most barren areas. A tree is a rarity in this land where the average rainfall is only three inches a year. The summer temperature rises to 130 degrees Fahrenheit, with a humidity below seven per cent. In such a climate a man requires

two gallons of water a day. Metal surfaces, such as the sections of steel radio antennas, were too hot to touch.

Close teamwork between the RCA International Division at home and abroad eliminated delays in the construction work. In New York, shipments of equipment and supplies were coordinated according to schedules set up by field engineers. There was a constant exchange of information between Arabia and New York on engineering details of the entire system.

Before oil began to flow in the pipe line in November 1950, the communications system installed by RCA had carried more than 500,000 telegrams and more than 750,000 telephone messages.

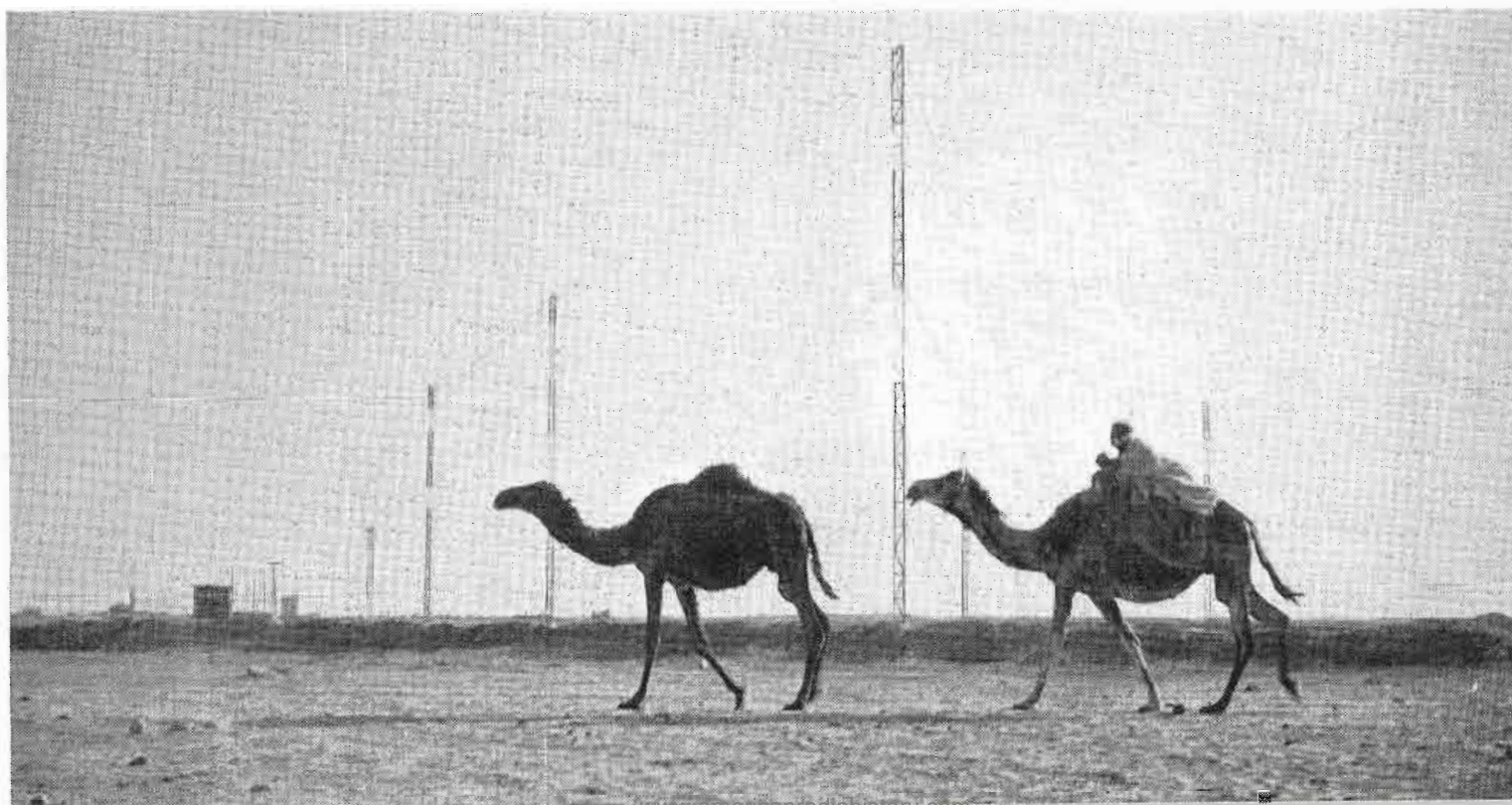
The completed system, as operated today, has the following specialized functions: (1) dispatching pumping operations, (2) airway and vehicular communications and (3) dispatching movements of oil tankers.

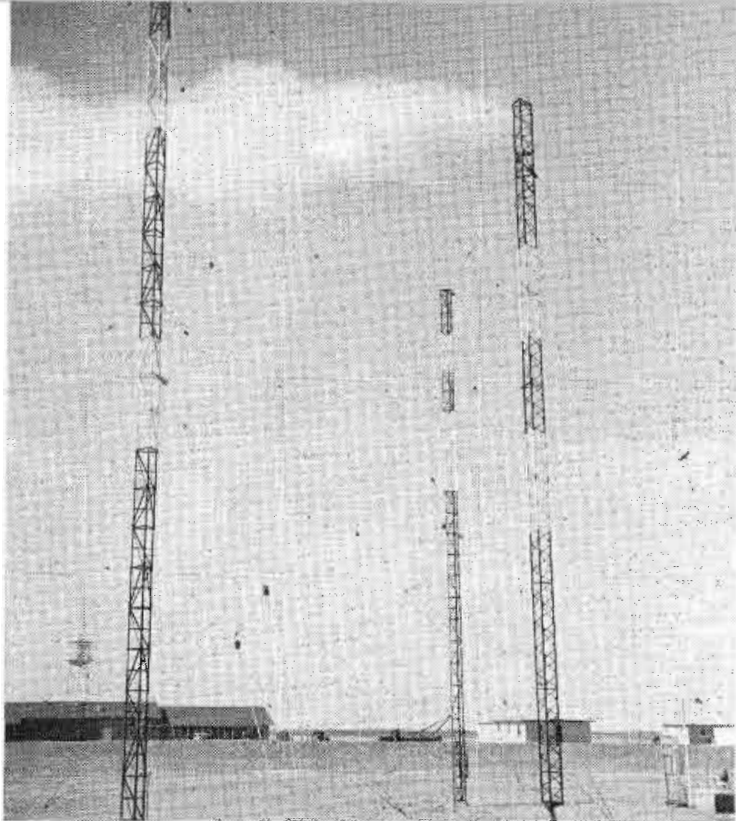
### *Voice Communications Can Be Coded*

Communications for pumping operations consist of parallel telephone and teletype circuits. Signals from the various pumping stations are received by an automatic repeater station at Rafha, midway on the pipe line, and retransmitted from there to other points. Through the use of automatic repeater operation and frequency diversity, nearly 100 per cent reliable telephone service is available between the pumping stations and the terminals at Beirut and Ras el Mishaab. For security purposes, a method was developed whereby all voice communications may be encoded into more than a hundred different combinations.

Since Tapline's pumping stations are separated by as much as 175 miles, air transportation is vital for the speedy shipment of materials, equipment, medical and food supplies, and personnel. Each station has its own

Plodding dromedaries form an old world foreground against a backdrop of Tapline's radio towers.





Radio antennas designed by RCA and erected at one of the oil pumping stations in Saudi Arabia.

airstrip for company airplanes. Communications with both vehicles and airplanes are coordinated with particular airports and stations by the operators at the various radio stations. Calls from an automobile or plane en route across the desert are received on a telephone switchboard like any ordinary call. If desired, communications may be conducted between a vehicle and an aircraft in flight.

All six airports are equipped with RCA air navigational beacons for the safe guidance of transport planes. Shortly after the beacon system went into operation, some of the commercial airlines changed their routes in order to take advantage of these navigational facilities.

#### *Old and New Worlds in Contrast*

Oil from Saudi Arabia reaches the end of its journey through Tapline at Sidon, on the Mediterranean, where tankers are loaded. Radio antennas towering above the orange and fig trees of this ancient city offer an unusual contrast between Old and New Worlds. Actual dispatching of tankers is controlled from the main office at Beirut by means of the radio station at Sidon. This station also supplies vital weather information to the tankers being loaded.

To accomplish the various specialized functions, the RCA-designed communications system utilizes frequencies from 250 to 88,000 kilocycles. Frequencies in the VHF range are employed for the radio link (instead of wire lines) between Sidon and Beirut. This link is engineered to carry eight voice channels, two teletype channels and two control channels for simultaneous communications in each direction.

A majority of the apparatus for the Tapline radio

system was standard RCA equipment, specifically intended for this type of service. However, custom-made components were needed in several cases to meet unusual conditions and requirements.

All transmitting and receiving antennas for the project were custom-made to provide interference-free communications. Antenna towers were designed to withstand the combined forces of the violent sandstorms and high winds that sweep the desert.

#### *Saudi Arabs Trained for Radio Work*

Aside from the actual installation of the radio system, the RCA International Division performed many technical and non-technical services which are important for successful operations. One contribution was the training of Saudi Arabs for radio operating and service work.

The two main difficulties encountered in this training were language and inexperience. Few Arabs were able to speak even a few words of English and only a handful of Americans were acquainted with Arabic. But gradually words were exchanged and slowly a new language came into being along the pipe line. It wasn't Arabic or English but a workable combination through which both groups could converse without too much difficulty.

Before the construction crews arrived, most of the Arabs had never seen such simple tools as a screwdriver or monkey wrench, yet in time they learned many skilled trades. After being carefully tested and selected for aptitude, Saudi Arab employees were given instruction in telephone, radio and instrument maintenance by RCA field engineers.

To minimize inventory problems, RCA developed a standardization program for spare-part equipment and techniques. The fewest possible types of tubes, equipment and antennas were utilized wherever specialized functions permitted. As a result, a technician familiar with one station can be transferred to another and find himself acquainted with equipment and procedures.

After the radio system was completely installed, many of RCA's engineers remained as permanent Tapline employees. This is not difficult to understand. At each pump-station settlement are air conditioning and refrigeration plants as well as recreation halls and infirmaries. In addition, the stations have comfortable dwellings, dining halls and athletic fields.

By overcoming such obstacles as climate, language barriers and technical problems, petroleum and communications engineers have made a tremendous contribution to the world's oil economy. Tapline is striking proof of America's ability to cope with difficult communications problems abroad and to solve them successfully.

