RADIO AGE

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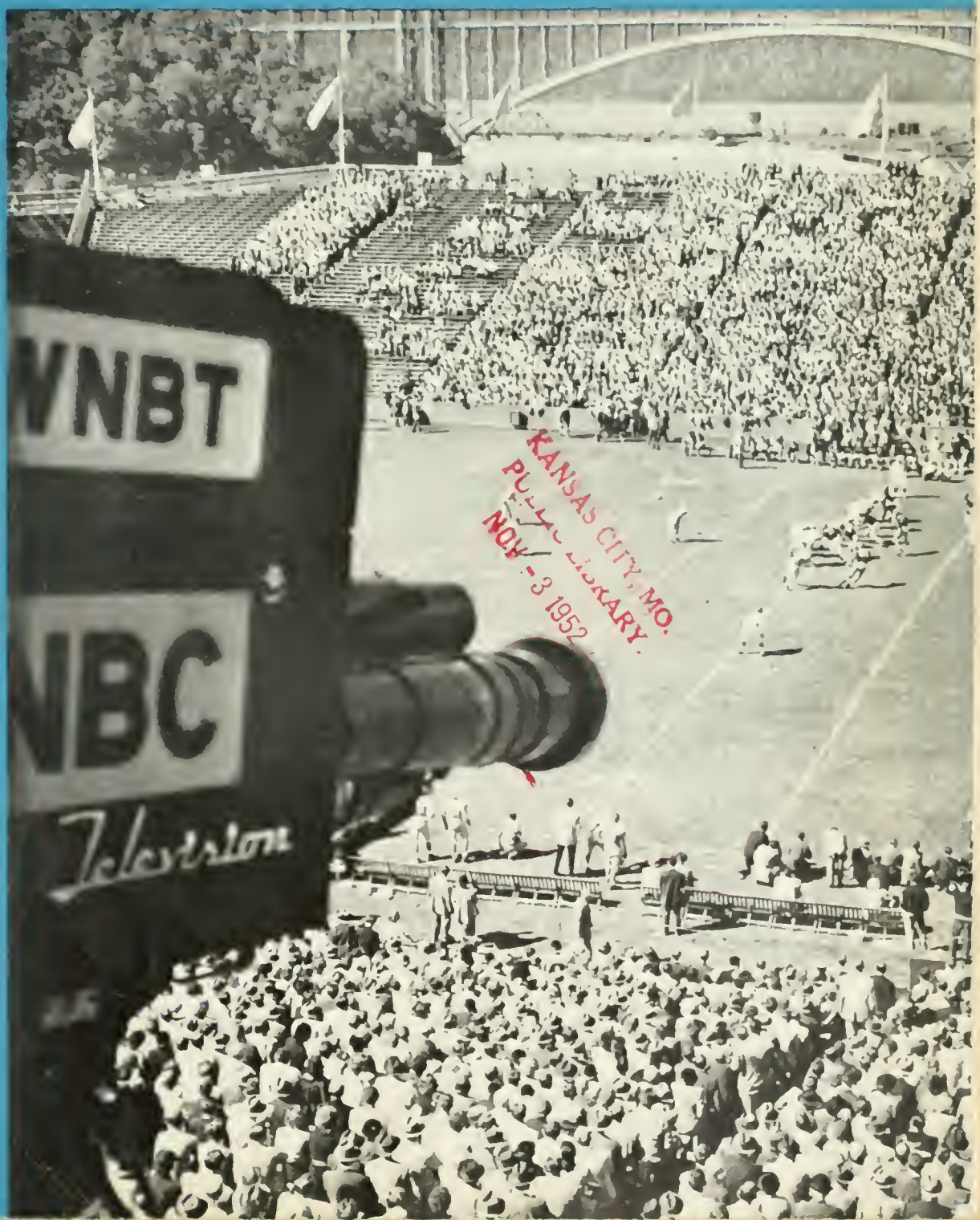

RCA

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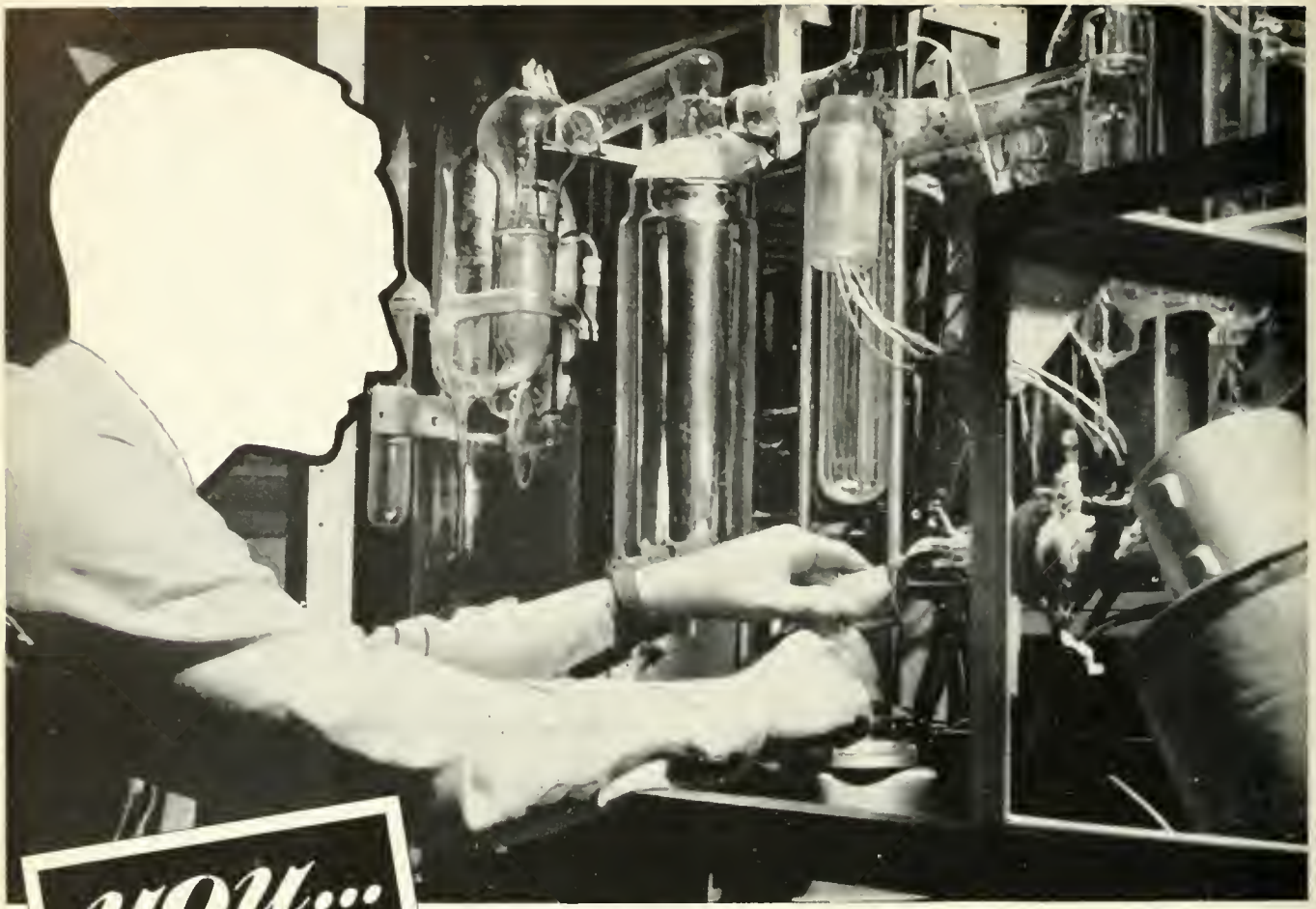

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RADIO CORPORATION of AMERICA

VOLUME 11 NUMBER 5

Radio Age

• MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

OCTOBER 1952

COVER

RCA television cameras are noking it possible for millions of football fans to watch the nation's leading teams fight t out an college gridirons this all. The NBC network will carry 11 of the contests.

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NOTICE

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

Radio Age is published quarterly by the Department of Information, Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N. Y.

Printed in U.S.A.

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

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RCA-designed superturnstile antennas have been installed in more than 75 television stations.

This scene in NBC's studio 8-H on election night in 1948 will be re-enacted this yeor on the evening of November 4.

Operation Election Night

A Staff of More than 1,500, Aided by Newly Developed Computing Machines, will supply NBC's Radio-TV Audiences with Fastest, Most Complete News Coverage of Balloting on November 4th

With batteries of television cameras, an augmented corps of radio and television commentators and eight almost-human computing cash-register-like machines developed especially for the occasion, ready to go, the National Broadcasting Company has completed its plans for the most elaborate radio and television news covering of any national election returns in the history of broadcasting. Focal point of activities on the night of November 4 will be 8-H, NBC's largest studio in Radio City, New York.

Continuous around-the-clock reporting of the returns will begin when polls close in the East on Election Day and will continue until most of the returns are in, 12 to 15 hours later. William R. McAndrew, director of NBC's radio and television coverage of both political conventions this year, will be in charge of the election night news center.

Under McAndrew will be a 500-man staff, including the roster of 25 politically experienced newsmen who supplied the nation with its most complete story of the Chicago conventions. More than 1,000 additional newsmen located at NBC affiliated stations throughout the country will be on the job to report the latest ballot counts in their respective areas. They will also contribute human interest sidelights and comment on voting trends as local returns are made available to them.

NBC is relying on its new computing machines to speed up and extend the scope of televised results. These machines had their genesis only a few weeks ago when Charles H. Colledge, NBC public affairs operations manager, discussed the network's election-night problems with Charles L. Keenoy, who heads the product development department of the National Cash Register Company, Dayton, Ohio.

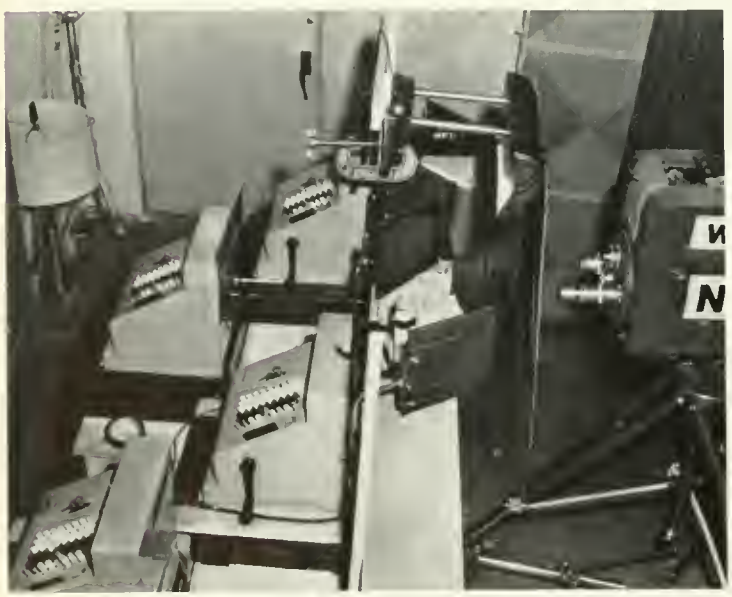
Machines Completed in Ten Days

"What we need," Colledge told Keenoy, "is a fast, visual means of presenting the tallies to the television audience. We want to show, as simply as possible and as quickly as possible, who's winning — in the presidential race, and also in the contests for congressional seats and governorships."

