JULY 1953

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

A NEW HOPE FOR HOUSEWIVES

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

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

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

National Broadcasting Company

a service of Radio Corporation of America

VOLUME 12 NUMBER 3

Radio Age

RCH • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

JULY 1953

COVER

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

NOTICE

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

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CONTENTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

RCA Inventions Available to Entire Industry

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

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

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

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

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

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

Color TV control console at Colonial Theatre.

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

Pilot Production of Color Sets Possible by Spring of 1954

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

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

RCA System is Compatible

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

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

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

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

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

RCA System Meets FCC Criteria

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

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

Price of Color Receivers

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

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

Price Reductions Foreseen

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

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

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

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

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

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

RCA's Manufacturing Plans

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

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

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

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

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

NBC Color Telecasting Plans and Policies

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

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

The petition stated:

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

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

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

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

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

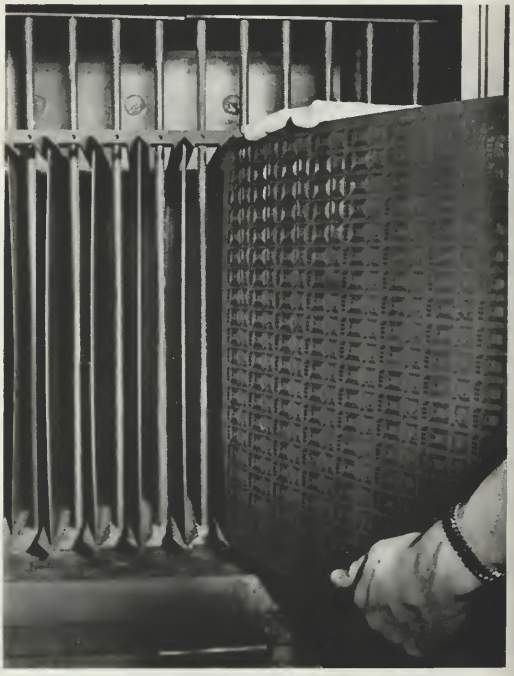
The petition points up the fact, now that a practical

(Continued on page 31)

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

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

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



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

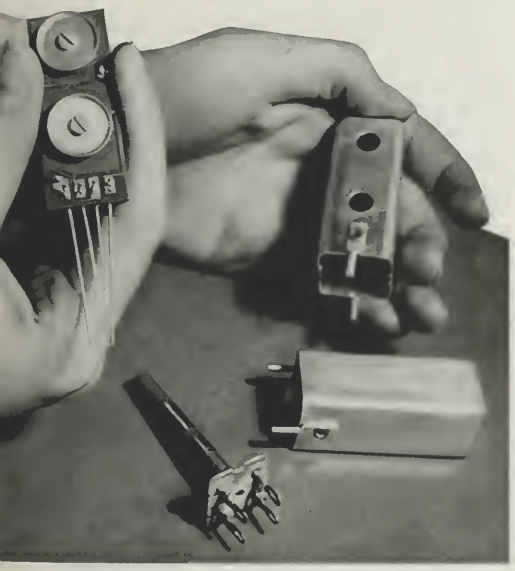
Radio-TV Coils Made by Printing

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

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

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

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



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

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

Uniformity Always Maintained

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

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

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

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

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

Viewers Get First Scenes of Coronation from NBC Television

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

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

As a result of this painstaking thoroughness in preparation:

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

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

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

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

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

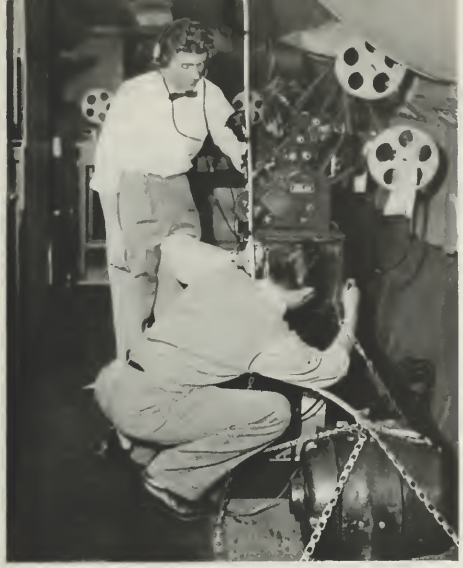
Film recording and editing equipment installed at the Blackbushe Airport outside London for the rapid processing of Coronation films before their shipment to the United States by fost plane.