# RADIO AND ELECTRONICS

## Their Status and Promise

By Dr. E. W. Engstrom

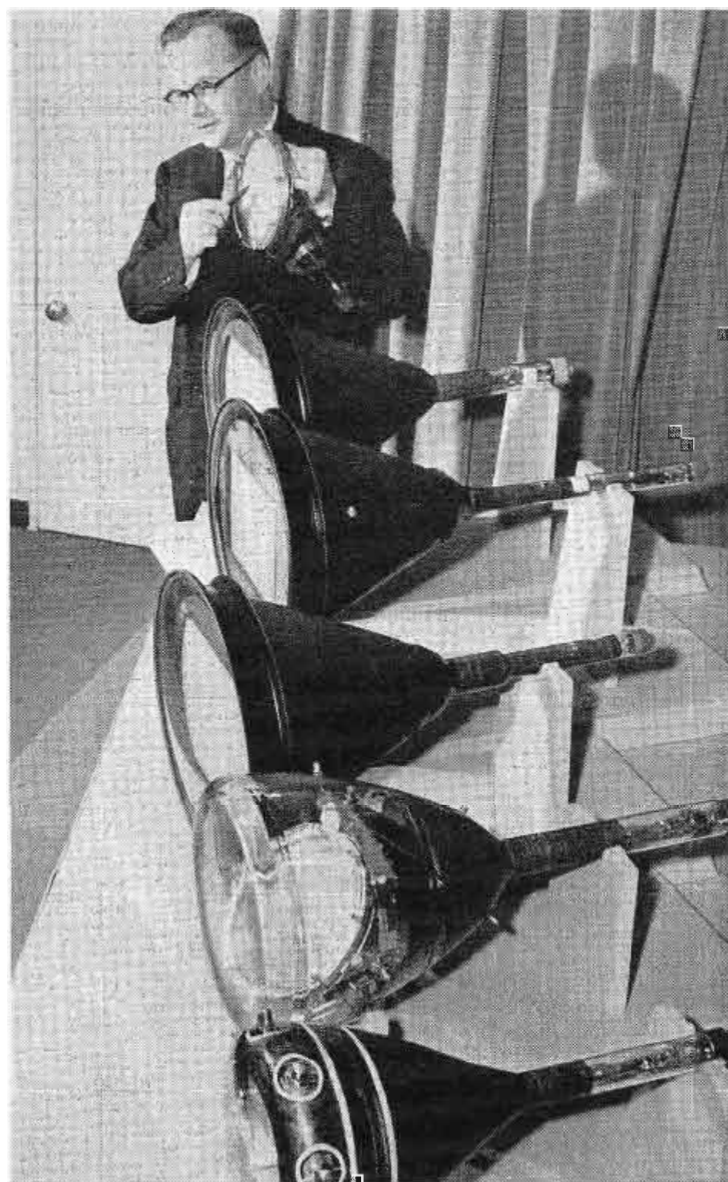
Vice President in Charge,  
RCA Laboratories Division

*An address delivered at the 60th Anniversary Convocation of Drexel Institute of Technology in Philadelphia on October 31, 1951.*

**I**T IS particularly appropriate on this occasion to speak about radio and electronics as a science and as an industry. It is appropriate because radio, followed by electronics, had its beginning at about the same time this Institute was founded. We may but think of Hertz's experiments in electromagnetic radiation. We may consider Branly and his coherer for detecting radio frequencies in the early 1890's. Again we may think of Marconi and his experiments of the 1890's, culminating in his historic transmission of the letter "S" across the Atlantic in 1901. These were the beginnings and I have called attention to but a few of the pioneers. They were followed by a host of others until today the technical workers are counted by the tens of thousands and those who serve in the industry, by the hundreds of thousands or millions.

In the years that followed the first practical radio transmissions, the service grew rapidly in both its continent-to-continent and ship-to-shore branches. During those early years the use of radio was confined to code communications. While some experimental work on radio telephones was done, the idea of broadcasting had not yet been proposed. The period of World War I and the years just following saw the development and initial use of the "vacuum tube." It is this electronic tube which today is at the base of the huge radio-electronics industry. I shall say more about this later.

While radio communications grew rapidly, it even now is small in terms of plant and equipment and in operating revenue when compared to the services to which it and the electron tube gave birth. I refer, of course, to radio broadcasting—sound and television—and to the many applications of electronics. Before leaving the subject of radio telegraph communications, it may be of interest to note that during the past several years the radio message traffic handled by private com-



The author points to one type of tri-color television picture tubes developed by RCA.

panies in the United States has run from one-half to three-quarters of a billion words each year.

With the advent of radio broadcasting in the 1920's, radio really began reaching its seven league stride. This new service, the outgrowth of radio communication, soon outdistanced its parent. As an example of the magnitude of this now mature service, 12 million sound receivers were produced last year in the United States. These had a retail value of 650 million dollars. In that same year some 380 million electron tubes were produced at a value of approximately 500 million dollars. Radio billings for network broadcasting totaled some 200 million dollars. As of the start of this year, 96

million radio receivers were in use in 45 million homes of our country — or 95 percent of the population.

This, then, is the measure of the service which has extended man's power to hear — to listen at a distance. For as long as man has had the concept and the vision to do so, he has likewise dreamed of sight at a distance. It is significant that as the pioneers were first experimenting with and conceiving uses for radio transmission, other pioneers were carving out the beginnings of television. Here, however, real progress in the art had to await the development of refined instrumentalities of electronics.

Television of a practical and commercial nature began as World War II developed. Once started, the service marked time until the cessation of hostilities. Since then, the growth has been phenomenal — beyond the estimates of the most optimistic. Last year in this country some 7½ million television receivers were produced, representing a retail value of approximately 2 billion dollars. Today, more than 14 million television receivers are in operation.

109 television broadcasting stations serve more than 60 important areas representing roughly 60 percent of the nation's population. The number of stations would be much larger except for the "freeze" on new stations which has been in effect since 1948. The majority of the 109 stations are now served by network programs. This network facility has just recently become trans-continental. Currently, billings for television network broadcasting are approximately the same as that of sound broadcasting. Soon it is expected that new station authorizations will be given, both through the lifting of the freeze and the establishment of service in the ultra-high radio frequencies.

#### *What Electronics has Accomplished*

We have examined three of the stepping stones leading to the present. There are others. Electronics gave the silent films a voice. Electronics gave the speaker, the singer, and the performer an enlarged voice for large audiences. Radio and electronics gave the public, industry, and individuals means to communicate and means to control at a distance. Electronics means control and safety on land, on sea, and in the air. Now industrial forms of television permit sight at a distance in places where it is difficult or dangerous for man to view. Other forms of industrial television permit teaching in new and improved ways. Electronics abounds in control processes for machinery in factories. Now electronics is doing our counting, our computing at lightning speed. There are facets so numerous that I can but mention these few examples.

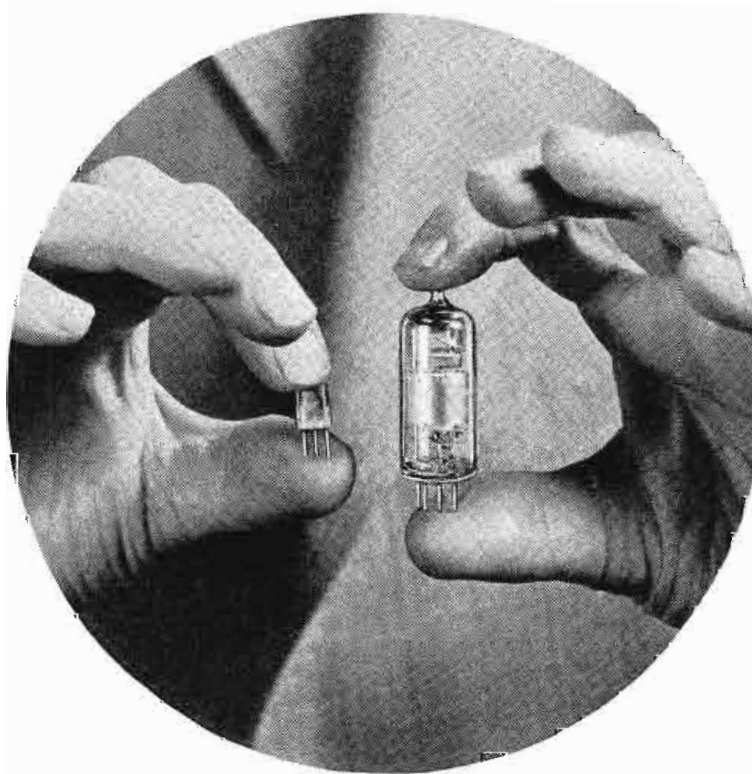
Radio provided its first major test as a military tool during World War I. By World War II, radio and electronics were integral parts of the military machine. Superiority in radio, radar, and electronics had much to do with the outcome of the conflict. One used to say that an army marched on its stomach. Now one may say that military might on land, on sea, and in the air, lives, moves, shoots, and conquers on its electronics. Radio and electronics are the "brains" on which all military movements and actions depend.

#### *New Materials Enter Scene*

Radio equipment of the early days made use of essentially the same materials as its older brother, the electrical industry. I mean the use of conductors — materials permitting the ready movement of electrons when under the proper influence; insulators — materials where the electrons are bound; and magnetic materials. From almost the beginning, however, a new class of materials entered the radio scene. These were neither conductors nor insulators in the usual sense and they did not obey Ohm's law. I refer to the loosely packed particles of the coherer and the crystal with its point contacts. These were the detectors of radio waves. While the performance of such units could be measured, the basis of the performance was little understood. Except for such specialty applications these semi-conductors were the discards of the electric and radio arts. They served well

*(Continued on Page 26)*

The tiny transistor (left) is compared here with a miniature vacuum tube which it may eventually replace in radio sets and other electronic apparatus.



# TELEVISION IN 1955

Prospects of Video Industry Outlined by NBC President in Year-end Statement  
which also Analyzes Trends of Viewing Audience, Theatre Television  
and Sponsor Participation



By Joseph H. McConnell  
President,  
National Broadcasting Co.

**A** TELEVISION viewing audience of 84,000,000 people, more than half the total national population is envisaged for 1955 in a year-end statement by Joseph H. McConnell, President, National Broadcasting Company. "By that time," he said, "we will think of television as we think of radio today; not in regional terms but as an instrument of mass communications for all of America."

Mr. McConnell expressed his opinion that theatre television will keep abreast of home viewing. "I anticipate that 4,100 theatres will be television equipped on our target date (1955). Each will accommodate an average audience of 1,000 bringing the theatre total to 4,100,000 viewers.

"The economic graph for television will climb with all the speed of audience growth," he continued. "We now count television billings in the tens of millions; but 1955 should put us in figures several times as great.

"Total national expenditures for advertising in 1951 were \$1,775,000,000. With an expanding economy, with television vaulting toward maturity, with growing business awareness of the importance of all advertising media,

I anticipate that the total annual income from all advertising sources in 1955 will reach \$8,000,000,000.

"Considering the present leaping demand for television network time, it is probable that television in 1955 will achieve billings of \$1,000,000,000; or one out of every eight dollars spent by American advertisers in all media.

"At first glance, this sounds fantastic: one communications medium, in three additional years, to achieve a gross income that represents more than 50 per cent of today's total advertising budget. But that is typical of television's history. A billion dollar industry has been created almost overnight. Hundreds of millions are being spent on new equipment, on scientific research, on programming and talent and on network expansion.

"Despite the vast increases in revenue, the major networks will not record large profits. Income will be plowed into growth. It is possible, even probable, that networks will continue to show losses in this period of feverish expansion.

"We who are custodians of the airwaves have an obligation to the American people to use this new medium for the benefit of all. We intend to fulfill it. By 1955, I expect to see television well entrenched as our foremost cultural instrument. Not since the printing press has any invention offered such opportunities for the enlightenment of everyone."