Within less than ten days, Keenoy came up with plans for eight super-sized cash register machines. Each machine is capable of performing 27 different functions.

This is their role in the night's operations: Two of

Four yeors ago, street crowds gathered in Radio City to watch election returns os they were projected onto a large screen from RCA's theatre-type television projector.



Mochines similar to those shown above will speed up the tobulation of balloting for NBC's television audience.

the machines, with 24 states on each, will be assigned each presidential candidate; each machine will record the percentage of election districts reporting, the current popular-vote tally by states, and the name of the state. The next two machines, one per candidate, will add up the national totals as taken from the two machines which record by individual states; and machines 7 and 8 will totalize the individual races for Congressional seats.

The first six machines will be so constructed that the TV camera can pick up the image directly. The last two, developed for the Democratic convention in Chicago, work by means of mirrors. In all cases, only the figures will be visible — the machines being blacked out. The figures will be superimposed against a graphic background — possibly against a map of the United States distorted to conform to the number of electoral votes of each state.

To coordinate election results and bulletin news for broadcast, NBC will make use of its combined radio-TV news-desk system which it pioneered with great effectiveness in Chicago. The joint desk will be the nerve center for disseminating all the latest information to radio and television reporters.

NBC will assign commentators to report and analyze the presidential voting, while others will report from a special newsdesk, concentrating on the important Senatorial contests, such as that in Wisconsin. A third combined newsdesk will report gubernatorial contests in Illinois, Massachusetts, Michigan, Ohio, Texas, Indiana and Arizona. A fourth radio-TV group in NBC's election-night headquarters will cover state-by-state voting for hotly contested seats in the House of Representatives.

Alongside the editor and reporter at each of the combined radio-TV newsdesks will be a team of tabulators who will break down the results as they appear on the face of the National Cash Register Company machines and post them on a huge blackboard that will cover the length of studio 8-H.

Cameras to Cover Party Headquarters.

NBC will station TV camera crews, newsmen with tape-recording equipment, and commentators at the various candidates' headquarters in New York and at both Democratic and Republican National Committee offices in Washington.

Several temporary TV settings and radio studios will be constructed adjacent to the newsdesks to provide facilities for interviews with top political figures, commentary and programs on the margin of the election reports. Most of NBC's Washington staff and commentators from other key cities will be concentrated in New York for election night.

Current plans call for continuous network programming on both NBC radio and television beginning about 8:00 p.m., EST., with three to five minutes allotted to local stations at stated intervals for broadcasting local results.

Progress in Electronics

The following text is taken from an address by Brig. General David Sarnoff, Chairman of the Board of RCA, at the Weizmann Institute of Science, Rehovoth, Israel, July 27, 1952.

The spearhead of pioneering and the gateway to progress is research. From it stem new knowledge, new inventions, new products, new services. It brings renewed vitality to business, increases opportunities for employment and provides higher standards of living for the people. Research is a creative effort that enlarges man's horizons and thus leads him onward toward new achievements.

In a sense, the pattern of modern life is largely the product of scientific research and technological development. The wonderful thing about research is the more of it you do, the more of it there is left to do. Each piece of research opens new fields for further exploration.

More Fundamental Knowledge Needed

In the words of Dr. Samuel Johnson, "The future is purchased by the present." And I know of no better way for industry, whether in America or in Israel, to assure its future than to join wholeheartedly in the full utilization of scientific research for the common good.

In recent years our scientific emphasis has been heavily concentrated in applied research, in engineering, and not enough attention has been devoted to pure, or basic research. As a consequence, there is, in a number of important areas, a shortage of the fundamental knowledge that is the raw material for engineering developments. Therefore, we must develop more fundamental knowledge. The safety and progress of the free countries of the world depend upon it.

The scientist bent on basic research is usually given little credit and, frequently, lacks the money and tools to continue his search of the unknown. It is not easy in industry nor in Government, to justify appropriations for pure research. It is hard to answer the question, "Of what value is a program of abstract science without a definite goal?" It is important, therefore, that we cultivate "science appreciation" much as we do "music appreciation."

The task of advancing the cause of pure science is made more difficult by world conditions. The barriers of secrecy are serious deterrents to scientific progress. Unquestionably, the world of science has suffered much because the requirements of national security necessarily restrict the free flow of scientific information.

Basic to the advance of science is a free and unlimited exchange of information. In the growth of fundamental knowledge over the centuries, it often has been true that the report of a scientific discovery made in one part of the world stimulated important advances along the same line in other sections of the world.

There has been no such chain reaction in numerous vital areas of science for many years. The more basic facts and fundamental knowledge we uncover, the greater and the sooner will be our progress through applied research. Indeed, it is fundamental research that uncovers new phenomena and opens new vistas that are far-reaching in their applications. For example, recent studies in electronics of solids, as contrasted to electronics in a vacuum, are making possible an entirely new device—the transistor—a tiny electronic device made of single-crystal germanium. As an instrument capable of performing many of the functions of an electron tube, the transistor promises to open a new era of development which bids fair to surpass electronics achievements of the past.

Transistor May Increase Use of Tubes

In creating wider horizons for the electronics art, the transistor does not necessarily supplant the electron vacuum tube. On the contrary, the new applications made possible by transistors may actually increase the use of electron tubes.

Apparatus used in research at Weizmann Institute.

One of the buildings of the Weizmonn Institute of Science ot Rehovoth, Israel.

Today, we are likely to think of television substantially from an entertainment viewpoint. This, of course, is natural since television is an electronic brother of radio broadcasting. Nevertheless, television has many applications outside the realm of broadcasting.

In the field of education and instruction, the possibilities of television are unlimited. Teachers in the classroom and the lecture hall, in medical centers and surgical operating rooms, will be able to add the power of demonstration to the effort of description.

Television Only in Its Infancy

Television in the United States has grown in the period of only five years from practically nothing to an industry whose volume of business last year amounted to three billion dollars. Including radio, the industry as a whole is now running at a rate of about five billion dollars a year. Yet television is only in its infancy. Before many years have passed, its black-and-white images also will be seen in color.

Today there are about 18 million television sets in American homes. There are 108 television broadcasting stations serving a potential viewing audience of more than 70 million persons.

Within the next five years there will probably be 50 million television receiving sets in the United States and about 1,500 television broadcasting stations with a potential viewing audience of 150 million persons. Every home in the land equipped with a television set will be within range of television programs.

We have a striking example of how success is being made toward this goal. Never in the history of the United States were the national political conventions within range of so many people as they were in July of this year. Indeed, Americans had one of the greatest lessons in civics ever put before them on a nationwide scale. Television has revealed itself as one of the most powerful and effective forces that ever came into the political arena. It promises to be a decisive factor in the election results in November.

International Television a Prospect

Within the next five years we may expect to see television established on an international basis. International television will become a powerful aid socially, educationally, and politically. If properly used, it can cultivate better understanding among nations and help to reduce the tensions born of misunderstanding. Television's performance vividly illustrates the old saying that "Seeing is Believing."

I firmly believe that before too many years pass, New York, Chicago, San Francisco, in fact all the cities and towns of the United States will be able to tune in the panorama that television will present of Israel and the rest of the Mediterranean world. Similarly, you will be able to view America as the electronic cameras swing from nation to nation.

Industrial TV has Hundreds of Applications

This is still another type of service known as closed-circuit, or industrial television, also made possible largely by the vidicon tube and a 7-pound miniature camera which can be mounted in normally inaccessible locations. Industrial TV is, in effect, a remote eye for industry. Its hundreds of applications include the observation of dangerous processes as well as transmission of information such as signatures, maps and files. It has a variety of uses in mass training, in industry and in the military services. Industrial television can add immeasurably to the safety and to the efficiency of workers in business.

In still another direction, several years ago our engineers entered into a development program for the electronic inspection of medical ampules containing vaccines and other liquids. This work was undertaken to improve inspection methods for insuring the highest degree of purity in drugs.

We have also developed and demonstrated to the dairy industry a portable inspection machine which makes certain that empty bottles are clear of contamination before they are filled with milk. These, and other electronic developments, are adding importantly to the possibilities of improvement in health.

Now let us look across another horizon of electronics. Through man's inventive and engineering ingenuity, electronic computers have been made to add, subtract,

(Continued on page 31)

Because of the potentialities of this amazing development, the electronics world is interested in

The Status of the Transistor

By M. E. Karns

Manager, Technical Services, Commercial Dept., Radio Corp. of America.

LIMITED use of semiconductor elements and devices is as old as radio. The original crystal detector was a semiconductor device. Until recently, however, there had been little technical progress in this art. Within the last few years interest in semiconductors, including transistors, has become very great, particularly in the electronics industry.

The first transistor was announced only four years ago. During this short period the acceleration of engineering effort has been unusual. Important progress has been made in learning the fundamental theory of operation of transistor devices and in establishing control of their operating characteristics and construction processes.

Experimental results already obtained in the laboratories indicate the practicability and usefulness of transistors. There appear to be a number of fields in which transistors will be used widely and to great advantage.

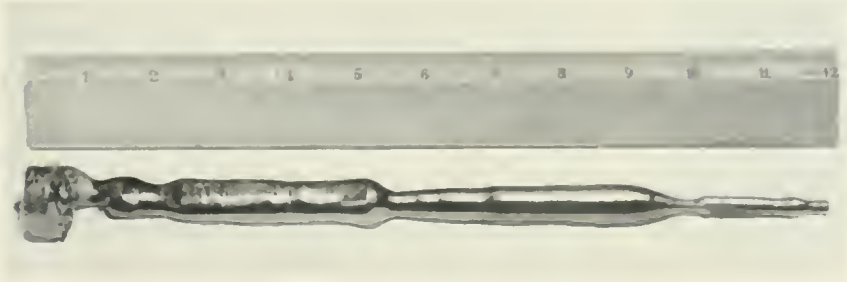
The development of the transistor will make possible new types of electronic equipment which will use not only transistors, but also electron tubes and other electronic components in increasing quantities. The commercial application of transistors appears to be not too distant, although a considerable time is probably required before these units become commercially available on any sizable scale at low cost.