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

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

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

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



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

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

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

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

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

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

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

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

Small Air Bubble Wrecks Plans

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

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

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

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

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

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

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

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

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

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

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

Radio-TV Broadcasters Honor Sarnoff

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

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

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

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

Highlights of General Sarnoff's Address

Among the highlights of General Sarnoff's address were:

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

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

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

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

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

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

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

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

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

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

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

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

Microwaves Aid Flood-Ravaged Holland

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

By William R. Dean

Engineer,
RCA Service Co., Inc.

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

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

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

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

Convoy Brought Own Power Plants

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

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

Prospects Doubtful at First

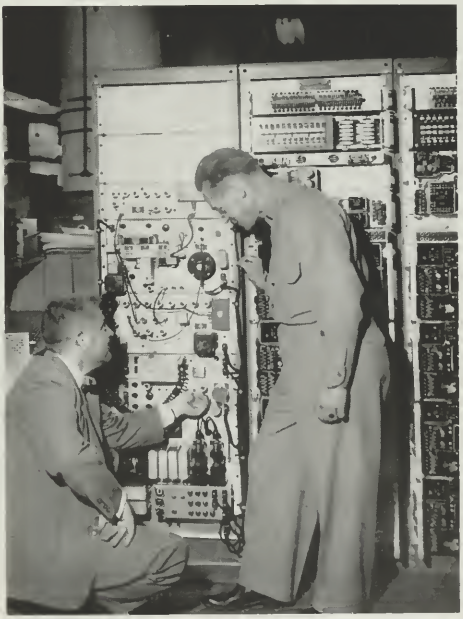
Installation at both ends had been completed by the evening of the 10th. Lacking adequate maps, it was impossible to determine the exact bearings or distance between terminals so the decision to use or not to use the repeater station had to be postponed temporarily. The distance that had to be spanned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