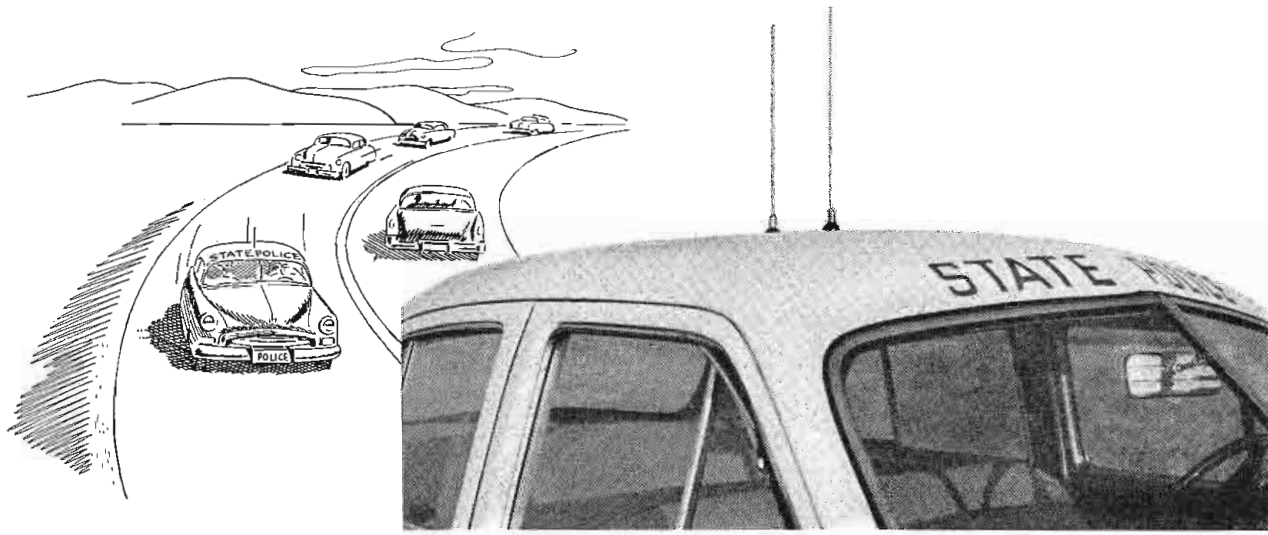
## David S. Rau Promoted

Election of David S. Rau as Vice President and Chief Engineer of RCA Communications, Inc., was announced by H. C. Ingles, President on January 4. C. W. Latimer, formerly Vice President in Charge of Engineering, was appointed Vice President and Chief Technical Consultant of RCA Communications.

Mr. Rau, who joined RCA as a student engineer upon his graduation in 1922 from the United States Naval Academy at Annapolis, has served since 1950 as Assistant Vice President and Chief Engineer.

Mr. Latimer has been with RCA since its formation in 1919, having begun his engineering career three years earlier with its predecessor, the Marconi Telegraph Company of America.

# Microwaves Protect Motorists on New Jersey's New Turnpike



**M**OTORISTS travelling the 118 miles of the recently opened New Jersey Turnpike extending from the New Delaware Memorial Bridge at Pennsville to the George Washington Bridge will be safeguarded throughout their journey by a comprehensive seven-station microwave radio relay system.

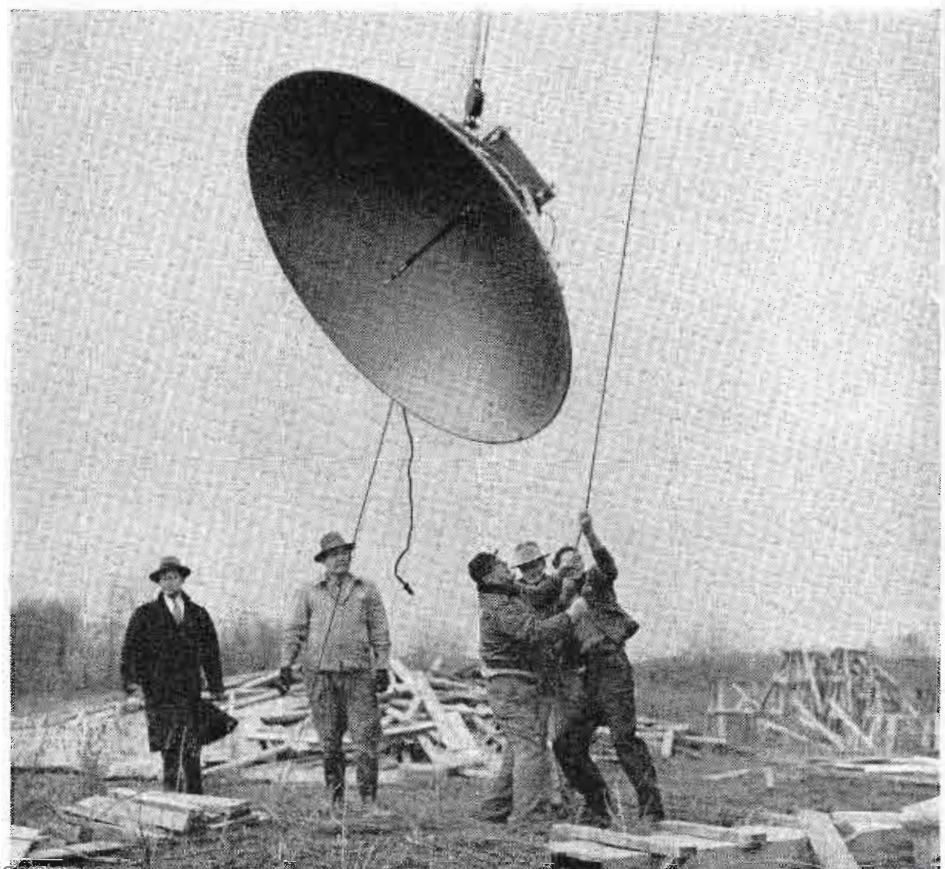
This modern highway communication control network was created through the joint efforts of the Paul Godley Company of Upper Montclair, New Jersey, which formulated the broad engineering requirements, and the RCA Engineering Products Department, which designed the radio equipment and worked out the details of the system. The Godley Company also developed the VHF antennas used in the two-way mobile radio system installed as an adjunct of the highway communication system. Installation of the system was carried out by the RCA Service Company.

The seven-station hook-up, operating at a frequency of 960 megacycles, provides a voice channel for monitoring the entire system, another for dial-phone administrative calls, two voice channels for communication with state police cars and maintenance trucks fitted with two-way mobile radio equipment, and one partyline teletype. At five of the microwave towers there are VHF base stations which furnish two-way radio coverage for the length of the turnpike.

The new microwave relay installation obviates the need for underground cables or overhead pole-and-wire lines as a means of communication. It also assures continuous functioning through sleet, snow, and windstorms. Calls are made and received over the microwave system

in a manner similar to ordinary telephone procedure, but between sending and receiving points, there is a difference. Voice sounds are converted into microwave radio signals and sent to a transmitting antenna. The antenna focuses the microwave signals in a narrow beam which is then directed through space to a relay station from 25 to 40 miles away. The relay station antennas are located on towers, erected on the highest elevations available along the turnpike. The first relay station picks up the signals, amplifies them, and beams them on to the next station. This process is repeated at successive stations. At the receiving point, the signals are reconverted to voice sounds.

**Workmen hoist a parabolic microwave antenna into place on one of the turnpike's relay towers.**





The system is also capable of sending code signals such as those used in teletype. Furthermore, the system can, when desired, carry a number of conversations at the same time and unscramble them at the receiving point.

The new microwave facilities provide the Turnpike Administration at New Brunswick with a means of instantaneous communication with all state troopers, maintenance trucks, and toll gates along the road. The dial phones and teletype link the police divisions along the turnpike with one another and with the State Police Headquarters at Trenton.

Each police car is furnished with dual-frequency two-way radio equipment operating in the 152 to 174 megacycle band. The cars transmit on one of their two frequencies and receive on the other. The very high frequency base stations at the microwave towers operate on the same frequencies as the cars, reversed as to sending and receiving. That is, they receive on the frequency on which the cars send, and transmit on the other frequency. Hence, the normal path for a message transmitted from a car is to the nearest base station, from which it is retransmitted to other cars in the vicinity and to toll gates. At the same time, the VHF receiver at the base station feeds the message into the microwave system, where it is relayed to all other base stations and retransmitted by them.

### *System Has Extra Features*

Several unusual "extra-feature" provisions make the system one of the most flexible and foolproof ever installed.

In most cases, two base stations will be able to receive a direct transmission from a single car. A special "sensing" and lock-out device has been provided, therefore, to select the base station receiving the strongest signal as the one to feed the microwave system at the same time locking out the other station. The rejected station, as well as the other remaining base stations, receive the message through the microwave system.

If an officer in one police car wishes to talk directly to one in a nearby police car without entering the microwave system, he may do so by throwing a switch which changes his transmitter to the receiver frequencies. This feature prevents local communications from tying up the entire turnpike communication system.

Base station antennas are two-element arrays designed to concentrate a high proportion of the radiated signal along the turnpike. This insures a strong signal on the highway with a minimum possibility of interference to and from adjacent communities.

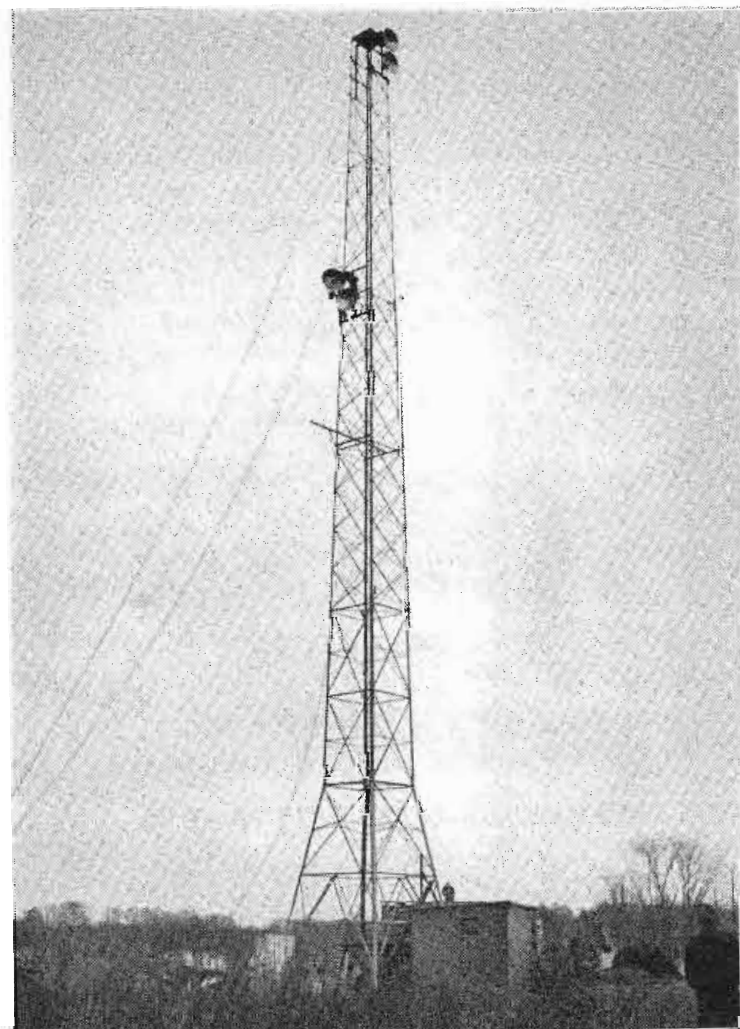
The radiations from two consecutive base stations

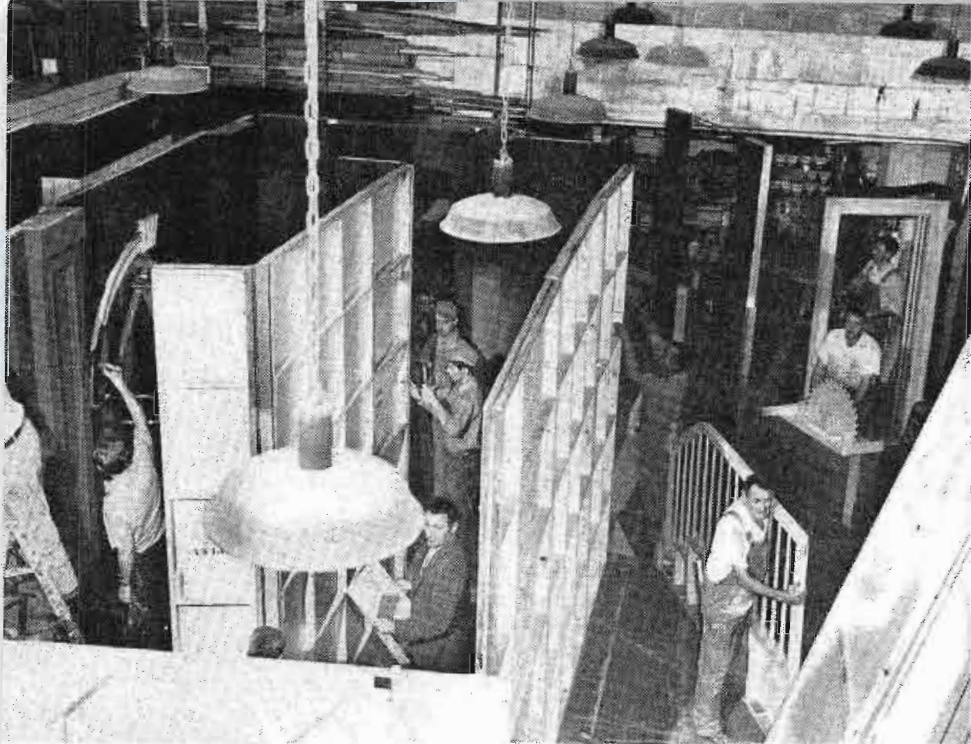
necessarily overlap, and there is an area where signals from both stations are of approximately equal strength and reception would normally be distorted. To prevent this, dual antennas are mounted on the roofs of the police cars. A switch selects directional reception characteristic favoring the chosen base station.