The intense interest in the transistor may be attributed to the fact that it performs functions similar to those of electron tubes. The transistor is of particular interest to equipment designers who see many circuit possibilities in its characteristics. It is small in size and the power requirements for its operation are extremely low. When suitable circuits are developed, space and power requirements for complex electronic equipment may be simplified to a large degree by the use of transistors. Another promising feature is that the operating life of certain types of transistors shows indications of being very long, thus minimizing replacement problems. The physical ruggedness of the transistor offers other obvious advantages. In addition, the transistor requires no "warm up" time but will operate instantaneously upon application of voltage to its electrodes.

It is anticipated that transistors will be improved in many other respects.

At present, transistors will operate at frequencies up to a few hundred megacycles, but the noise at low frequencies is greater than that of electron tubes. Besides, the power output is relatively low. Nevertheless, when the favorable characteristics of the transistor are weighed against its limitations, it appears that this device, even in its present developmental stage, is destined for many applications. The anticipated improvements in characteristics undoubtedly will create new and expanding fields of use. At the same time, the principles of semiconduction in solids may be expected to play an increasing part in the development of many new electronic devices, of which the present transistor is but the first.

There are two types of transistors of major interest at this time—the point-contact type and the junction type. The point-contact transistor was developed first and has performed at higher frequencies. In many



Part of a single germanium crystal "grown" from a crystal seed. As many as 7,000 transistors can be obtained from the crystal shown.

Developmental junction-type transistor before and after embedment in plastic container, shown here in comparison with pencil point.

applications, however, the junction transistor promises to be as important as the point-contact type. In comparison with point-contact transistors, the junction types have lower noise, higher power gain, greater efficiency, and higher power-handling capabilities, but presently are more limited in frequency response.

At first, the frequency response of the point-contact transistor appeared to be limited to frequencies in the neighborhood of 4 or 5 megacycles. Recently such transistors have been made to oscillate as high as 300 megacycles. Currently, the simple junction transistor has been made to amplify up to several megacycles and the limits are being rapidly raised.

The power capabilities of either the point-contact or the junction transistors depend largely on the rate at which heat can be removed from the active portion. There are no basic limitations imposed by the electronic principles of transistor devices which will prevent the attainment of high powers. With relatively simple special cooling means, particularly with the junction types, it is possible to design units with outputs up to a watt or more.

The life expectancy of transistors is largely dependent on electrical and physical considerations. Realization of tens of thousands of hours does not seem unlikely in normal operation. Transistors can be physically rugged. They can be made practically impervious to moisture and the elements. Resin-embedded units have withstood impact acceleration of 1,900 times gravity and centrifugal acceleration of 31,000 times gravity. Transistors have been immersed in water for several months, with practically no effect on their characteristics.

Although high ambient temperature is now a limitation, developments indicate progress in lowering this barrier. No damage occurs to the transistor during storage from minus 94° F to 212° F. Operation over the wide ambient range of minus 94° F to 122° F is practical and higher ambient temperatures will be feasible if proper attention is given to heat dissipation.

Uniformity of Characteristics

Uniformity of characteristics comparable to that of the electron tube seems possible. The art of crystal growing is rapidly progressing and the uniformity of germanium has progressed to the point where various transistor characteristics such as current amplification, power gain, feedback resistance, and input and output resistance have been controlled within ± 25%.

At present, the characteristics of high gain, low noise, greater stability, higher efficiency and higher power capabilities indicate that the junction transistor will be used principally as oscillators and amplifiers at lower frequencies. Another feature of the junction transistor is its ability to oscillate with power inputs around a millionth of a watt. It is anticipated that further development will increase the frequency limits and broaden circuit usefulness.

On the other hand, the point-contact transistor may be applied to very-high-frequency circuits wherever noise is not a limiting factor. Another feature of the point-contact transistor is the negative resistance properties which are especially useful in counter and similar circuits. Negative resistance means that an increase in current flow decreases rather than increases the drop in voltage.

Commercial Use Appears Near

Estimates of the time when transistors will be available in quantity for production of salable products must be somewhat speculative.

Engineering of some types of transistors has reached an advanced stage. The problem of providing adequate supplies of processed germanium with proper characteristics at reasonable costs remains to be worked out. Also, quantity manufacturing processes, machinery and other facilities are yet to be developed.

Limited application in special devices where cost and quantity are not major factors is close at hand. Wider use in quantity production, such as consumer home instruments, is dependent on the availability of processed germanium and production facilities.

KPTV, Portland, First Commercial UHF Television Station on Air

Transmitter that Made Television History at Bridgeport, Conn., Used in Oregon to Speed TV Programs to the Northwest

In a surprise move made possible by round-the-clock labors of engineers and construction crews, station KPTV, pioneer commercial UHF station, went on the air in Portland, Oregon, at midnight on September 18. Since that time, an increasing flow of TV receivers and UHF Selectors into the Oregon city has made it possible for the station's images to be viewed by thousands of residents. Reports of reception have been enthusiastic in their appraisal of the picture clarity and signal strength throughout the city and in some instances as far as 40 miles from the transmitter site on Council Crest, a 1,000 foot hill near Portland. The speed with which KPTV was put into operation brought praise from a large segment of the industry and from the citizens of Portland.

Regular programming by the station began on October 1 with a special pick-up from New York during which FCC Commissioner Paul A. Walker and Brig. General David Sarnoff extended their congratulations to the station and its owner.

Speaking from Washington, D. C., Chairman Walker referred to KPTV as the "harbinger" of a new era of expansion for American television. He commented upon the speed with which the station was installed at Portland by its owner, Herbert Mayer, President of The Empire Coil Company, Inc.

Upon completion of Commissioner Walker's remarks, the program switched to New York where Miss Sandra Mayer, on behalf of her father, presented to General Sarnoff a citation in appreciative recognition of the manifold benefits which the Radio Corporation of America has contributed to the development and growth of television as well as to the planning and research that made it possible for KPTV to begin broadcasting at that time on UHF.

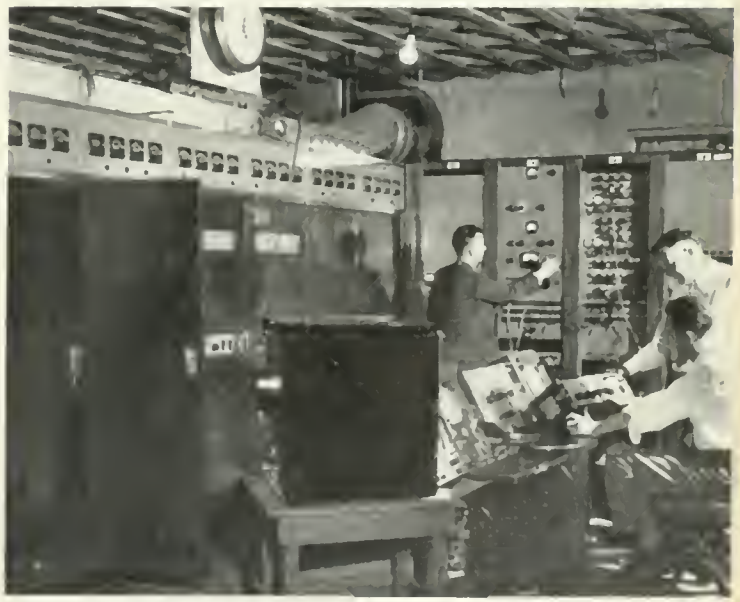
"In bringing television to Portland, Mr. Mayer and his associates have acted in the traditional pioneering spirit of the great Northwest," General Sarnoff said. "They are blazing a new trail which leads to and from all parts of the country.

"As a triumph in radio exploration," he said, "the opening of the UHF spectrum may well be compared with the historic Lewis and Clark expedition that opened up the northwest wilderness and made valuable scientific collections and observations. As those famous explorers pushed westward overland through forests, over rivers and mountains, so RCA research scientists and engineers for more than 25 years have conducted an expedition in the wilderness of space. To reach the goal of UHF they had to develop new electronic tools, new types of electron tubes and other equipment. . . . Indeed, it may be said of UHF, as it was said of the Lewis and Clark expedition, 'Few feats of exploration excel this in romantic interest.'

"These ultra-high frequencies are of great significance to the future of television," General Sarnoff said. "Hundreds of new channels bring additional millions of Americans into range of television programs, not only for entertainment and news but for education.

"Chairman Walker and his associates on the Federal Communications Commission are to be highly commended for their great interest in bringing the new trails of UHF into service. By licensing new stations they now encourage the television broadcasters to make

(Continued on page 30)



Engineers in control room of KPTV making final adjustments as station prepared to go on air.

Coaxial transmission lines lead from central television receiving antenna on Mt. Belknap to Laconia, six miles away. At right: Close-up of Antenaplex tower on 2,400-foot mountain.

Antenaplex Brings TV Programs to New Hampshire City

RESIDENTS of the industrial and resort city of Laconia, New Hampshire, who have been denied dependable television reception are now able to enjoy TV programs through the medium of an RCA Community Antenaplex system, the first to be installed in New England. Located 85 miles from Boston, Laconia's nearest source of TV programs, this community of 15,000 has been balked in its attempts to pick up the signals of station WBZ-TV in the Massachusetts capital because of the ranges of mountains and hills that rise between the two points.

To bring the signals over the mountains, RCA engineers, after a survey of the terrain, selected a site for the antenna on 2,400-foot Mt. Belknap, six miles from the center of Laconia. From a 40-foot tower erected on the peak, cable was laid down the mountainside to a distributing network installed throughout the residential section of the city. Residents who contract for service tap into the system through a TV baseboard outlet in their homes and are able to receive all available stations without individual rooftop antennas.

Some of the problems encountered in installing the system were described by speakers at the gala opening of Laconia's Antenaplex service on June 25.

As the principal speaker at the ceremonies, Governor Sherman Adams of New Hampshire told how workmen had struggled through the snow and rainstorms of last winter to bring television to the community.

"There was no road for the last half mile," he pointed out, "and hundreds of pounds of equipment had to be carried up that slope. I think it was a real demonstration of Yankee grit.

"Today," he added, "we see the results of that tremendous effort — television reception that compares favorably with the best anywhere."

Robert M. Macrae, RCA Regional Manager for the Northeastern Region, told the gathering that the Laconia installation would provide a pattern for the entire region.

He said, "I expect soon to see scores of other mountain-locked towns in this area enjoying good television. With community Antenaplex, there is no reason why TV reception in all New England can't compare favorably with that enjoyed in any other section of the nation."

Workmen drew hundreds of pounds of TV equipment up last half-mile of roadless, snow-covered mountain.

NBC's New TV Center on West Coast Finished in Record Time

Roomy Studios and Service Quarters Embody Latest Advances in Design and Construction

ONLY a few weeks ago two huge slabs of concrete rising like monoliths amidst piles of lumber, a contractor's hut, scattered building materials and debris, dominated a 48-acre site at the busy intersection of Alameda and Olive Streets in Burbank, California. Today, passing motorists see in the same spot two large television studios and a vast service building operating at high speed. This is the first unit of NBC's new West Coast TV headquarters.