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

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

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

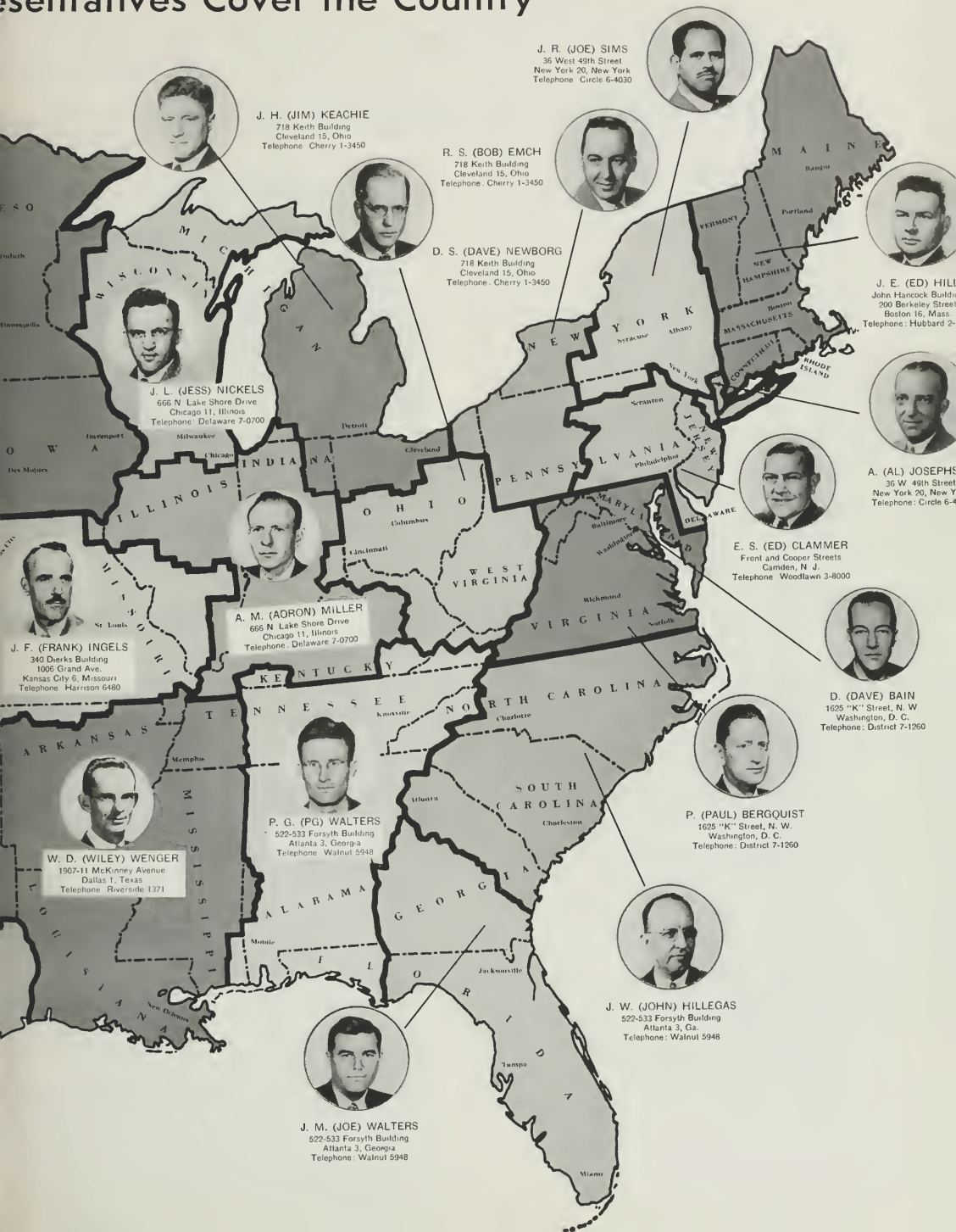
G.I.'s erect emergency microwave tower near Rotterdam to supply communications over Holland's flooded areas.



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

RCA Victor Broadcast Station R

esentatives Cover the Country



Safety at Sea Advanced by New *Portable Lifeboat Radio*

By Irving F. Byrnes

Vice President in Charge of Engineering, Radiomarine Corporation of America

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

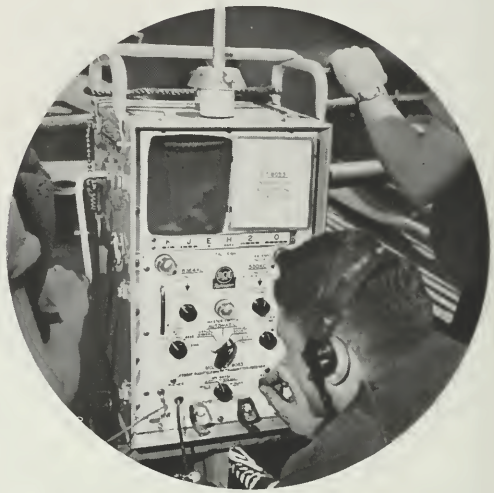
The weight of the complete set is under 60 pounds and it is built to withstand a 20-foot drop into the sea from a ship's deck. Naturally, it is watertight and buoyant.

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

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

Power Supply Was One Problem

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



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

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

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

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

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

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

Receivers Are Simple Instruments

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

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

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

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

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

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

Insulators Made of Special Plastic

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

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

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

Television Affiliates Reaffirm Complete Confidence in NBC

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

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

The text of the resolution:

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

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

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

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

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

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

The Man in the Glass

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

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

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

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

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

Anon.