At the New Brunswick Turnpike headquarters, a switching arrangement permits separation of the system into two, three, or four sections. This arrangement increases both the flexibility and the message capacity of the system. When tied end-to-end, the system is essentially one large party line. If serious vehicle traffic develops in any one region, the New Brunswick headquarters can isolate that section of the communication system, leaving it free to handle its local affairs without tying up calls for the rest of the turnpike. However, headquarters is still in a position to monitor messages exchanged in the area, and can, by a throw of the switch, bring it back into the overall system.

More than \$100,000 has been spent on the new communications facilities. Towers up to 150 feet in height have been erected in or near Swedesboro, Moorestown, Bordentown, Trenton, New Brunswick, and Newark, with two near the latter city. The base stations employ 60-watt RCA radio transmitter-receiver units. In addition, 15-watt fixed station transmitters are located at interchanges, maintenance buildings, and other points. More than 50 police and maintenance vehicles have been equipped with 15-watt RCA Carfone mobile units. The microwave relay equipment is RCA's latest Type CW-5B 960-megacycle equipment.

Microwave relay station near Bordentown, N. J.





Workmen assemble walls, balustrade and doorways to form an interior scene for a television production.



Wizardry of scene painters creates an illusion which the television camera cannot penetrate.

## Diary of a TV Set Designer

By Tom Jewett

"Television Playhouse" Designer,  
National Broadcasting Company

**A** SET DESIGNER for an hour-long weekly television program such as NBC's "Television Playhouse" has everything at his command except a 14-day week. Tools are there in abundance, talent is always available but time is a relentless taskmaster. This unusual situation is created by the fact that while the designer is creating 15 or 20 sets for one show he is currently planning a similar volume of scenery for the program that is scheduled a week later.

For purposes of illustration let us use the December 23 production of the Vogeler story "I Was Stalin's Prisoner". In diary form, this is the procedure that was followed by the writer during the seven days preceding the actual broadcast.

*Monday:* Worked all morning on paint shop elevation and detailed plans which included specifications of colors to be used in all sets. In the afternoon, accompanied a camera crew to a rural area near New York to film outdoor scenes which would be inserted in the program.

*Tuesday:* After a production meeting in the morning hours were devoted to the selection of furniture, pictures and lamps for the indoor sets. Came evening, and a conference called by the producer to make last minute changes in settings.

*Wednesday:* This was the day set aside for the designer's weekly visit to the property shop in the basement of NBC's huge storage warehouse and production

plant on West 56th Street. Stored there are more than 1250 pieces of furniture and miscellaneous "props" that may number 2,500 or more. To sort over and inspect this mass of material takes time. Some of the items sought may come from shelves of imitation breakfast foods or from the stalls where old taxicabs and horse-drawn shays are stored. Whatever is chosen, it must be in precise keeping with the period and locale of the drama. Errors here are quickly detected by astute viewers. On Wednesday afternoon plans were begun at a production meeting for the program of December 30. At this conference, the designer was expected to come through with a rough floor-plan of the stage settings. This he did, and then returned to the warehouse to continue his selection of props for the show of the 23rd.

*Thursday:* Morning hours devoted to the making of drawings for the second production after which attention was turned again to supervising the construction and painting of the scenery for the Vogeler story, then only three days away. In the construction shop, the designer showed his blue print specifications to the foreman and then selected additional pieces of stock scenery from a photographic catalogue. The twelve experienced stage carpenters employed here can build almost any object from a "flat" to a castle. The many out-of-the-ordinary requirements placed upon these artisans have taught them that nothing is impossible to simulate. In the past they have reproduced rocks, a Gothic cornice and a Victorian gingerbread porch.

It is in this stage of set production that ingenuity comes to the fore. Both time and money must be saved, wherever possible. One way of doing this is to design sets that are flexible. It is not unusual to make two

stage settings do the work of four or five. The dressing can be altered, tapestries can be rolled down like maps, pictures shifted and furniture changed.

There are numerous other money saving "kinks." A cellar window can be produced by turning a fireplace wing upside down and topping it off with an inexpensive mullion. Doors and windows are constructed so that they may be used front and back, and even an elaborate cave can be built out of heavy wrapping paper, staples and paint.

*Friday:* Now with only two days to go, the tempo increased. First came a rehearsal of the Vogeler drama, then more time across town in the paint shop. Dinner over, back to NBC studio 8G in Radio City to supervise the erection of "flats." Flats are the vertical surfaces which comprise the walls of a set. After being completed at the production shop these flats, together with furniture, draperies, etc., had been trucked to a receiving platform 34 feet under ground below the RCA building and brought to studio level on a freight elevator.

*Saturday:* Beginning at 8 a.m., the set designer, together with the "dressing crew", went to work in 8G putting drapes and furniture in their prescribed places and touching up paint jobs where necessary. Then back to the designer's drawing board for more work on the following show which already was creeping up.

*Sunday:* The Day! The set designer moved back and forth between the studio stages and the control

room. At a time like this, it is always amazing what the camera will reveal. For instance, at one point the producer decided on a higher camera shot than had been specified originally. The producer was satisfied by having one flat mounted above the other, bolted on and then painted to correspond with the color already applied. A chair which, on the monitor screen, didn't seem quite authentic enough was removed and a replacement located by making a fast taxi tour of theatrical rental firms and antique shops. Of course, the correct chair was found eventually, and placed on the stage. But just as the designer was about to put his O.K. on the setting, he realized that one picture was so brilliant that its reflection blackened the face of an actor standing beside it. A spray gun solved this problem, but immediately the control room reported that a coffee pot was casting a bad reflection. This time a coating of wax deadened the glare.

And so it went on, right up to the minute when the little buttons on the front of the television cameras glowed red to warn the performers that they were "on the air." Then and only then could the set designer sit back and relax. There was nothing more that could be done for the Vogeler story, but, facing him like another necessary spectre was the show of the 30th. On Monday, the hectic pace would be picked up again.

Truly, fourteen days in a week would be a solution—after a fashion.

Dress rehearsals give the set designer his final chance to make the changes in scenery and "props" that will add reality to the drama.

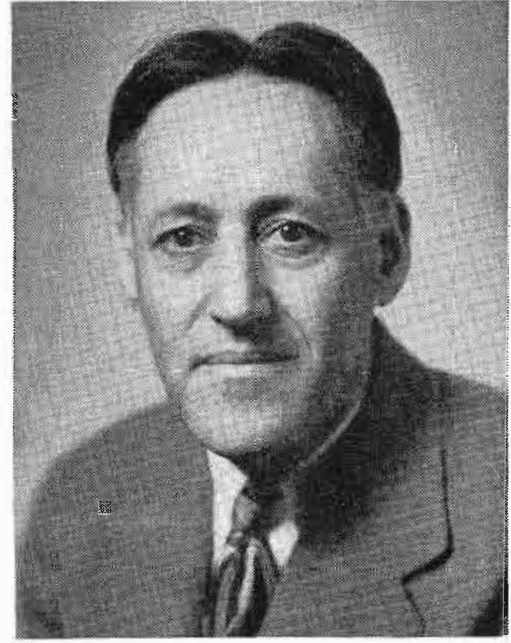




ROBERT L. WERNER



ERNEST B. GORIN



DR. IRVING WOLFF

## Werner, Gorin and Wolff Promoted

**R**OBERT L. Werner and Ernest B. Gorin were elected Vice Presidents of the Radio Corporation of America by the RCA Board of Directors on December 7.

Mr. Werner, who has been General Attorney of RCA since April 6, 1951, was elected Vice President and General Attorney. He joined RCA in 1947 as First Assistant Attorney in the Law Department. He was graduated from Yale in 1933, and received an LL.B. degree from Harvard Law School in 1936.

Mr. Gorin was elected Vice President and Treasurer of RCA, having served as Treasurer since September 2, 1949. He became associated with RCA in June, 1944, as Administrative Assistant to the Vice President in Charge of the RCA Victor Division, and subsequently was named Budget Director of that Division. In April, 1949, he became Budget Director of RCA.

Dr. Irving Wolff, formerly Director of Radio Tube Research for the RCA Laboratories Division, and a specialist in ultra-high frequencies, was named Director of Research for the Division on November 26. Headquarters of the Division are at the David Sarnoff Research Center, Princeton, N.J.

Dr. Wolff joined the RCA research staff in 1928. He concentrated on research in the audio field, developing one of the most-used loudspeakers of the '30s. He later shifted his field of interest to the development of equipment for the generation of microwaves. In 1934, he began experiments in radio reflection work—much of which proved basic to the development of radar.

Dr. D. H. Ewing was appointed Director of Research Services, RCA Laboratories Division, in November. Dr. Ewing, formerly Director of Development for

the Air Navigation Board of the U. S. Government, was previously manager of advanced development for the Engineering Products Department of the RCA Victor Division.

To recommend and make plans for long-range research projects, Dr. E. W. Engstrom, Vice President in Charge of RCA Laboratories Division, announced in November the formation of a Research Planning Committee composed of Dr. V. K. Zworykin, Vice President and Technical Consultant, Chairman, Dr. Wolff, L. P. Smith, Consultant, Physical Research Laboratory; C. D. Tuska, Director of Patent Department; and Dr. Ewing.

At the same time, Dr. Engstrom also made the following promotions in the Laboratories staff: E. W. Herold, Director of Radio Tube Research Laboratory; G. H. Brown, Director of Systems Research Laboratory; R. S. Holmes, Director of Contract Research Laboratory.

### RCA Radiophone Only Link With "Flying Enterprise" Hero

The radiotelephone which served as the only form of communications between Capt. Henrik Carlsen, master of the ill-fated "Flying Enterprise", and the ships standing by to rescue him, was a small 20-pound ship-to-shore unit designed by Radiomarine Corporation of America for use aboard small pleasure boats.

According to a statement from Radiomarine, the captain bought the equipment just before sailing on the freighter's last trip, and carried it along to test its operation on the high seas.

A model of the compact radiophone was one of the feature exhibits at the recent Motor Boat Show in New York.

# Nostalgia and Old Records

By George R. Marek,

*Director, Artists and Repertoire,  
RCA Victor Record Department*

**T**HE experienced people in the record business say that an artist's records stop selling when the artist stops concertizing, when he is no longer in the limelight. In general, that is true. In particular, it is not. RCA Victor has one artist on its roster who has actually earned more money after his death than during his lifetime. Granted, he is a unique artist: he is Enrico Caruso. Caruso's total income from record royalties amounts to about \$3,000,000. About \$1,700,000 of this was earned after his death in 1921. Caruso is the most financially solvent memory you are ever likely to meet. His continued popularity is not only an expression of Caruso's pre-eminent position in the operatic world, his matchless quality as a singer, but also of the fact that there exists a lively interest in the recordings of a past age.