Unlike the usual motion picture theatre with its small stage and maximum seating capacity, the NBC studios have been designed in reverse. While the stages are large, each auditorium has seats for only 500. The remainder of the 90- by 140-foot studios has been set aside for scenery, acting, an operating area for cameras, booms and associated equipment.

As the result of a suggestion by NBC star Red Skelton, arrangement of the seating area varies slightly from the normal. Skelton suggested that seats in the west studio start from seven feet above floor level, so that cameramen could move farther back underneath the seats for long shots.

In addition to the production space, the first floor of each studio includes a foyer, a conference room, properties room, producers' offices, an echo chamber, lens storage closet, lighting and technical equipment storage rooms, and a sound effects room.

Spacious Facilities for Stars

Other facilities will include five dressing rooms for stars, equipped with showers, three makeup rooms, two quick-change rooms, one large wardrobe room, a steam room, a rubdown room with showers, and rest rooms at each end of the main corridor. The dressing room section occupies a space 33 feet by 140 feet.

A second floor has seven additional dressing rooms, the control rooms, equipment rooms, engineers' lounge and more rest rooms. Another 10 dressing rooms—four for choruses, which also can be used as rehearsal halls—a makeup storage room and telephone equipment area are housed in the basement between the adjoining buildings.

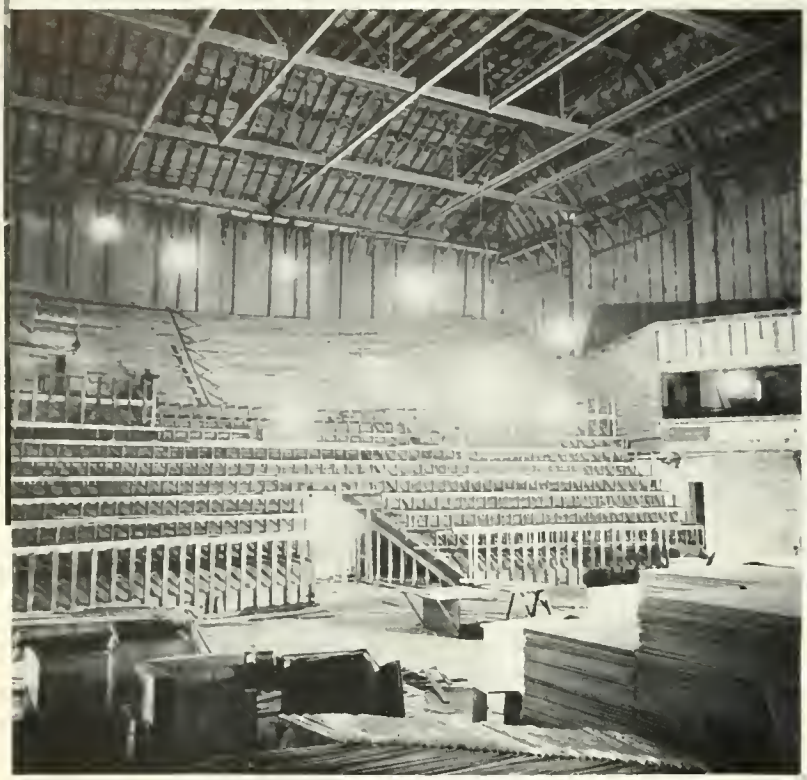
The one-story service building, 140 feet by 180 feet, contains two large rehearsal halls, a carpentry shop, paint shop and large storage areas for scenery and other materials. The overall dimensions of the TV Headquarters are 305 feet by 210 feet.

Shows televised in the new Burbank studios normally will go onto the coaxial cable through NBC's "Radio City" at Sunset and Vine in Hollywood. If normal relay facilities should fail, however, Burbank will be able to beam its programs direct to the NBC transmitter atop Mt. Wilson, northeast of Los Angeles, for telecasting. Large dish-type transmitting antennas are being installed on the roof of the studio building to provide this safety factor. A five-mile extension to the transcontinental video cable has been installed along the Cahuenga freeway through the Hollywood mountains, connecting NBC-Burbank with NBC-Hollywood.

Concrete Walls Built on Ground

Structural innovations speeded up the construction work. For example, instead of erecting lofty wooden forms for walls and columns, the reinforced concrete panels — a total of nearly 150 units — were poured in advance on the ground and lifted into place by giant cranes, a feat in itself. Erecting the panels—each weighing 16 tons—one on top the other, required ingenuity. This was accomplished by lifting one panel, or half-wall, turning it sideways, inserting it between the columns, then turning it back and bringing it into position.

To Gordon Strang goes much of the credit for completing the job on schedule, according to John K. West, vice president in charge of NBC's Western Division. Strang joined NBC in 1927, soon after he had visited WEAF, NBC's original New York outlet, to install telegraph facilities for handling election returns. He liked what he saw of the company, applied for a job and a few weeks later, much to his surprise, was invited to join the network, then only one year old. Since then, he has participated in setting up most of NBC's owned-and-operated radio stations outside of New York. In recent years he has been concerned with the construction of NBC television plants in Washington, New York, Chicago and Hollywood.



One of the two main studios at Burbank as it neared completion. Elevated control room is at the right.

O. B. Hanson, NBC vice president and chief engineer checks a line on the Burbank site. With him are Roy Ward, engineer-builder; William Hamby, design consultant, and Sol Kornberg, NBC production executive.

Before Strang's arrival in Burbank, the project already had been launched by Joe Arnone as supervisor of construction, working under O. B. Hanson, NBC Vice President and Chief Engineer. Earl Rettig, chief of TV operations for the Western Division, and Ed Sobol, production executive, contributed ideas on the required staging facilities and on the layout of the service building. Howard Johnson, TV production facilities supervisor in Hollywood, and his assistants, Joe Tichener, chief scenic artist, and Brice Reid, carpentry chief, were consulted on makeup rooms, wardrobe quarters and the arrangement of shop facilities. Control rooms, technical equipment and lighting came under the supervision of Bob Clark, chief video engineer for the Western Division; Paul Gale, head of station relations and traffic, handled details on wire and telephone facilities.

The new TV Headquarters, which is expected to expand through the years, is the result of a decision NBC executives made in 1951 to go ahead with its own television center rather than continue to invest increasingly more in leasing and buying theatres for its expanding video network. Property was purchased from nearby Warner Bros. Studios and the City of Burbank. In February, 1952, pencil was first put to paper but it was not until last April that ground actually was broken and plans made to complete the project this Fall.

A huge crane swings a 16-ton concrete panel into place as part of the studio's outer wall.

Rain and snow are two of the numerous visual effects made to order for the producers of NBC television dramas.

It Isn't Always as You See It—on TV

There's Art and Magic in Producing Visual Effects that Heighten the Drama of Television Programs

By James Glenn

Manager, Staging Services, National Broadcasting Company

WE—in Special Effects—are known, among other things, as the "meteorologists" of television. We are responsible for simulating such natural phenomena as rain, fog, fire, smoke, snow and wind; such supernatural phenomena as multiple images and distorted scenes; and such visual gags of the Ed Wynn type as exploding hats and collapsing cameras. When a TV script calls for a special effect, it is up to us to produce it. And so far, our batting average is close to 1000.

NBC's rain comes in three sizes: small, synthetic and wet. In that order, (1) a common, garden-type watering can may be emptied just in front of a camera; (2) synthetic rain is made by glamme, a cellophane-like plastic woven into cloth, the strip of which is attached to a drum and rapidly revolved. One camera shoots the actual scene, the other shoots the revolving glamme — and the superimposed images make it rain. (3) wet rain, on a 12- by 24-foot scale, is produced by a sprayer system installed above the scene to be televised. The water falls into a tank which is under the floor boards on which the actor stands and is re-circulated by an acoustically treated pumping unit. The tank is treated with excelsior or glass wool to avoid noisy "plops" which would rob the scene of conviction. It goes without saying that this is the most effective of all rains.

We also have several ways to make snow. Falling snow can be produced by a plastic spray; bleached corn-flakes (a Hollywood standby that is a little noisy for television); confetti (very convincing except that it doesn't melt indoors), and a powdered ice (it melts, but the mechanical system needed is too noisy). We are currently working on a device that will create a synthetic snowfall a viewer won't be able to tell from the real thing.

For a dressing of snow, we find that powdered gypsum, marble dust and dairy salt are all good. For snow banks or window ledges, dairy salt is first piled to the desired form, then lightly sprayed with water to give it a crusty, frozen look. Real open fires are stringently limited in NBC television productions by the fact that film is stored both in the RCA building and at NBC's 106th Street studio building. Where actual flames are unavoidable for close-ups of fire-places, we have evolved "logs" made of stovepipes covered with plaster and asbestos. Shredded waste asbestos is soaked with wood alcohol and tucked in among the logs. Chunks of "frozen" alcohol, resting in trays under the logs, are ignited, touching off the alcohol-soaked asbestos, and creating a controllable flame. For best photographic effect the flame is colored by the use of various chemical formulae.

Synthetic fires, fine for long shots, are produced by lightweight silk or nylon gauze cut into flame shapes

A bird's-eye view of a city serves as a back-drop to create a realistic impression of height for a TV "thriller".

and attached to a diffusion chamber which contains lights and a connection with a blower system. Even candle flames can be simulated in this manner with miniature mechanisms, driven by flashlight batteries, concealed in the candlestick.

Smoke is made by special pellets dropped on electric hot plates or by igniting tobacco in a tube to which a hand syringe, acting as a pump, is attached. Occasionally, for smoky explosions, magician's cotton or flash powder is set off by an electric charge.

"Martin Kane, Private Eye," gets hit on the head at least once a week. Until recently, the cameraman put the TV audience in Kane's predicament by throwing the camera in and out of focus. This is a relatively slow method. About to be used—for this and other supernatural effects—is a distortion lens, which, when rotated, gives a dreamlike, out-of-this-world image. Prismatic lenses, which turn images upside down or multiply them eightfold, can be rotated by a crank to create all kinds of weird impressions.

The "Flexitron," an electronic device, distorts an image under controlled conditions and is used not only for such supernatural effects as were created during the three-part "Peer Gynt" production but also to give motion to the titles at the beginning of TV dramas.

On a recent "RCA Victor Show" on NBC, Harpo Marx was rebuked by a headwaiter for an untidy dining table—dirty dishes, overturned glasses, empty bottles, empty bottles, full ashtrays. One second later an abused Harpo pointed to the table and revealed an impeccable setting with clean dishes, sparkling glassware, full wine bottles, flowers arranged artistically in the center. On the same show the wretched Harpo fed nickels continuously to a parking meter, which registered a violation each time he turned his back.

All this was done without trick photography. For instance, the table was a two-sided affair, pivoted in the center, the top cut out along the pattern of the table cloth. Dishes, glassware and silverware were screwed down. Harpo had only to push down on one end of the table and the top flipped over revealing the other setting. The dummy parking meter registered a violation every time a stage-hand off-camera, pulled a string releasing a pin that held down the indicating sign.