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

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

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

Electronic "Detective" Spots Metal Pieces in Ores and Rocks

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

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

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

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

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

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

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

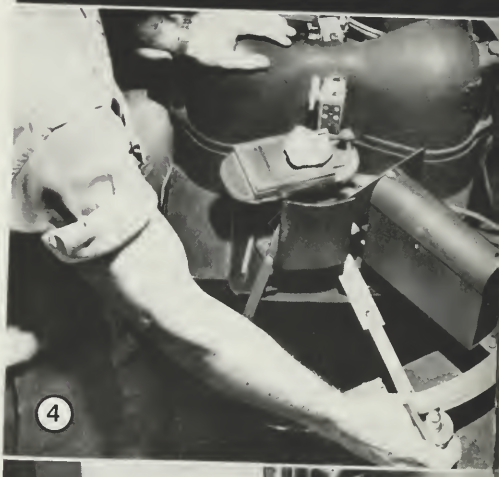
How Crystals of Quartz Are Fashioned into Electronic Controls

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

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

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

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



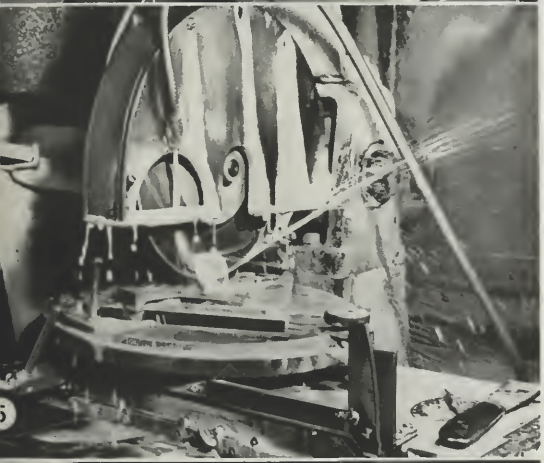
4—The correct sawing angle of the crystal, as determined by X-ray analysis, is assured by orientating the specimen on this machine.

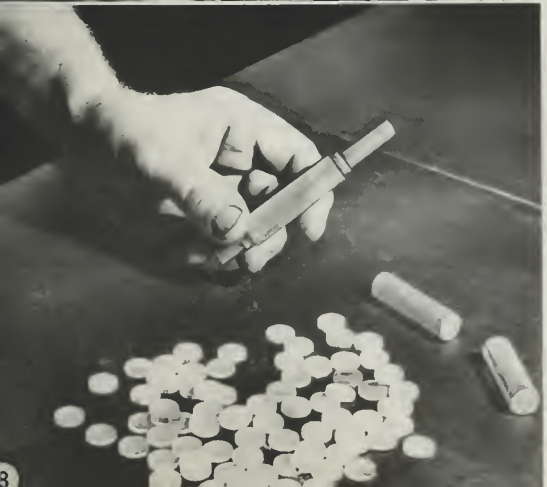
5—The next step is to place the glass-mounted crystal under a diamond edged saw. The saw table is tilted to slice the quartz along the desired plane.

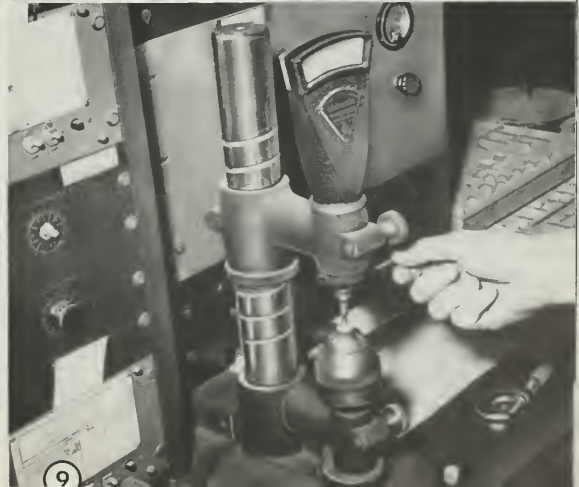
6—Wafers are diced into segments by a smaller diamond edged wheel.