Caruso is a favorite of thousands of people who have never seen him. He is known to thousands who probably have never been inside an opera house. They want to hear not only what he sounds like, but also what his companions in greatness sound like. The phonograph has given them this opportunity.

Henry Irving once said that an actor is a sculptor in snow. This is true as well of the singer or the musician. Rather, it was true before the phonograph. As soon as the voice was mute, as soon as the last echo of the piano tone had died away, the singer or the musician became but a memory, often a highly inaccurate memory. In a double sense of the word, no record of his art survived. Until recordings came along!

Many of the early phonograph records are still prized by connoisseurs, and some early issues bring high prices. But their general circulation is necessarily limited to the "collectors." The old recordings are no longer good technically—and particularly unsuitable for the new speeds which, being more sensitive, show up the flaws more clearly. The untrained musician is, quite naturally, bothered by their raspy sound. Gradually they are disappearing from the dealers' shelves. Still, the interest in the old singers, the great pianists of the past, etc., remained alive. This interest increases as distance lends enchantment and as we, living in the frightening fifties, look back with fairy-tale fondness to the early part of the century.



Caruso's recordings have totalled nearly two million dollars in royalties since his death in 1921.

In March 1950, RCA Victor embarked on the project of rehabilitating the masters of the old records and transferring them to the new speeds. It was quite a project! In the first place, some 2,000 masters were examined. From them were chosen 300 recordings which seemed most valuable artistically. Then these old masters were subjected to the most painstaking and meticulous repair work. Ticks, pops and other extraneous noises were removed, as far as possible. They were then transferred to tape, first selecting a pickup that would give the highest fidelity and lowest surface noise. It was during this operation that all the devices known to the art, such as filters, compensators and transfer turntables, were brought into play in order to improve the quality of the musical content, reduce distortion, etc. In a number of the recordings, excerpts from several parts were pieced together in order to assemble one side that was good overall.

The acclaim which the "Treasury of Immortal Performances" received from dealers and public proved that this care was well applied. More than a quarter of a

million albums of the first edition of the Treasury were sold.

During this month, the second Treasury, consisting of seven volumes of classical music and twelve volumes of popular music is being published. Among the classical albums there will be, of course, another Caruso album. For the first time, both John McCormack and Rosa Ponselle will be featured in individual albums. The other albums are *Famous Duets*, *Pianists of the Past Play Chopin*, *Stars of the Golden Age*, and a new idea, *Aida of Yesterday*, a presentation of excerpts from the world's most popular opera sung by Caruso, Homer, Martinelli, Ponselle, Gadske, Amato, Pinza, Rethberg and Gigli. Among the artists represented in the popular series are Benny Goodman, Sidney Bechet, Jelly Roll Morton, Lionel Hampton, Earl Hines and Billy Eckstine.

Several curiosities are featured among these records. In the McCormack album there is one record in which the great John sings an excerpt from *Tristan and Isolde*. He never sang Tristan in any opera house. In fact, he made this record merely as an experiment and for his own amusement. No master of it could be found for a long time. We appealed to Mrs. McCormack, who started a search in her home in Ireland and after some time disclosed a test pressing. This rarity, now published for the first time, makes it possible for the public to listen to McCormack's art in all of its facets, from Irish



Lucrecia Bori and the late John McCormack as they appeared for a broadcast in the early Twenties.

songs such as *I Hear You Calling Me* to *Adeste Fideles*, and to arias from *Lucia* to the *Tristan* excerpt.

In the Caruso album will be found the last record that he made. It was recorded in Camden on September 16, 1920, less than a year before his death. Appropriately enough it is a church aria, the *Domine Deus* from Rossini's Mass. But the album also contains an aria from *La Boheme* — not Puccini's famous *La Boheme* but Leoncavallo's forgotten opera, an opera which Leoncavallo wrote to spite Puccini. Caruso scored one of his early great successes in the Leoncavallo *Boheme*.

## Realism Enhanced by New Theatre Screen

A NEW and radically different motion picture projection screen, hailed as the first major improvement in film projection in 25 years, has been placed on the market by the Radio Corporation of America. The first installation was made in the Plaza Theatre, New York.

Designed by theatre architect Ben Schlanger and his associate, William Hoffberg, the screen features side wings and a top panel which together pick up and reflect diffused light from the picture. When color pictures are shown, reflected hues appear on the wings and panel. This effect gives a dramatic sense of realism by making the screen action appear to occupy a larger portion of the viewer's field of vision. The screen is made of RCA Snowwhite screen material, a heavyweight Firestone "Velon" plastic.

Because the projecting wings are not directly lighted, but pick up only the illumination from the screen, the intensity of light and the predominant color reflected by these panels vary in proportion to these same factors present in the screen picture. The optical impression is that of viewing a "live" scene, where vision is concen-

trated on a particular object or in a certain direction, but the viewer is conscious of the surrounding area at which he is not looking directly. The new RCA screen allows for this peripheral vision, or "seeing out of the corner of the eye," in contrast to the sharp cut-off necessary in the conventional screen, which gives a picture sharply outlined against a black background.

The RCA wide-vision screen consists of the image screen on which the picture is actually projected, narrow (9-inch) flanges set at a relatively acute angle to the screen, and wings projecting from the flanges at the sides and from the top of the projection screen. The picture image is actually "framed" on the screen by the flanges, which perform the same function as the usual black masking to eliminate fuzzy edges, but diffused light and color from the projected picture are picked up by the wings at sides and top of the screen. Reflection of light on these wings eliminates the sharp, contrasting outline of the screen image and makes it appear to taper off in the outer portions of the spectator's field of vision.

# Patent Granted Sarnoff on Radar System For Detecting Planes and Missiles

**T**HE Official Gazette of the U. S. Patent Office published in its October, 1951 issue a description of an invention made by Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, of an automatic early warning system. The U.S. Patent Office has granted him Patent No. 2571386, which he assigned to the RCA.

The invention relates to an automatic early warning system which combines the principles of television, radar, microwave relay and the latest methods of detection and direction-finding. The new system can utilize equipment already developed and in use.

In describing the principles of the system disclosed in this patent, Dr. Elmer W. Engstrom, Vice President in Charge of RCA Laboratories Division with headquarters at the David Sarnoff Research Center, Princeton, N. J., said:

"General Sarnoff's patent discloses a method and means for surveillance of a string of areas off-shore, or remote from the borders of a country, for detection of planes, guided missiles, enemy vessels, or other targets in those areas. It provides for instantaneous communication of running target positions to a central intelligence station or command post within the country.

"The patent describes a method and means for dispatching fighter aircraft and directing them to the enemy planes, guided missiles, or the like that have been detected.

"It also describes means for early interception of report and control signals sent from and to a guided missile, and the radiating of identical signals for jamming of the channel, or counter-controlling of the missile.

"The system proposed by General Sarnoff would enable detection at much greater distances than is now feasible. At the same time it would transmit the information to a Control Center that could act immediately. By this new method, countermeasures will have a greater opportunity to deal with enemy planes or guided missiles that might be carrying atomic bombs and to destroy them at sea before they can reach their targets on land.

"A further object of this invention is to provide an improved radar fence with a greater depth of protected area.

"The patent specification includes information about

an airborne radar net for national defense in which a succession of planes leaving shore on a predetermined course, search the specified area with radar equipment. The information thus compiled, is then relayed automatically from the lead plane successively through the trailing planes and finally to the Control Center on the home base. In this way, the radar net is moved continuously across vast distances covering possible enemy invasion routes.

"By adding a television camera to the plane's equipment, as explained in the patent specification, the radar information, together with dial readings indicating air-speed, compass bearing, altitude of the craft and any other needed facts, can be relayed to the Control Center in the form of a continuously changing television picture.

"General Sarnoff's patent also describes means for intercepting the control and position signals transmitted by an enemy to and from a guided missile and the immediate radiation of identical signals for the purpose of eliminating enemy control over the winged weapon. In this way, the missile could be directed on a new path which would be continued until its fuel is exhausted and it falls harmlessly into the sea or on an uninhabited land area.

"In a variation of the same military application, the patent specification describes an arrangement for the early detection of enemy planes or long-range radio-controlled missiles, and describes a method for dispatch-

*(Continued on Page 25)*

In General Sarnoff's proposed system, properly spaced planes would provide a radar "fence" giving greater depth of protected area.



## Tozzi's 4¢ Ring Brings Him National Recognition

**A**NGELO M. TOZZI, president of the Tozzi Manufacturing Company, a small metal parts business in Bayonne, N. J., vaulted into national prominence as the result of an RCA institutional advertisement.

Mr. Tozzi was cited for his contribution to the defense effort in the advertisement, which was headed "America's Secret Weapon and Angelo Tozzi's 4¢ Ring." It told how he had provided a finely-ruled aluminum ring for the new aircraft interphone system developed by RCA for the Air Force. This ring, which he produced for only 4 cents, resulted in a large saving, which RCA was able to pass on to the Air Force.

The advertisement singled out Mr. Tozzi, who has never employed more than 50 people, as one of the thousands of small businessmen who are contributing to the defense effort. It said that America's real secret weapon was the ability of all our industry — big and little — to work together as a team.

After the full-page advertisement appeared in several leading newspapers, Frank M. Folsom, president of RCA, received over 300 letters praising Mr. Tozzi as typical of America's ingenious small businessmen, and endorsing this campaign to promote better understanding of the importance of industrial teamwork. The letters came from members of the President's cabinet, his top production officials, Congressional leaders, corporation executives, financiers, labor leaders, educators and prominent clergymen.

Mr. Tozzi, too, received bagfuls of congratulatory mail at his Bayonne plant. His telephone buzzed steadily for several days. He was invited to Washington to be guest of honor at a luncheon attended by two dozen of the nation's top newspapermen. His opinions were quoted in a nationally syndicated column.

The editors of *Reader's Digest* reprinted the advertisements as a full page feature and hailed it as an example of "Advertising *cum laude*."

*Business Week* magazine devoted four columns to a picture of Mr. Tozzi and to a report on the advertisement and the importance of the Bayonne businessman to the defense effort.

"Nationwide fame touched Angelo Tozzi one day early in October," the article said, "when RCA ran a full-page ad in the newspapers headlined 'America's Secret Weapon and Angelo Tozzi's 4¢ Ring.' . . .

"Tozzi has no patience with the moaners who cry that changing times have stifled the chances of the small businessmen. 'Why should it?' he says. 'With all the technical advances in this field just since I've been in it, there are all kinds of opportunity for a man to start out by himself.'"



Angelo M. Tozzi (right) receives scroll of commendation from Earl Bunting, managing director of the National Association of Manufacturers, for his contribution to the Nation's defense

The *Business Week* article completed the story begun in the RCA advertisement. It told of his early career, his start in business, and of the inventiveness which led to the 4¢ ring and other articles of value to defense.

As a final honor, Mr. Tozzi was invited to the annual convention of the National Association of Manufacturers. Earl Bunting, managing director of the NAM, presented Mr. Tozzi with a scroll of commendation for his typically small-business contribution to defense.

### RCA Television Transmitter Sold to Dominican Firm

A 5-kilowatt television transmitter, the ninth to be sold by the Radio Corporation of America in Latin America, has been purchased by Director Colonel J. Arismendi Trujillo Molina, President, Treasurer and founder of radio station La Voz Dominicana at Ciudad Trujillo. In making the announcement, Meade Brunet, a Vice President of RCA and Managing Director of the RCA International Division, said that the new station unit is the first one for use in the Dominican Republic.

The antenna of the new station will be located atop the Palacio Radial, modern Palace of Radio, in the capital city of Ciudad Trujillo. Facilities of the Palacio Radial are now being enlarged to accommodate the television transmitter and studio equipment.



## New Line of Air Conditioners Introduced by RCA

Details and prices of three models of home air-conditioners, the first to be offered by RCA, were announced on December 27. Designed for rooms with floor areas up to 485 square feet, the new units range in price from \$249.50 to \$399.50.