One of the department's proudest accomplishments is the fog-making machine. With it we can produce realistic fog that will swirl, hang and allow the actors to walk through it. Prior to the development of the machine, TV fog had been produced by smoke candles, which give off an acrid vapor irritating to nose and throat. Smoke-candle fog was neither predictable, consistent nor realistic. It looked like what it was: smoke not fog.

Another fog-making method was to blow steam on dry ice. This method is still used in smaller studios where it is necessary to get rid of the fog quickly, but it is not desirable for a full-scale, sustaining fog. Still another method was to shoot the scene through a smoke-filled glass chamber, a procedure which tends to drop a veil—both physically and psychologically—between the viewer and the actor.

The new machine, an electric Rube Goldberg-type marvel, atomizes a special oil, which is then vaporized by being sprayed on a hot plate. In other words, it becomes smoke and no longer globules of oil. The vapor is blown through an acoustically treated compartment, passed through dry ice, and exuded under low air pressure. Two of these machines can fill a vast studio like NBC's huge 8-H in less than three minutes. Moreover the devices are so well muffled that they can be operated noiselessly within four feet of a microphone.

A few drops of chemical squeezed into a liquid produces a cloud of vapor that can be photographed for television.

NBC Opera Telecasts Scheduled

Eight Works Including Two Premieres and a Repeat Performance of "Amahl and the Night Visitors" in Fall-Winter Series

EIGHT opera presentations, including the American premiere of Benjamin Britten's "Billy Budd" and the first professional performance of Leonard Bernstein's "Trouble in Tahiti," are to be given in the 1952-53 season of the NBC Television Opera Theatre. The announcement was made by Samuel Chotzinoff, NBC general music director. As in previous years, the series will be under the musical and artistic direction of Peter Herman Adler, with Chotzinoff as producer.

The season also will include a virtually complete version of Richard Strauss' "Der Rosenkavalier," to be given in two segments. Puccini's "Suor Angelica," the second of his triptych of one-act operas, also will appear in the schedule. Gian Carlo Menotti's "Amahl and the Night Visitors," first telecast on Christmas Eve, 1951, will be repeated this season.

Eight of the television presentations will be offered monthly on Sundays. The opening opera was "Billy Budd" on October 19. The performance ran an hour and a half, starting at 2:30 p.m. Theodor Uppmann, baritone, who created the title role in London and Paris, was seen again in this part.

Leonard Bernstein's "Trouble in Tahiti," revised since its presentations at Brandeis University and Tanglewood, will be given as the second opera in the schedule on Nov. 16 at 3:00 p.m. This opera runs about 40 minutes. The remaining time in the one-hour telecast will be devoted to a ballet presentation with music by Bernstein.

Gian Carlo Menotti's phenomenally successful "Amahl and the Night Visitors" will be repeated in December, probably near Christmas time. Menotti again will stage the work, with Thomas Schippers as conductor. The same sets and costumes of Eugene Berman will be used. Menotti is searching for another Amahl since 13-year-old Chet Allen, who sang the role twice on NBC last season, is no longer a soprano.

Operas for January and February have not yet been scheduled, but probably will be selected from the standard opera repertoire.

In March, "Suor Angelica" will be given. This opera has an all female cast and is set in a convent. NBC Opera last season presented the other two of this triptych of one-act operas, "Gianni Schicchi" and "Il Tabarro."

In April no opera is scheduled, because "Der Rosenkavalier" will be given in two sessions, both in May.

The staff of the NBC Television Opera Theatre will be largely the same as last year, with Charles Polacheck as associate producer to Chotzinoff, and Kirk Browning as television director.

All presentations of the NBC Television Opera Theatre are given in English.

Scene from NBC's TV production of "Gianni Schicchi", one-act opera by Giacomo Puccini.

Robert Weede and Eloine Malbin in last season's telecast of Puccini's "The Cloak".

Watchdogs of Quality

Expert Technicians at RCA's Testing Laboratory Check the Company's Products Before They Reach the Customer

By William J. Zaun,

Manager, Quality Control,
RCA Service Co., Inc.

OFF the beaten track, in the pine woods at Browns Mills, N. J., 30 miles due east from Camden, is the one RCA showroom that the public never sees.

There, in a two-story brick building, a visitor would see long rows of the latest TV sets, blocks of 45-rpm record players, lines of air-conditioners, parades of table radios, all hard at work, 24 hours a day. The television screens are alive with pictures; the 45's are spinning; the air-conditioners are extracting degrees Fahrenheit from the atmosphere, and the forest-green radios have their dials alight. Antennas of every description, including of course, the RCA Antenaplex, sprout from the roof top. Outside the building stands a station-wagon, rigged with three mobile-radio systems, one RCA and two of competitive makes. This is the company's Field Quality Testing Laboratory. From its operations come information which contributes substantially to the "priceless reputation of RCA."

The Laboratory, operated by RCA Service Company, bulges with products assembled for inspection under the searching eyes of ten technician-judges. Products for the tests are arriving constantly from the various manufacturing plants throughout the country. In one shipment from Indiana, for instance, there will be more than 100 new models of TV consoles. At the same time, a smaller quantity of competitors' receivers will show up to be put through the same rigorous inspection.

All instruments are tested at once—two and three-quarters of an hour "ON", one-quarter hour "OFF"—24 hours a day—until each has been in operation for 100 hours, a period approximating the set's first-month service in the average home.

These speeded-up tests are conducted to learn if first-run instruments from the production line meet specific standards of RCA quality. Other checks are made to determine the margin of superiority over competitive products. Competing sets are placed side by side with those manufactured by RCA, and examined by technicians for such characteristics as bandwidth, overall gain, synchronizing action, as well as picture definition. When special tests are desirable on new products, they may continue for 1,000 hours or more.

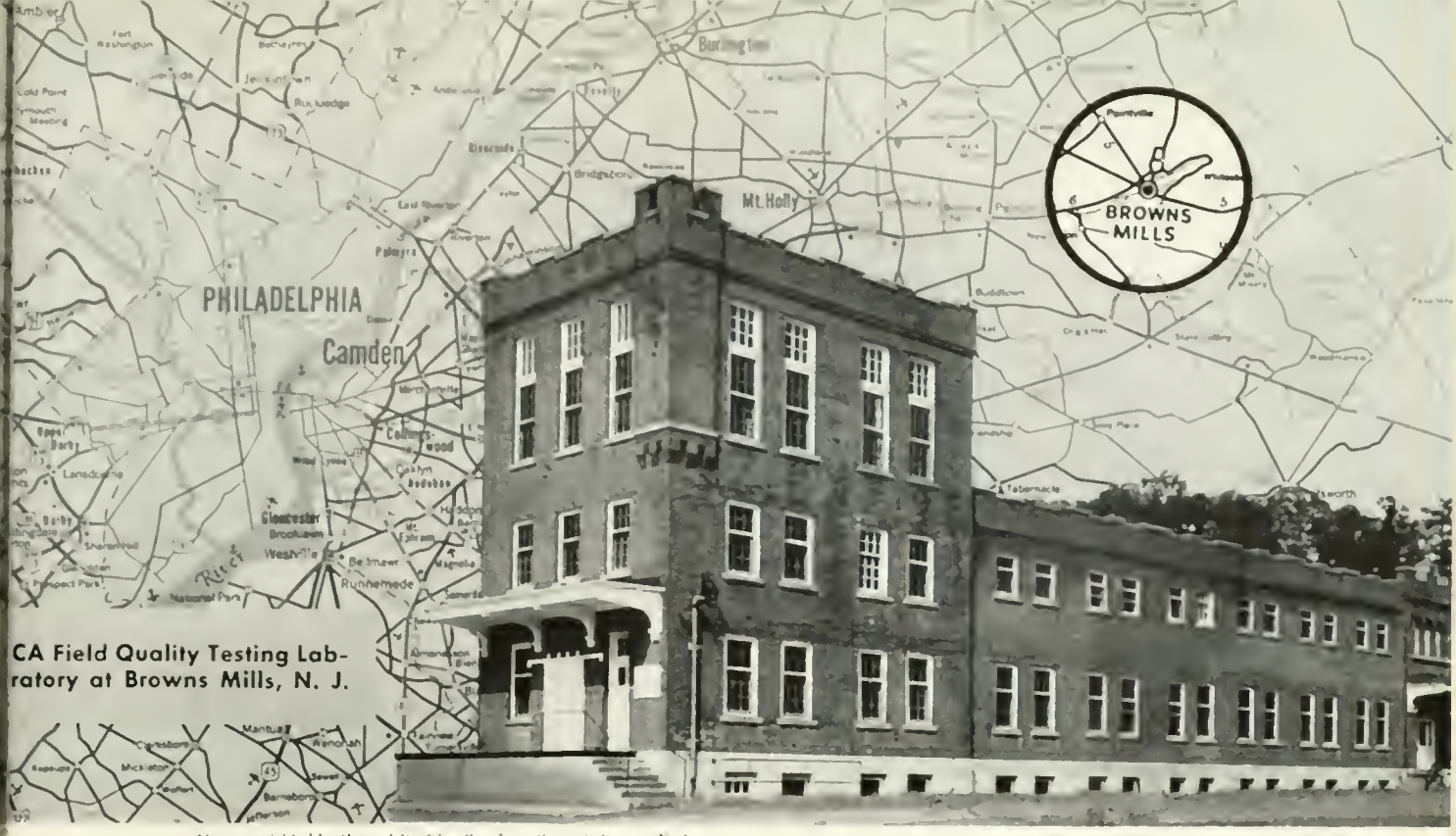
Upon the completion of the test period on television sets, three types of reports are sent out:

(1) A daily teletype report is dispatched to the quality manager of the plant which made the models under observation; a duplicate goes to the engineering department. These messages relate what was found wrong or report "no fault." Special emphasis is placed on failure of parts and tubes, cabinet defects and fringe reception that falls below standard.

(2) At the end of each 100-hour test, a summarized report is compiled, based on the sample lot tested. This is inclusive, including model, line

Thirty-two automatic record players, selected at random from production lines, undergo life-tests.

The finest and most accurate instruments are available for the many tests carried out at the Field Laboratory.



CA Field Quality Testing Laboratory at Browns Mills, N. J.

Map copyrighted by General Drafting Co., Inc., Convent Station, N. J.

Rows of table model radio sets (above) and new television receivers (below) are subjected to on-and-off tests for 100 hours or more while technicians watch for any deviations from RCA standard of quality.

and the identity of the plant which turned out any defective parts.

(3) An overall or "management" document is compiled, according to originating plants. This part of the program is carried out only after several sample lots have been inspected.

If trouble reaches high percentages, the information is rushed to Production or Engineering Departments or both, in order that necessary changes may be made immediately. Before these foolproof checks were started in 1951, Production and Engineering had to wait, sometimes for as long as 25 weeks for reports from the field.