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

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







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

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

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

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

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

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

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

Government Orders

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

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

Significant Developments

Other significant developments reported by General Sarnoff:

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

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

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

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

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

The Future

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

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

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

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

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

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

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

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

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

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

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

Television

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

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

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

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

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

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

Radio Broadcasting

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

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

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

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

Tape Recorders

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

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

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

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

Industrial Television

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

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

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

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

Microwave Relays

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

Foreign Business

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

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

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

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

These installations also open new markets for home television receivers.

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

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

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

Microwave Radio Becomes More Important to Industries

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Towers Will Withstand 100-Mile Gales

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

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

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

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

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

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

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

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

Service Unaffected by Elements

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

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

RCA and NBC Petition FCC to Adopt Compatible Color TV Standards

(Continued from page 7)

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

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

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

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

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

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

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

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

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

Sarnoff Receives Honorary Degrees

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

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

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

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

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

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

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

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

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

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

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First in Television

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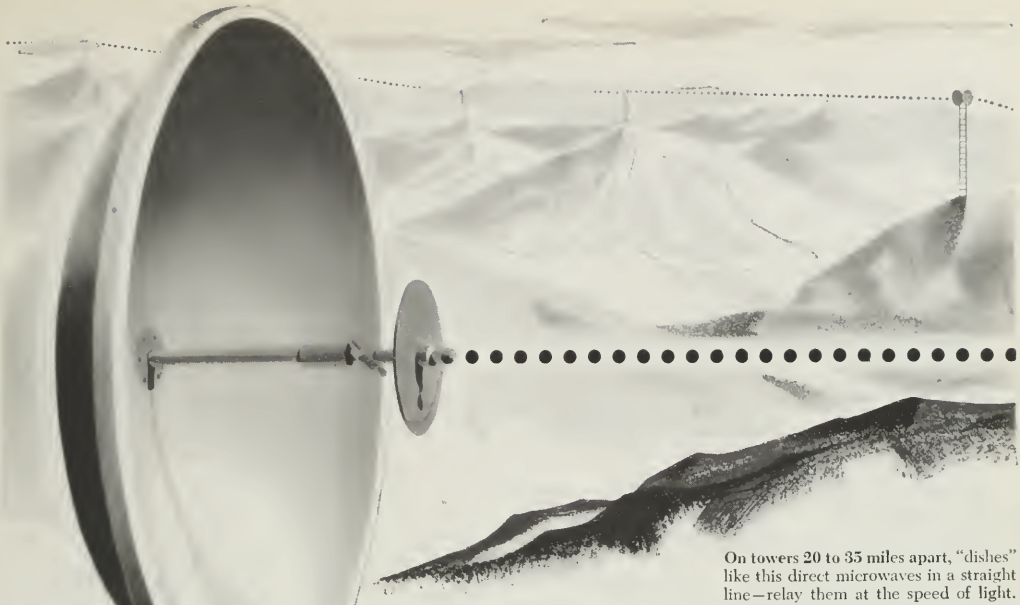


On towers 20 to 35 miles apart, "dishes" like this direct microwaves in a straight line—relay them at the speed of light.

Out of this "dish" come service and safety

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

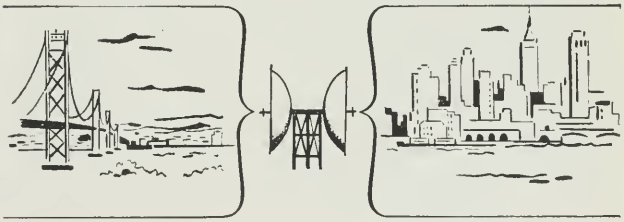
Needing no wires, economical to install and maintain, RCA microwave is "weatherproof." Wind and rain almost never affect its performance while, obviously, ice *won't form on a radio beam* to put it out of action.

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

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

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

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



RCA

RADIO CORPORATION OF AMERICA

World leader in radio—first in television

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

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

Tireless TV Eye

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

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

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

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

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

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

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

RCA® RADIO CORPORATION OF AMERICA

World leader in radio—first in television