Initial shipments of the models will be made during January to distributors in all major market areas, Robert A. Seidel, Vice President of RCA Victor Division, disclosed. Technicians of the RCA Service Company will install and service the air-conditioners.

Suitable for any room decor, the models are designed with simple lines and finished in two colors — the cabinets in "polar beige" and the grilles in "arctic tan."

To assure quiet, trouble free operation, compressors of the units are hermetically sealed and spring-mounted. Adjustable grilles on all models make possible the easy control of air flow and draft-free operation.

RCA's entrance into the air-conditioning industry marks the company's first step beyond radio, television and phonograph instruments in the appliance field, Mr. Seidel pointed out. The decision to handle air-conditioners was made after a detailed survey of market conditions and a study of competitive products in the field, he said.

"The home air-conditioning market has scarcely been tapped," Mr. Seidel declared. "According to reliable surveys, the industry has achieved less than 1/2 of one per cent of its potential.

"One of the principal obstacles in increasing home air-conditioner sales has been the lack of adequate installation and service facilities. While some air-conditioner manufacturers and distributors have maintained service organizations in some cities, there has been no



This model RCA Air Conditioner is suitable for rooms up to 485 square feet.

nation-wide organization offering efficient, direct-to-the-consumer service.

"With the facilities of the RCA Service Company to draw upon, and with its thousands of highly skilled technicians stationed throughout the country, ready to install and service air-conditioners, RCA is in a very favorable position to expand the distribution of air-conditioners and assume an important role in the field."

### Patent Granted on Radar System

*(Continued from Page 23)*

ing fighter aircraft to meet and destroy them long before they are able to reach their objective.

"This could be accomplished by launching parasitic planes from the aircraft on radar patrol. These parasite planes, equipped with radar and radio would send back to the nearest group of defensive fighter planes a continuous flow of signals giving the position, speed and direction of flight of the enemy plane or missile. Supplied with this information, the fighter planes, taking off from land base or carrier, would be able to set their course accurately to intercept their target.

"As a peacetime service, the disclosed system would apply also to a similar chain of spaced planes extend-

ing from shore to shore which could be utilized to relay television programs to and from Europe and other foreign countries. Such a relay system, according to the patent specification could also carry high speed ultrafax communications.

"Because of the proposed use of lightweight, low-power microwave relay apparatus, General Sarnoff's plan could be adopted for both military and non-military purposes without materially affecting the freight and passenger carrying capacity of the planes."

In 1948, General Sarnoff was awarded Patent No. 2,455,443, which he also assigned to the RCA. It covered a secret signalling system by which ordinary messages are converted to a succession of arbitrary symbols and transmitted by facsimile or television to a receiving and decoding terminal.

# Radio and Electronics—Their Status and Promise

(Continued from Page 14)

during the early radio days but passed from the scene when the electron tube emerged. Like actors in a play, a place was reserved for them in a later scene. We shall come to that soon but first, we need to examine the electron tube.

The electron tube is the lever-arm of radio and electronics. It is the foundation stone or the keystone of all apparatus and techniques upon which the present ever-expanding industry depends.

## *Industry Built on Electron Tube*

In its simple form, an electron tube is a device—a vessel devoid of air—in which electrons are boiled out from a metal or cathode material. When freed in the vacuum space, they are subjected to the desired action by a control influence. Through the effect of a small control influence, a larger output effect is produced on the electrons. This output effect is transformed in a work circuit so as to do what the designer seeks to achieve. From this simple form we have progressed to a myriad of electron tube types. We have transducers of voltage, current, light, and other manifestations of energy. Upon this versatile instrument we have built an industry of first magnitude. It is truly a modern version of Aladdin's Lamp.

While we have progressed far, and while we are still expanding the versatility and usefulness of electron tubes, attention again has been directed to the discard materials, the semi-conductors. As is so often the case, we find in the discard, the real gem itself. But this time the approach was not through empirical experimentation but by painstaking research with understanding of each step. Also it was not a single approach but one which has taken many routes with many evidences of current and potential results. This has been termed the electronics of the solid state. The electron tube might be similarly termed electronics in vacuum.

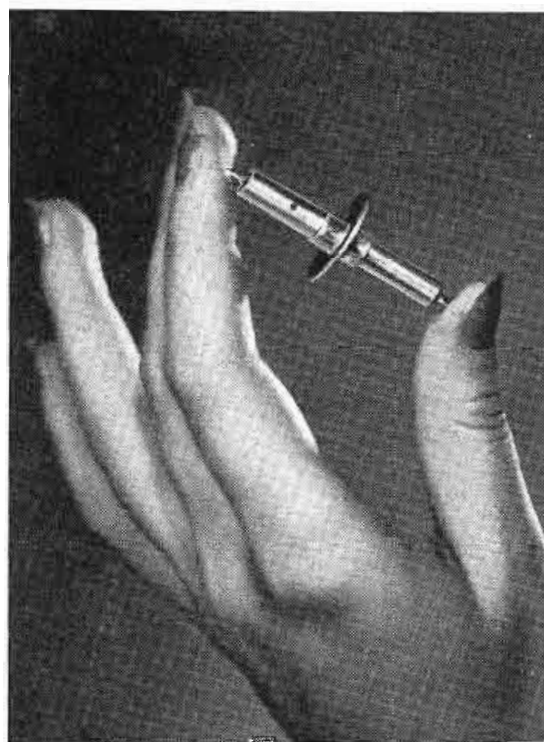
The first broad uses of these new materials came from their non-linear and unilateral properties which were those of importance for radio-frequency detectors of the early days. Then we moved into small power applications as well. As understanding grew, we learned that conductivity could be influenced by radiant energy (photoconductivity), by electron bombardment (bombardment induced conductivity), and by applied voltage (transistors), just as is the case for the electron tube. Here, however, we are working with the controlled action of electrons in solid materials.

Why is this important? It is important because we have a new tool, a new instrumentality. It promises

to augment and to supplement the electron tube. It means new freedoms in the future in the designs of equipment. It means wider and added services and uses. It provides a new dimension.

In radio and electronics we view the scene on an approximate sixtieth anniversary and we see a vast panorama of what has been created. These are the creations of scientific and applied research with the dress of ingenious engineering. We see a view which has radiated outward in an ever-expanding fashion. Now as we move to the present and look to the future, we do so with new instrumentalities in hand. We do so with a sound established framework of research and engineering. We see service for which our measuring tapes are too short. The horizon is boundless.

## NEW TUBE FOR UHF



A new tube in the "pencil-type" series which is capable of producing an output of 1,000 watts in certain types of specialized service, at frequencies up to 3,300 megacycles, has been announced by the RCA Tube Department.

The tube, a triode, is distinguished by its small size, light weight and stability. It was specifically designed for service in transponders, navigation beams, telemeters and pulse altimeters, and for use in signal generators and mobile transmitters operating in the UHF region. All metal parts of the tube's envelope, with one exception, are made of silver-plated steel.

## UHF Television Demonstrated At NBC Convention

Radio station representatives who were guests of the National Broadcasting Company at the network's Fifth Annual convention at Boca Raton, Florida in November, witnessed the first demonstration of a new portable ultra-high-frequency television transmitter in actual operation. The purpose of the experiment was to illustrate the simplicity and practicability of converting present very-high-frequency (VHF) receivers to receive high quality pictures from ultra-high-frequency (UHF) transmissions. The simple steps that must be taken to convert from VHF to UHF were illustrated through the use of UHF antennas and converters.

For the demonstration a specially built portable transmitter was designed by the David Sarnoff Research Laboratories of RCA in Princeton, N. J. UHF directional antennas, looking like step ladders, also were built for the Boca Raton project. A number of 21-inch RCA Victor television receivers were shipped from Camden.

The UHF pictures were transmitted from the Lions' Club in Boca Raton Hills, one and a half miles from the hotel. The receivers and their converters were placed throughout the hotel.

The NBC television camera, placed in the hotel grounds, picked up scenes which were fed by microwave radio relay to the transmitter. At the Lions' Club the camera signals were transferred to the UHF transmitter which then beamed the signal to a series of UHF antennas at the hotel.

In addition to the live action scenes picked up by the outdoor camera, a complete film chain transmitted newsreels recordings and motion picture film over the system.

Each UHF antenna was 38 feet long, suspended 50 feet from the ground. The UHF station used the frequency band of 524-530 megacycles, with radiated power of 6 kilowatts for the picture and 3 kilowatts for the sound.

Engineers and technicians of RCA and NBC worked more than six weeks to make the experiment possible.

### High Placement Record

Of the 794 students graduated from RCA Institutes during the 1950-51 school year, 98.5 per cent have been employed in various branches of the radio-television and electronics industry. The Institutes' Placement Service has reported that graduates were employed as follows: 222 television installation men, 169 laboratory technicians, 113 transmitter engineers, 71 radio technicians and 25 junior engineers.



Brig. General David Sarnoff sending the letter "S" in Morse Code around the world, as I. E. Showerman, President of the Radio Executives Club (left) and Harry C. Ingles, President, RCA Communications, Inc., look on.

## Radio Executives Pay Tribute to Marconi

The vast progress which radio communications has made since Marconi succeeded in transmitting the three dots of the letter "S" in Morse code across the Atlantic in 1901 was demonstrated on December 20, 1951 during a luncheon of the Radio Executives Club commemorating the 50th anniversary of the Italian inventor's accomplishment in communications.

At the meeting, which was held at the Waldorf-Astoria Hotel in New York, Brig. General David Sarnoff transmitted the same letter around the world over the facilities of RCA Communications, Inc. Members and guests of the Club heard the returning signal as it completed its globe-circling path in one-eighth of a second, after travelling via Tangier, Manila and San Francisco. This distance was approximately ten times that covered by Marconi when he spanned the ocean between Cornwall, England, and St. John's, Newfoundland. Later, General Sarnoff held a two-way radiophone conversation with Marchesa Marconi and her daughter Elettra, who were in the radio studio of Italcable in Rome.

At the conclusion of the demonstration, General Sarnoff related incidents in his long association with Marconi, and described some of the technological advances that might be expected in the communications field in future generations.

# *Network Affiliates Hear NBC Officials Outline Plans for Radio and TV*

**M**ORE than 500 broadcasters joined executives of NBC in the network's fifth annual convention in Boca Raton, Florida, from November 28 through November 30. The guests, who included a record number of officials of radio and television stations affiliated with the National Broadcasting Company, listened to NBC speakers as long range plans for the orderly advancement of both radio and television were outlined.

In welcoming the conventioners, Niles Trammell, NBC chairman of the board, urged them to devote themselves to more solid planning, more intelligent study and more self-analysis to insure an expanded future for both media.

"Broadcasting, since its inception," Mr. Trammell said, "has been subject to constant change and requires constant planning for the future. Your network, with the counsel of its partners, the affiliated stations, has always taken a position of leadership in anticipating change and meeting the challenge of the future."

Mr. Trammell said he was convinced that the measures recommended in NBC's Basic Economic Study were absolutely essential to a sound future in broadcasting and predicted that they will set a pattern that will strengthen and stabilize radio.

## *UHF Stations Advocated*

Joseph H. McConnell, President of NBC, delivered the convention's keynote address. He emphasized that NBC radio sales, programming and merchandising will be greater than ever in the coming year. He also urged radio station operators to consider the opportunities for the establishment of hundreds of new television stations with the opening of the ultra-high-frequency band.

"I have more optimism and confidence in the future of network radio than I have ever had before," Mr. McConnell told the meeting. "I think we, at NBC, are coming to grips with our main problems and are developing patterns that will keep radio strong for the future.

"We're finally selling radio on its solid advertising values in moving merchandise, instead of on a show-business basis alone," he continued. Mr. McConnell added that, program-wise, "NBC is enlarging its news service, strengthening its musical lineup and planning to bring to the network an array of talent that would do

radio proud in its greatest days, and to do this at reasonable prices."