For the testing of TV sets, Browns Mills is an excellent location. Signals are received there from Philadelphia, Wilmington and New York. The last—60 miles away—provides fringe-type reception conditions. Television signals are brought in on both independent and multi-antennas.

However, the success of the Quality program would not be assured by the simple collection, analyzation, and reporting of data. Coordination and team-work with Quality Control Managers, Manufacturing Supervisors, and supervisory Engineering personnel of the various Instrument, Tube and Components' Plants play an important part in the program. A plant-wide quality committee, consisting of representatives from the manufacturing plants, engineering, merchandising and service, meeting regularly, review the overall RCA Victor Quality level and its trends, and institute the necessary action to assure unrelenting adherence to high standards.

Benjamin Franklin was the central figure in an historical program of the "American Inventory" series.

"Importance of child care" was one of the educational offerings in NBC's experimental telecasts.

American Inventory — *a Successful Experiment in Adult Education by TV*

In JULY 1951, NBC in cooperation with the Alfred P. Sloan Foundation undertook a major television experiment in adult education. The chief objective was to present a series of educational and cultural "for instance" telecasts to determine the most effective techniques which TV might employ for the advancement of public information and enlightenment. Since that time, more than 50 programs, mainly on economics and the social sciences, have been telecast, bringing high praise from educators, the public and the nation's press.

Because the program series was first considered as an experiment, it was believed that there should be no set pattern. Instead, it was decided that the word "experiment" should be taken in the full scope of its meaning: anything and everything should be tried. This would include living newspaper techniques, drama documentaries, panels with a difference, films, cartoons, puppets, individually and in combinations.

Although a majority of programs so far have been presented in "live" form, a more extensive use of film is considered for the remaining shows in the current series.

This change in emphasis was revealed in an announcement of plans for the coming year by William Hodapp, the program's executive producer. Stock films, Hodapp said, will be out, and "live" shows will be relatively few.

There are two reasons for the change, Hodapp explained. "We want to go out more and more on location throughout the country to tell the story of what is at stake in America; we want to capture the personality of particular American institutions and communities; we want to show what communities can do.

"And, also, we'd like 'American Inventory' to have uses beyond the original TV screening. If we make our own films, they can be made available to classrooms, and we'd like what we've learned to be sent out to groups. This would not be possible otherwise."

Another innovation for the coming year will be a greater emphasis on star personalities. "We want to go after big film stars and directors," Hodapp said, "especially for films on economic subjects."

A third new trend will find more interpretation of industry's function in the American way of life. "We want to try a new approach to industrial films," Hodapp said. "Not a straight documentary, but something with a human interest story grafted on."

Some of the subjects scheduled for Fall presentation are:

"Social Security," a "Kukla, Fran and Ollie" program, their second for this series.

"Why Wait for a Million?" an on-location film story of Thayer Hospital in Waterville, Me., a small hospital that has attracted increasing attention for its successful hospital-community relations.

"Foreign Students in the U. S.," an account, filmed at Massachusetts Institute of Technology, of this country's foreign student program.

New Historical Series on TV—

"Victory at Sea"

CLIMAXING more than 12 months of intense research in film libraries and governmental archives, NBC's long-awaited public service program series, "Victory at Sea" will make its debut on October 26 at 3:00 p.m., EST. Thereafter, it will be viewed at the same time on alternate Wednesdays until the 26-part video story of wartime naval operations has been completed.

To insure the most accurate visual reporting of the "war at sea", NBC engaged the services of outstanding authorities who virtually searched the world for film strips. The original musical score for the program was written by the distinguished American composer, Richard Rogers. Robert Russell Bennett arranged the music which was recorded by the famed NBC Symphony Orchestra under his direction. The entire score for "Victory at Sea" will comprise almost 13 hours of music, the longest symphonic work ever written.

The program was produced through the establishment of a special NBC unit, staffed by experts and organized to the last detail. Robert W. Sarnoff, then director of NBC unit productions and now Vice President in charge of NBC-TV's newly created Film Division, immediately envisaged the vast potentialities of a public-service dramatic-documentary when he was approached two years ago with the idea for "Victory at Sea" by Henry Salomon, naval historian. Sarnoff, whose responsibilities then included "The Comedy Hour," "Your Show of Shows," "All Star Revue" and "The Kate Smith Hour," set machinery in motion that resulted in "Victory at Sea." He helped arrange for complete cooperation between the network and the Navy, organized a production unit to create the program, and made Salomon producer. He has served throughout the preparation of the series as its executive producer and co-ordinator.

"Victory at Sea" was assembled from more than 60,000,000 feet of film obtained from the files of 10 different governments and 26 different agencies. Much of the film, including captured German and Japanese footage, will be seen for the first time. The attack on Pearl Harbor, for instance, is seen largely through the eyes of the Japanese. Submarine warfare in the Atlantic is pictured to a considerable extent from films exposed by U-boat crews.

Neither cost nor effort was spared by NBC in searching for the exact sequences needed to depict specific phases of the war. For instance, the editors

Continued on page 32

Left: Some of the millions of feet of film from which editors selected sequences for the "Victory at Sea" series. Below: One of the exciting scenes from films made available to NBC by the U. S. Navy.

Night Driving Made Safer by Electronic "Eye"

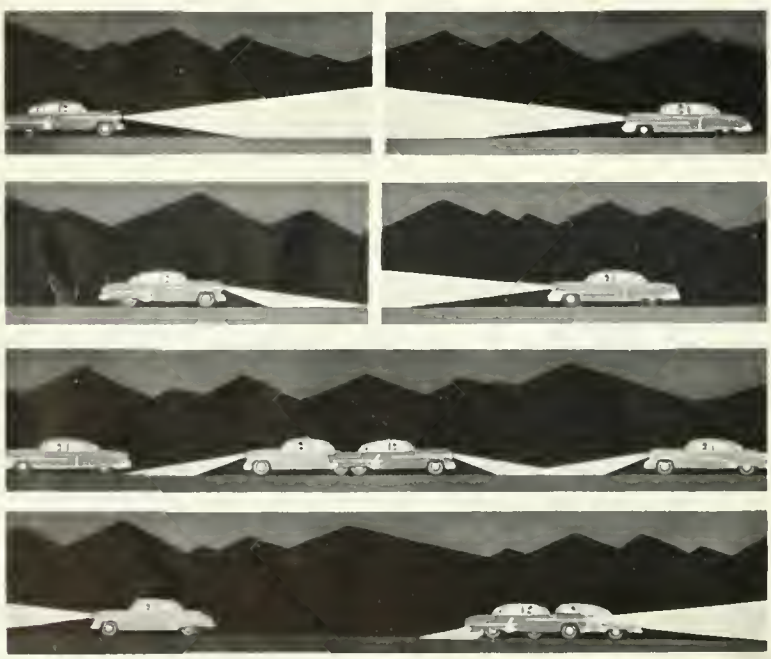
EYE-BLINDING headlight glare, bane of night drivers and one of the hazards of after-dark travel, has succumbed to the wizardry of a small tube developed by RCA. The tube—a multiplier phototube—is the essential component in the "Autronic Eye", an automatic headlight beam control developed by the Guide Lamp Division of General Motors Corporation.

Mounted behind the windshield of an automobile, the "Eye" sees what the driver sees and electronically selects the safest headlight beam to suit approaching road conditions. The "Eye" relieves the driver from the responsibility of constantly operating the conventional foot-switch to dim when approaching other cars or entering well-lighted or dark streets and highways.

The phototube is extremely sensitive to light. When it picks up light from approaching traffic, it triggers a control circuit which dims the headlights of the car on which it is installed, and keeps them dim until the other vehicle or vehicles have passed. Similarly, it dims the headlights when the car enters well-lighted streets, and brightens them when the car enters darkened avenues.

Autronic Eye, containing small light-sensitive tube (insert), electronic relay and control circuits, automatically depresses bright beam when one or more cars approach and raises beam when traffic has passed.

The device is available on several 1952 model automobiles and in due time may become standard equipment on all vehicles because of the greater highway safety and driving comfort it affords.



HOW THE AUTRONIC-EYE WORKS

1. Autronic-Eye keeps headlights bright as long as approaching headlights are beyond the glaring range.

2. Eye automatically shifts headlights from upper to lower beam when oncoming car approaches.

3. Maintains lower beam—even though oncoming lights are depressed—until nearest car and others behind it have passed.

4. Automatically returns headlights to upper beam when all oncoming cars have passed.

Television in Canada

By F. R. Deakins
President,
RCA Victor Company, Ltd.
Montreal, Canada.

CANADIANS, more than 100,000 of whom have been watching television from American border stations for four years, have, since the second week in September, been able to see regular scheduled programs originating in their own country. In the Montreal area, where a small number of set owners picked up distant American stations on a haphazard basis, unscheduled experimental programs went on the air in June and the first regular telecasting in Canada began on September 6.

Television as a Canadian activity is so new that it is still viewed more as a technical marvel than simply as entertainment. The public in both Toronto and Montreal, the only two cities presently having television transmitters, is buying receiving sets enthusiastically, and Canadian homes in these areas are going through the same early stages of the new adventure experienced by American TV audiences three or four years ago. Just as Americans were doing in the years immediately following the war, Canadians are adjusting themselves to this medium of entertainment and education.

Canada's approach to the miracle of the second half of the twentieth century has been more cautious and more gradual than was that of the United States. For the time being at least, telecasting in Canada is restricted to stations built and operated by the Canadian Broadcasting Corporation, a government-owned body which also operates the only radio networks in Canada. Later, at a time still to be decided, private stations will enter the television field and supplement the services of the government-owned system, giving variety and more intense local coverage to a medium which will probably continue to be dominated on a national basis by the CBC.

The delay in introducing television to Canada has been due to two factors: first, the extremely high cost of attempting to provide television coverage in a country which is spread across 4,000 miles and has a population approximating that of the State of New York; and second, the desire on the part of Canadian authorities to benefit from technical and programming experience in the United States before making extensive expenditures in Canada. As a result, the equipment being used by the first two CBC television stations is of the highest standard and based on that developed for the best television stations in the United States.

Canadian television has been in the planning stage since 1947 when the first Canadian engineers and program staffs were assigned to study television as it then existed in the United States, Great Britain and France. Teams of producers and engineers visited stations in New York, Chicago and the midwest and then continued to London and Paris, reaping the benefits of knowledge accumulated in those centres. On the basis of their studies, television in Canada was organized and the fruits of their labor were made available to Canadians this year when the first programs went out over the transmitters in Montreal and Toronto.

Programs Telecast in English and French

In the two cities, specially designed five-story structures are the operating headquarters of Canadian television. Programs are on the air daily for an average of three hours. In the afternoon a half hour is directed to children, and two and a half hours in the evening for adults. Programs are a mixture of live and film presentations. In Montreal, half of the programs are in the French language, the other half in English. Approximately 70 per cent of the citizens of Montreal speak French.