Mr. McConnell also read to the convention a message of greeting from President Truman, felicitating NBC on its 25th anniversary this year.

## *Future of Network Radio*

The future of network radio was discussed by Charles R. Denny, NBC executive vice president. After outlining a plan for further strengthening the NBC radio network, he said:

"At NBC, we have great confidence in network radio both for the present and for the long-range future. It is because we have this confidence that we have undertaken a specific program of action with our eyes fixed to the future. We are proud that our network has taken the leadership in rolling up its sleeves and tackling these basic problems."

Among the other speakers at the session devoted to radio were Charles C. Barry, vice president in charge of network programs; Henry Cassidy, director of news, special events and public affairs; John K. Herbert, vice president and general sales manager of the radio network, and Fred N. Dodge, merchandising director.

## *Power of Television Emphasized*

In his keynote address opening a full day session devoted to television, Sylvester L. Weaver, Jr., NBC vice president in charge of television, told the broadcasters that no other group in the world today has the power they hold; that by design, NBC Television can create an aroused, alert, knowledgeable, balanced, mature public opinion, and that public opinion will force a drastic upgrading of all activities for social good.

"This," he predicted, "will form a vigilant, calm, resourceful people who will go into a tremendously brilliant future with resolution and integrity. Cooperation between the network and the affiliates can bring this about.

"If we go forward with your help in making NBC-TV what we plan," he continued, "then the future will mean that your children in five years can tell you every statesman's name on sight, what country he comes from,

what he does, what he's like, and then tell you about his country, its people and their customs, dress and geography.

"They will know the physical universe around them because they will have seen it. They will have gone into outer space from Mt. Palomar, and into sub-microscopic worlds through the electronic microscope. They will have seen American history sweep across the tube with an impact hitherto undreamed of.

"They will know," he continued, "artists and music, as well as current events and how to interpret them in the larger pattern of life today."

### *TV More Influential than Print*

Weaver said television must do all this to meet the responsibility "that comes from the stewardship of the greatest mechanism to influence men, mores and survival, that has ever happened. Yes, a stronger influence than was the discovery of print, the only invention comparable in potential.

"The public will look to NBC and its affiliates to serve them," he said, "because we use their air and we will serve them well, and nobly."

He told the affiliates they "are playing a role given to few men throughout history," adding: "You are a major part of an organization that can prove decisive in letting our people freely and with full information choose their own destiny."

Weaver predicted that the public will determine in large part what of the old is to be carried on to the new.

"Here," he states, "is where television can perform a revolutionary service. For the first time in a great world crisis, the people can know the alternatives, can be given an understandable pattern of what is happening and why it is happening and what the choices are for them.

"Television can clarify the great issues of our times, and be a force for good, a force for broad public action, unique in world history. NBC television, by itself, and I exaggerate only slightly, can be the most important single influence for a better adjusted, more mature, more stable, more enlightened, more peaceful world. And accomplish its mission before this decade is out."

### *Color Television Discussed*

In a discussion of color television, Joseph V. Hefferman, NBC financial vice president, declared that NBC is determined to bring programs in color to the homes of the public. He said that NBC, which pioneered in the development of color TV, believes that it will be the most effective medium yet known to convey information, entertainment and sales appeal.

Announcement of the expansion of NBC-TV's broadcast operations into the morning hours with the addition to the present schedule of 25 program hours a week, was made by Frederic W. Wile, Jr., vice president in charge of Television Production.

NBC's plans for maintaining undisputed leadership in television programming through the acquisition of more marquee names were outlined by Robert W. Sarnoff, vice president in charge of Television Unit Productions. In addition to acquiring other established box-office names for NBC-TV, he said, the network will expand its efforts to develop new, young talent as tomorrow's television stars.

### *Advertisers to Spend \$30,000,000*

Advertisers will spend about \$30,000,000 during the next 12 months on NBC's own package programs, Rudwick C. Lawrence, director of Television Sales Development, revealed to the broadcasters. He pointed out that two out of every three hours of sponsored NBC time are devoted to shows packaged by the network, accounting for 78% of NBC's advertisers. Lawrence compared NBC's 33¼ hours of sponsored network-controlled programs with the second network's 19.

A glimpse of television's fantastic future was given to conventioners by Robert E. Shelby, director of TV Technical Operations, who announced that the network is constructing a disaster mobile unit—a complete broadcasting and film processing plant entirely independent of external wire connections—which will bring to TV homes on-the-spot views of any great catastrophes the future may bring.

### *Marvels on Planning Boards*

Also on the NBC planning boards, Shelby revealed, are such marvels as air-borne TV from helicopters, a flying box-car capable of transporting a small mobile broadcasting unit to the site of any event of public interest, and a remote control camera operated like a robot plane.

A film titled "Illusions Unlimited" was shown to the affiliates by Fred Shawn, NBC Director of Television Production Services. It outlined the new techniques devised by the network for providing startling and unusual illusions in TV production.

Completing the roster of speakers at the television meeting were Mr. Connell, who spoke of the economics of network television; Edward D. Madden, vice president in charge of TV Operations and Sales, who examined television as an advertising medium; George H. Frey, vice president in charge of TV Sales, and Brig. Gen. E. Lyman Munson, director of TV Operations.

## NBC Announces Plans for Political Conventions

COMPLETE television and radio coverage of the Democratic and Republican conventions next July will be supplied by NBC's combined radio and television networks, with Philco Corporation as the sponsor. The announcement was made jointly on January 2 by Joseph H. McConnell, president of the National Broadcasting Company, and James H. Carmine, executive vice president of the Philco Corporation. NBC predicts the largest lineup of stations ever assembled by a single network to carry the more than 60 hours of convention activities.

The Republican convention is scheduled to begin in Chicago on July 7 and the Democratic convention follows two weeks later, beginning July 21.

NBC has assigned its combined radio and television staffs of more than 100 nationally known news reporters, commentators, analysts and writers to the two conventions. They will be supplemented by 200 technical staff members.

Television's newest marvel, the "walkie-talkie-lookie," a portable television camera, developed at the David Sarnoff Research Center, will be used for the first time at the two conventions. The "walkie-talkie-lookie" will bring home-viewers within elbow reach of delegates and other convention and platform notables, as well as important leaders in hotel rooms and corridors and other locations where news is breaking.

NBC television is constructing two complete tele-

vision studios in the International Amphitheatre, site of both conventions, and another studio is being constructed for NBC radio. Two additional studios, one for radio and one for television, are to be constructed in the Hotel Conrad Hilton, headquarters for both parties.

NBC's television coverage of the conventions will be directed by William R. McAndrew, currently NBC-TV's director of Public Affairs and a veteran of six political conventions since 1940. Radio coverage will be under the direction of Henry C. Cassidy, NBC's director of News and Special Events for radio.

Supervising the convention coverage will be William F. Brooks, NBC's vice president in charge of Public Relations; Davidson Taylor, general production executive for NBC-TV, and A. A. Schechter, general executive for NBC-TV. All three are nationally known figures in the field of convention coverage and have had extensive experience in such coverage in the past.

Bill Henry of NBC's Washington staff will report the running story of both conventions on both radio and television. Other well-known NBC news figures who will report the convention include John Cameron Swayze, Dave Garroway, H. V. Kaltenborn, W. W. Chaplin, Leon Pearson, George Hicks, Ben Grauer, Robert McCormick, Morgan Beatty, Earl Godwin, Richard Harkness, David Brinkley, Leif Eid, Ned Brooks, Ray Henle, Albert Warner, Clifton Utley, Alex Dreier, Bob Letts and Elmer Peterson.

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### RCA Opens Direct Radio Circuits To Three More Countries

Three new direct radio circuits linking the United States with Syria, Thailand and the island of Guam have been opened by RCA Communications, Inc. The Guam circuit also provides direct radiotelegraph service with the Philippines.

In announcing the opening of the first direct radiotelegraph service with Syria, it was reported that the Syrian Government has recently completed the construction of new transmitters and receivers near Damascus. The government has also modernized operations by installing high-speed teleprinter equipment.

The new radio channel linking Bangkok and San Francisco establishes, for the first time, direct radiotelegraph contact between the United States and Thailand. Previously, communications between the two countries were handled via Manila.

### World's Loftiest TV Station Is Planned by Mexican Firm

The loftiest TV station in the world, and Mexico's latest addition to its telecasting facilities, will be located at Cortes Pass, 12,500 feet above sea level.

The new station will be operated by Televisión de Mexico S. A., an enterprise of Romulo O'Farrill, Sr., who also owns television station XHTV, radio station XEX, and publishes the newspaper "Novedades."

The 2,500-watt transmitter, purchased from the RCA International Division, will be operated as a satellite of station XHTV Mexico City, to cover the Valley of Mexico, the Valley of Puebla, and other areas where reception from XHTV is blocked by mountains. Cortes Pass is located about 65 miles from Mexico City and 40 miles from Pueblo, between Mexico's two famous volcanos, Popocatepetl and Ixtlacihuatl.

# Major Radio-TV Achievements in 1951

Ten outstanding achievements in radio and television during 1951 were listed by Dr. C. B. Jolliffe, Vice President and Technical Director of RCA, in a year-end summary issued at Radio City, New York. Dr. Jolliffe's selections follow:

1. Field testing the RCA compatible, all-electronic color television system under regular broadcasting conditions, showing the public and industry its potentialities for service. Tests included outdoor and studio pickups, transmissions by radio relay and coaxial cable from New York to Washington, D. C., reception on experimental home type receivers, featuring the RCA tri-color picture tube, and showings on a 9- by 12-foot screen in a Broadway theatre.

On October 16, 17 and 18, 1951, a test program of the RCA compatible color system was transmitted across the Nation. It was received in San Francisco and Los Angeles and relayed back to New York, where it was also received. In all, these color signals travelled nearly 8,000 miles.

2. Adoption by the National Television System Committee of field-test standards for a compatible color TV system, which were incorporated in the RCA-NBC equipment, and field tests started. Other companies also began testing these standards.

3. Emergence of the practicality of the UHF (ultra high frequency) portion of the broadcast spectrum for television's expansion into 70 new channels that can provide for more than 2,000 UHF stations and bring TV coverage within range of nearly every American community. Major contributions toward this goal resulted from operation by RCA-NBC of America's first UHF experimental station on regular schedule, at Bridgeport, Conn., which has become the testing ground for the receiving-set industry.

4. Inauguration of coast-to-coast television service employing microwave radio relays.

5. Start of pilot production of the transistor, a tiny device which will eventually replace certain types of electron tubes and play an important role in communications of the future.

6. Development of new and improved electronic equipment for the Armed Forces. An important example is "miniaturization," or the diminishing of the size of electronic instruments through development of smaller components; also, the development of special electron tubes to meet the exacting demands of military applications.

7. Super-electronic computer — known as "Project

Typhoon" — designed and built by RCA scientists in cooperation with the U. S. Navy. The unit has been used in 1,000 test runs of proposed guided missiles at an enormous saving to the government in expended materials.

8. Theatre television, which, as a new industry and service, spreads across the country for independent operation and in networks linked by radio relays or coaxial cable.

9. Multiple transmitting antenna, developed by RCA, which made possible simultaneous broadcasts by five TV stations and three FM stations from the tower atop the Empire State Building in New York.

10. Extension of the usefulness of industrial TV, one of the most significant being the television-microscope, which extends the range and versatility of the light microscope.