Montreal's CBFT, with its RCA 5-kilowatt transmitter located on top of Mount Royal, the mountain park in the heart of the city, enjoys the distinction of having been the first station to telecast in Canada. Early last June, several weeks ahead of schedule, it was on the air with test patterns, and in the last week in July was telecasting International League baseball games. To the great satisfaction of Montrealers who carry on year-round competition with Toronto in everything from sports to science, CBFT continued its priority and was on the air two days ahead of Toronto with regular programming in September.

Part of the credit for Montreal's performance belongs to RCA Victor engineers who installed the transmitter and temporary antenna on Mount Royal. Long before any actual construction work began groups of CBC technicians were taken to Camden and to the David Sarnoff Research Center of RCA in Princeton, N. J., to see RCA equipment. These trips were followed by visits to NBC where similar equipment could be seen in operation.

In 1950, an order was received for a TT5A standard 5 kw transmitter, the maximum power available at that time, and for a three section superturnstile antenna designed for Channel 2. For approximately a year the CBC was negotiating with the city of Montreal to secure a transmitter site on the mountain top. When these negotiations were successfully completed, the transmitter was brought to Montreal and instructions were received to go ahead with the necessary engineering plans and drawings for installation.

Meanwhile, CBC proceeded with construction of its building, allowing space for a 20-kw amplifier and an additional transmitter which will be installed later when French and English programs are telecast simultaneously on different channels. As the work proceeded, public interest increased and CBC, which was more or less committed to go on the air by the fall of 1952, was anxious to be telecasting experimentally before that. Then the steel shortage intervened and it appeared that completion of the tower in time might be impossible.

RCA Victor engineers were informed of CBC's problem and offered their assistance in overcoming it. A temporary antenna seemed to be the only solution. Our engineers told CBC: "We will design one for you from scratch and have it ready in time". The offer was accepted. An order for the temporary antenna was received on February 21; on May 29 it was completed and on June 3 it was installed, tested and was operating under its full power.

Installation of the transmitter commenced April 7 and was completed on June 19. After going through its performance test and following minor adjustments which are always necessary on new installations, it was accepted by CBC on June 23. RCA Victor engineers in the Montreal plant designed the complete transmitter installation and supervised all preliminary telecasts. Bruce MacKimmie, antenna specialist; Bob Norton, transmitter engineer, and John Jackson, supervisor, all of the Montreal RCA Victor plant, handled the installation under the direction of H. B. Seabrook, chief of the Engineering Products division of the Canadian company. For the final check on performance, Ray Colvin, service engineer, was brought from Camden in order that CBC might have the advantage of his experience on many similar jobs in the United States.

Full cooperation from the CBC technical staff, thoroughly designed equipment from RCA Victor's plant, and competent engineering combined to make possible Canada's first telecasting well ahead of schedule. A three-section superturnstile antenna and two FM antennae are still to go up and, eventually, that second TV transmitter to take care of the second language programs. In the meantime CBFT is on the air and is being received in points as far away as eighty miles, with clear reproduction.

Station CBFT's antenna on Mount Royal looks down on this view of Montreal's business section.

Workmen rig a temporary television antenna atop the transmitter building of CBFT, Mantreal.

Test pattern shaws up on RCA Victor control console installed at CBFT transmitter.

Canadian and U. S. television representatives at official opening of CBFT. Left to right: C. B. Denny, NBC vice president, and Mrs. Denny; Donald Manson, CBC General Manager; Paul A. Walker, FCC Chairman; Thomson A. Moore, assistant to President of RCA Victor, Ltd., and André Ouimet, CBC assistant co-ordinator of television.

Montreal and Toronto, of course, are only the beginning. While each city has a potential television audience of more than 2,000,000 people, another ten million people across Canada are impatiently awaiting the day when they will get in on Canada's biggest show. Toronto is now linked with Buffalo, N. Y., by microwave and can handle live programs from there, but for some months to come Montreal will view only shows originating outside the city on kinescope recordings. The Bell Telephone Company is installing a series of 12 microwave relay stations between Toronto and Montreal via Ottawa, and this first television network in Canada is scheduled to open in June 1953. It estimated that a similar network, coast-to-coast, will cost at least $50,000,000.

Television on a semi-national basis will be established in what CBC refers to as its second stage. Transmitters are planned for Quebec City, Ottawa,Windsor, Hamilton, London, Winnipeg and Vancouver, with only the Ottawa transmitter now having reached the blueprint stage. Ottawa, it is expected, will be on the air with programs fed mainly from Toronto and Montreal, by mid-1953. Other cities in stage two will probably have to wait another two years with Atlantic and Pacific coast cities scheduled for about five years from now.

When the network as envisioned by CBC is completed, private stations will be invited to join. Only then will television coverage in Canada approach that now available in radio, and when that status is reached, Canada will then be able to see itself on the television screen from coast to coast.

A new owner of RCA television receives operating instructions from a service technician.

Tactful Technicians

The RCA man who services your TV set must follow more than 40 rules of Conduct, Courtesy and Diplomacy

He won't take refreshments in your home, even if you urge him. And he won't smoke unless he's specifically invited to do so. He may not like having you, your children, and your Great Dane looking over his shoulder while he's working, but he's tactful enough not to show his annoyance. There are more than 40 other rules that govern his conduct while he's in your home.

This polite, patient man is a carefully trained installation and service technician from the RCA Service Company. Technical ability isn't enough to qualify these men for their jobs. Their training also includes a firm grounding in courtesy and diplomacy.

"The best TV technician in the world doesn't meet our requirements unless he practices unfailing courtesy and tact in his dealings with our customers," E. C. Cahill, president of the Service Company, states emphatically. "Good customer relations means bread and butter to us. It's as simple as that."

The company goes to great lengths to insure customer satisfaction through courteous treatment and prompt, efficient service. And that goal is achieved by a continuing program carried out in all of the service branches the company maintains throughout the country.

A big feature of this program is the President's Cup campaign, inaugurated last spring by Frank M. Folsom, president of the Radio Corporation of America. Launched on the theme, "Fix It for Sure; Fix It for Keeps," the drive was designed to stimulate inter-branch competition in efforts to achieve exceptional performance in maintaining customer satisfaction.

The contest proved successful, and another phase, keynoted by the slogan, "Courtesy Counts, Workmanship Wins," was launched last fall. The third phase, which ended in June, stressed prompt service with the theme, "TNT — Today, Not Tommorrow."

After each phase of the contest is completed, winning TV service branches are selected on the basis of those receiving the fewest customer complaints. Managers of winning branches are invited to a ceremony in New York, at which they are personally presented with the President's Cup by Mr. Folsom. Each victorious manager, on his return, is host to employees of his branch and their families at a dinner held in recognition of this achievement.

Does this emphasis on courteous service pay off? Hundreds of unsolicited letters from customers says it does. Complaints have been reduced as a result of the program. And some of the complimentary letters would warm the cockles of an advertising man's heart.

"Just a word to congratulate you on the caliber of your local organization. . . ."

RCA Service Company manuals, such as the technicians' handbook, "The Care and Treatment of Tele-

(Continued on page 30)

Three of the manuals prepared for the guidance of RCA Service personnel.

Color Book for TV Scenery Designers

By Albert W. Pratzman,

Technical Production Director, National Broadcasting Co.

IMAGINE a television stage scene as it would be viewed from the TV studio. The set designer has executed the background in the soft tones of grayed gold; the star is wearing a gown of ultramarine blue; the leading man is clad in a suit of medium gray, and the dominating piece of stage property is a divan covered in a brocade of warm green.

To the studio audience, the visual picture in color is a satisfying one, impressive and in the proper mood of the play. But strangely, the thousands who are watching the same scene on their home TV receivers in monochrome are left cold, unresponsive, unimpressed. To them, the video screen picture — in sharp distinction to the scene viewed by the studio audience — appears flat with an almost complete absence of tonal contrast between the costumes of the cast and the stage properties and scenery. In this imagined scene, some vital change has taken place between camera and receiver screen to nullify the best work of designers, producers and cameramen.

Unfortunate situations similar to this one have not been uncommon in television. The basic cause was the inability of the TV camera to convert the different colors of the scene into correspondingly contrasting shades of black and white. In the particular setting just described, the grayed gold, ultramarine blue, gray and green would have appeared on viewers' screens as a monotonously uniform tone of slate gray.

But NBC has taken positive steps to see that such incongruities won't happen again on its network. After months of methodical labor, the author and Cliff Stiegelbauer, NBC Supervisor of Design, have completed preparation of a reference book which removes all element of chance in selecting colors and color combinations for the most effective black-and-white TV presentations.

Preparation of a reference book of this kind would have been useles in the early days of television when the iconoscope was the standard camera tube, because the "ike" was not stable in its color response." Different tubes responded in different ways. But the RCA image orthicon — the present standardized camera tube — is being mass-produced with a dependable and specific spectral response. This response was used as the starting point for the NBC color charts.

When the study of color versus black and white was begun, it was essential first to establish a workable range in the gray scale, that is, from light gray to near black. As a basic source of comparison it was decided to utilize the accurate and standard Munsell Gray Scale. The Munsell system grades tones from black to white and arbitrarily numbers them from 1 to 9.5, but because the television system cannot successfully tolerate this wide contrast, it was necessary to confine the range between =2 black to =8.5 white. Munsell =2 black reflects only 3% of the light striking it while the =8.5 hue, called "television white," reflects 63.5% of incident light.

By actual tests it was found that a video picture could be more accurately reproduced if the reflectance of scenery, whether in color or in monochrome, were held within this restricted contrast range.

Preparation of the NBC Color Book was a long, tedious job. There were 192 colors to test and each color was broken down into four tints and three shades.

In its final form, the NBC book — which is not available for general distribution — consists of 14 pages,

(Continued on page 32)

The author (left) measures the temperature of the studio illumination as Cliff Stiegelbauer holds a red-orange card against a gray scale. The comparison shows that this particular hue will be reproduced on TV screens as Munsell =7 gray.

An RCA industrial TV camera scans passing freight cars and transmits the moving images to a recorder who notes the car numbers and other essential data.

TV Demonstrates Usefulness in Railroad Field

NEW uses of television in railroading which may save time, money, and wear-and-tear on both rolling stock and personnel have been explored in tests conducted recently by the Baltimore & Ohio Railroad and RCA at the railroad's Barr Yard in Chicago.

At demonstrations attended by the press and officials of the B. & O. and 28 other railroads, RCA used three of its newly developed "pint-size" Vidicon industrial TV systems to enable personnel in sheltered fixed locations to perform functions normally requiring both extra movement of freight cars and walking by employes over considerable distances.