## TV Opera Acclaimed

*(Continued from Page 9)*

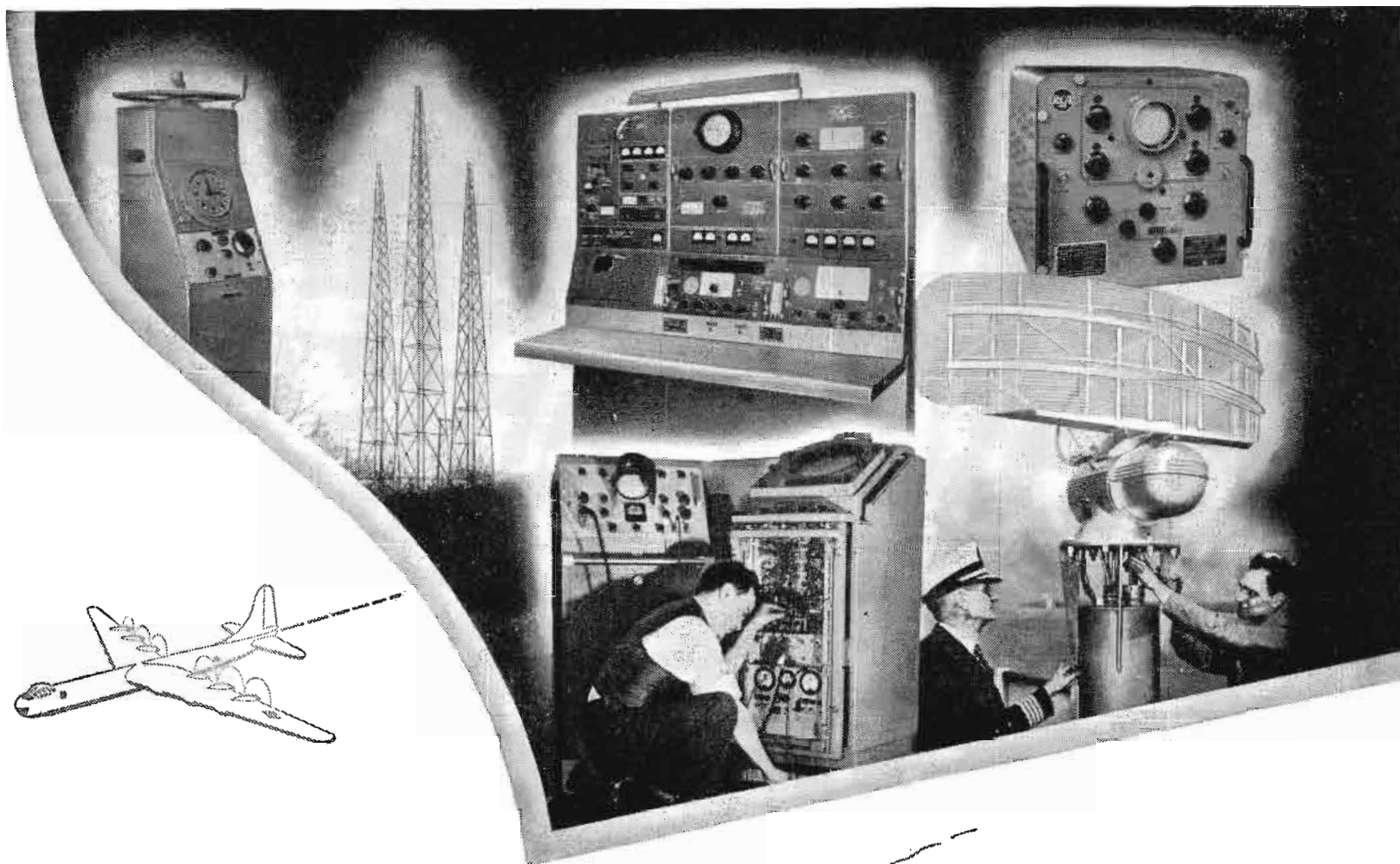
Allen, who played the title role, were given high praise, and Allen has since received offers of movie contracts.

The production given by NBC to "Amahl and the Night Visitors" was impressive in all respects. Eugene Berman, one of the most distinguished artists in the theater, was engaged to design the settings and costumes. No expense was spared and the results were acclaimed by the critics. The 21-year-old conductor, Thomas Schippers, too, was singled out for his sensitive interpretation of the Menotti score.

At the opening of the Opera, Menotti appeared briefly to introduce his new work. His own personal charm and wit captivated the television audience even before the opera itself was unfolded.

The great success of the opera was immediately followed by a recording session of the work by RCA Victor. The records probably will be released sometime this Spring.

An avalanche of requests from listeners and from the press for a repeat performance were seriously considered by NBC. It was impossible to repeat the opera immediately because several of the singers and the conductor had commitments abroad. However, NBC is considering the possibility of producing the opera again in April as an Easter offering. Undoubtedly, "Amahl and the Night Visitors" is the most outstanding success in opera on television to date.



# **RADIOMARINE** *stands watch*



For a quarter of a century Radiomarine has been designing, manufacturing and servicing radio communications equipment and electronic navigational aids. Radiomarine's leadership in the development of radio-electronic equipment for the marine field is world known. Its products are recognized as outstanding for durability, dependability and performance.

It is the mission of Radiomarine to advance the art of radio and electronics on vessels of all kinds—on the high seas, in harbors and on inland waterways . . . to co-operate with the military services of the United States for National Defense.

The entire facilities of Radiomarine Corporation of America: personnel, technical knowledge, research and production capacity are "standing watch" ready to serve America's maritime and military needs.

For information on how Radiomarine can be of service to you, write to: Radiomarine Corporation of America, Department U, 75 Varick St., New York 13, N. Y.

## **Radiomarine Products and Services**

**Communications Equipment**—Radiotelephone and Radiotelegraph Transmitters and Receivers, Lifeboat Emergency Equipment, Automatic Alarms.

**Navigational Aids**—Radar, Loran, Radio Direction Finders.

**Special Equipment**—Custom-designed and manufactured for all Government agencies.

**Shore Service Stations**—Speedy, reliable inspection and maintenance on all types of radio-electronic equipment. 29 service depots in principal U. S. ports. World-wide service facilities through foreign associates.

**Coastal Radio Stations**—13 coastal stations provide radio communication system for contact with vessels in all parts of the world.

**Training School**—Theoretical and operational instruction in radio aids to navigation.

RADIOMARINE CORPORATION of AMERICA, 75 Varick St., New York 13, N. Y.  
Offices, Communications and Service Stations in principal ports.



**RADIOMARINE CORPORATION of AMERICA**

**A SERVICE OF RADIO CORPORATION OF AMERICA**



# For Engineers...

# YOUR CAREER OPPORTUNITY OF A LIFETIME...at RCA-NOW!

IF YOU ARE FACING a big question: "What is the best move I can make to further my career?"—we believe you will find the answer on this page.

Today, as never before, RCA is engaged in far-reaching electronic developments that have created a need for career men of talent. This means you have the chance of a lifetime to make a permanent connection with RCA in a position offering you the opportunity of a successful career in the field of your choice. Here is what RCA offers.

### Wide Choice of Projects

Unusual opportunities await qualified ELECTRONIC, ELECTRICAL and MECHANICAL ENGINEERS . . . PHYSICISTS . . . METALLURGISTS . . . PHYSICAL CHEMISTS . . . GLASS TECHNOLOGISTS—in research, development,

design and application, also in technical sales. Qualified engineers have the opportunity to choose the area of activity they like best.

### POSITIONS OPEN IN THE FOLLOWING FIELDS:

**TELEVISION DEVELOPMENT—**  
Receivers, Transmitters and Studio Equipment

**ELECTRON TUBE DEVELOPMENT—**  
Receiving, Transmitting, Cathode-Ray, Phototubes and Magnetrons

**TRANSFORMER and COIL DESIGN**

**COMMUNICATIONS—**  
Microwave, Mobile Aviation, Specialized Military Systems

**RADAR—**  
Circuitry, Antenna Design, Computer, Servo-Systems, Information Display Systems

**COMPUTER DEVELOPMENT and DESIGN**  
Digital and Analog Computers, Magnetic Recording, Pulse Circuitry, Storage Components, Systems Design

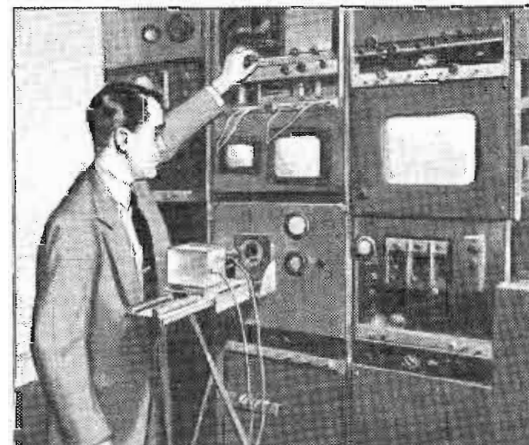
**NAVIGATIONAL AIDS**

**TECHNICAL SALES**

**ELECTRONIC EQUIPMENT FIELD SERVICE**



**Professional Status.** RCA engineers enjoy the highest professional recognition among their colleagues. You work in close collaboration with scientists and engineers who are distinguished in the industry. You receive recognition for your accomplishments.



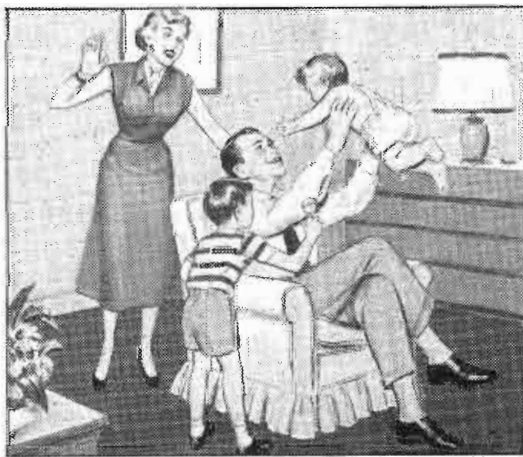
**Laboratory Facilities.** At RCA, unexcelled laboratory resources and advanced technical apparatus are available. You have unlimited opportunities for the complete expression of your talents in the fields of electronics.

*If you qualify for any of the positions listed above, write us for a personal interview—include a complete resumé of your education and experience. Write to:*

**Mr. Robert E. McQuiston, Specialized Employment Division,  
Dept. 111V, Radio Corporation of America,  
30 Rockefeller Plaza, New York 20, N. Y.**



**Good Living Conditions.** You have a choice of residential locations offering suburban-convenience or quiet, countryside living. Good shopping facilities, schools, churches, medical services and modern hospitals are close by. Excellent opportunities for graduate study.



**Position Security.** These are not temporary positions. Activities are focused not only on the long-range national defense program, but also on a diversified line of products for commercial use. You and your family are protected by Company-paid hospital, surgical, accident, sickness, and life insurance. A modern retirement program helps provide for your future.



**Rapid Advancement.** Opportunities at RCA are exceptional, for you to move ahead in the career of your choice. You can advance to high-level and supervisory positions which are filled from RCA's engineering staff. Salaries, determined on the experience and ability of individual applicants, are reviewed at regular intervals for increases on a merit basis.



**RADIO CORPORATION of AMERICA**



Into your home, through the miracle of television, comes a new world of entertainment, news, education, and sports.

## They can still go out while staying home

Now "homebodies" who seldom leave their neighborhoods can view programs from distant cities—with all the comforts of home. Drama, comedy and variety shows are brought into the living room. Sports, news events as they happen can be viewed by all. Now television is open coast to coast . . . Those in the East may look in on the West, and the West may look in on the East.

Television is enjoyed in more than

15 million homes, as a result of research at the David Sarnoff Research Center of RCA at Princeton, N. J. Today's image orthicon TV camera was perfected there. Dr. V. K. Zworykin of RCA developed the *kinescope*—which is the screen of television receivers. And RCA scientists have also perfected electron tubes, circuits, sound systems, phosphors, and antennas to make television part of everyday life.

The development of all-electronic television is only one example of RCA research. This leadership assures you high quality performance from any product or service of RCA and RCA Victor.

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See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th St., New York. Admission is free. Radio Corporation of America, Radio City, New York 20, New York.



**RADIO CORPORATION of AMERICA**

*World Leader in Radio — First in Television*