Instead of walking among trains and over tracks to list car numbers on an incoming train, for use in switching to make up trains destined for various sections of the country, a checker sat before a television screen and listed the numbers as cars passed before a small unattended camera. Similarly, supervisors in a single location were enabled to observe on the screens of two TV receivers, for the purpose of coordinating various activities, the disposition and movement of all cars and switching engines in the big classification yard. These views were picked up by two of the new small TV cameras, mounted atop the yardmaster's tower on bases that could be rotated at will by means of controls at the receiver location.

At a luncheon at the Union League Club preceding the special press demonstration this afternoon, W. C. Baker, B. & O. vice president in charge of operation and maintenance, envisioned numerous other railroad applications of television and said that the medium may play an important role in the railroading of the future.

Speaking for RCA Victor, W. W. Watts, vice president in charge of the RCA Engineering Products Department, reported that railroading is the newest and one of the most challenging of a growing list of industrial and scientific fields in which television promises increased efficiency, improved products and services, and elimination of risks and hardships for human observers. He said that the use of television in such places as factories, mines, laboratories, and railroad yards may some day be as common and as significant as its use today for home entertainment.

Object of the Chicago experiment, Mr. Baker said, was "to determine whether industrial television will be able to contribute to greater efficiency in the operations of a railroad classification yard."

Other possible uses have been suggested. For example, industrial television may prove to be useful at large railroad-marine terminals, such as the B. & O. operates in Baltimore. There, television might be used to help supervise the loading of ore at the import ore pier. Or, at the tipples of coal mines, television cameras might be adjusted to enable a clerk in a distant office to record the serial numbers of cars which are being loaded. Another possible application, it was pointed out, would be in the inspection of car gear. Industrial TV cameras operated from pits beneath the track or suspended from above the cars would permit an in-

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Two-way Radio System Speeds Flow of Materials in Steel Plant

The problem of maintaining the orderly movement of millions of steel parts as they are transferred from one manufacturing process to another has been solved by a Pennsylvania company through the use of an RCA two-way radio communications system.

The Standard Pressed Steel Company of Jenkintown, Pa., nine miles north of Philadelphia, is the world's largest producer of socket screws and fabricator of huge numbers of other metal products. Every day the plant converts 80 tons of steel into metal fasteners and shop equipment, for industry and the armed forces. Among these items are bolts for aircraft, and parts for jet, Diesel and reciprocating engines.

To transfer the parts from one station in the production lines to another, Standard relies on a fleet of small, electrically-operated vehicles called fork lifts, which cruise over the company's 15-acre plant and into its yards. Before radio entered the picture, contact with drivers of these lifts was maintained, after a fashion, by phone calls, messengers, public address systems and signal lights. All methods were either time-consuming or provided only one-way contact. Radio eliminated these drawbacks. Today, with each truck equipped with an RCA Carfone unit, a driver can be directed instantly to needed spots, or if he is on an assignment at the time, can so inform the dispatcher.

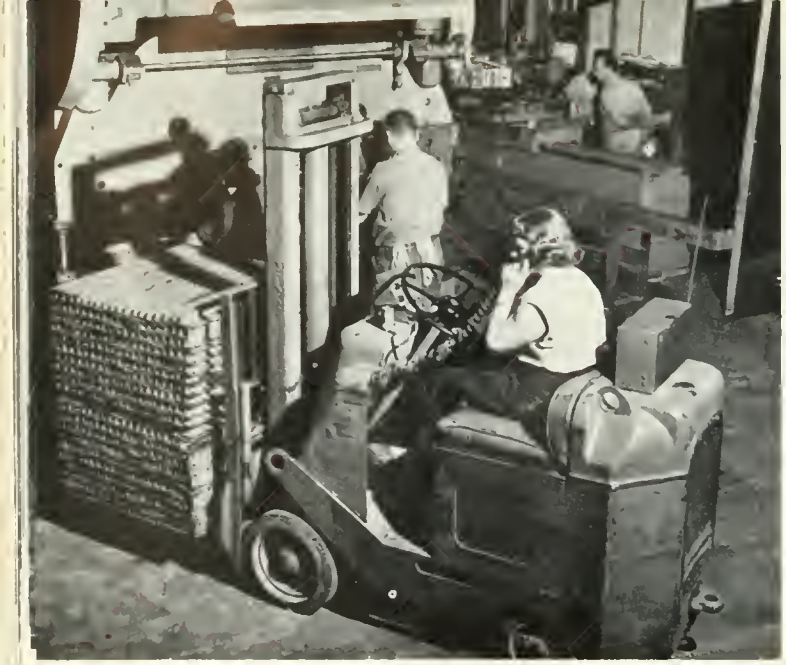
Radio Gives More Output from Trucks

Reuben Whittaker, Standard's Chief Expediter, has summed up advantages of the RCA two-way communications system in this manner:

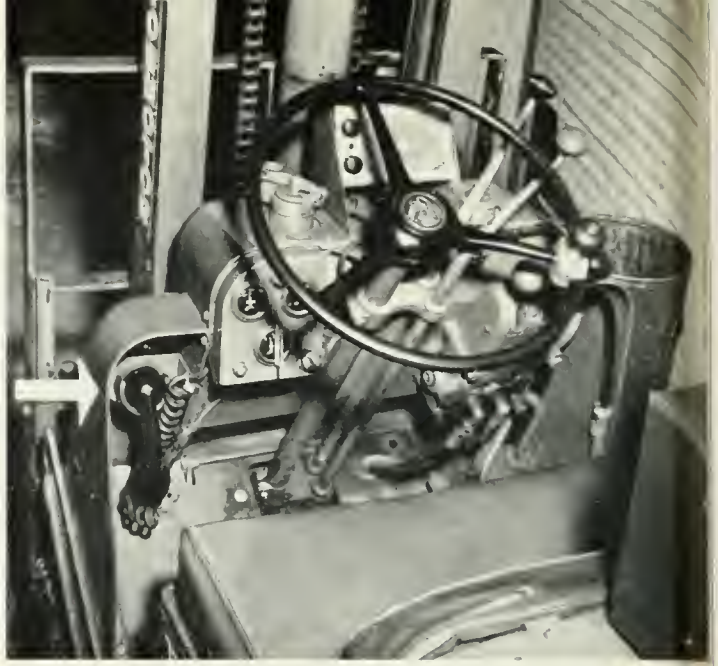
"We used to make dozens of phone calls and run our legs off getting fork trucks to needed spots but now all we do is call over our radio system and we get immediate results. We can now get a truck in five minutes whereas formerly it took half an hour. As a result we get more output from each truck."

Then, there was the matter of employee morale. Before the radio system was in operation, departments often disagreed over the urgency of their respective truckage needs. Now, that doesn't happen. When a department needs a truck, Production Control reaches a

Dispatcher (left) at Standard Pressed Steel plant in Jenkintown, Pa., is able to reach the operator of any lift truck (below) in factory or yards, over the RCA two-way radio system.



Huge machines and stockpiles of metal do not affect the operation of the interplant radio communications system designed by RCA for the Standard plant.



Headsets for the fork lifts are placed at the left of the operator with the transmitter-receiver installed behind the seat (extreme right).

driver at once and the lift arrives within a few minutes. As a result, everyone in the Standard plant is happier, particularly the truck drivers. They have definite assignments and no longer can be blamed for delays for which they are not responsible. Moreover, with radio, the drivers are protected from false accusations of loafing on the job. When they leave their vehicles, they notify the dispatcher who thus knows where they are and where they can be reached at all times.

When RCA communications engineers first studied the installation plans at Standard, there was some doubt as to the efficiency of mobile radio in the plant. This doubt arose because of the huge piles of steel stock and the number of steel machines throughout the buildings. Then there was the deafening din created by the galaxy of thundering machinery. But tests carried out by RCA proved the doubts unfounded.

Communications on the very-high frequencies (152-174 megacycles) assigned by the FCC to "mobile industrial radio" applications, was found to be unaffected by the steel stockpiles and the steel-reinforced walls of the building. The background noise, however, was a tougher problem. With normal conversation in the plants almost impossible, it seemed unlikely that the driver of a fork lift could hear his loudspeaker above the cacophony of sounds. Nor could the dispatcher hear the driver's voice as the latter's words entered his microphone along with the factory din. Again RCA found the solutions.

On trucks operating in the noisiest areas, the conventional loudspeakers were replaced with directional reentrant horns. These horns beamed the dispatcher's orders direct to the drivers and excluded confusing sound. Next, the regular microphones were replaced by noise-cancelling microphones which eliminated most of the background noise.

The completed RCA installation at the Standard Pressed Steel plant now consists of six radio units. One semi-portable Carfone is located on the dispatcher's desk and five mobile Carfone units are on the fork lifts, operated from the trucks' storage batteries.

Television in Railroading

(Continued from page 26)

spector, sitting before a television screen in his yard office, to examine the condition of equipment as each car passed the inspection point.

"Someone once said," Mr. Baker added, "that a railroad is no better than its communications. And, the better its communications, the better the railroad. If this is true, then the great new communications medium of television should have an important role to play in the railroading of tomorrow."

The new RCA Vidicon equipment is designed to afford maximum simplicity, compactness, and ease of operation; good picture quality; low-cost operation. The system consists of only two units: a small, light-weight camera, about the size of a 16mm home movie camera, and a combination monitor-power supply-control unit housed in a luggage-type case smaller than a home table model TV set.

The equipment is designed around a new RCA camera tube, the Vidicon, which is only one inch in diameter and six inches long, yet is almost as sensitive as the much larger studio-type image orthicon tube.

Radio Workshop Ends Tenth Year

Almost Unknown Amid Hollywood's Glamour, Summer School Sponsored by NBC and U.C.L.A., is Successful Example of Public Service in Education

By Thomas C. McCray

Director, Radio Network Operations, NBC Western Division

LITTLE known and little publicized amid all the glamour of big names and big shows at NBC in Hollywood are the activities of the U.C.L.A.-NBC Summer Radio Workshop.

While Bob Hope, Eddie Cantor and Red Skelton get the headlines, the Workshop has gone quietly about its business and has amassed an impressive record of accomplishment. Almost 1,000 men and women have attended the summer sessions; an estimated 40 per cent have found permanent careers in radio.

The aims of the Workshop are two-fold: (1) to give university students and teachers who have some background and knowledge of radio an advanced course in the practical workings of the industry; and (2) to give people already in radio a greater knowledge of their own business.

The course was known as the U.C.L.A.-NBC Radio Institute when it began in 1943, and its six weeks of daily sessions were held at Hollywood Radio City, the NBC building at Sunset Boulevard and Vine Street. NBC executives and department heads conducted the classes, for which students received no credit. There were seven courses that first year: control room operation, radio acting, radio writing, radio production, announcing, radio news editing, and a survey course. The curriculum remained the same until 1948 when a course in radio education was added. In 1949 radio sales was added.

Over the years, as the Institute continued, a gradual metamorphosis took place. Until 1950, an enrollment of 100 students was admitted. Now qualifications for admission have been raised, and this year only 30 students were admitted to the Workshop.

The Institute began under the Department of English at U.C.L.A. In 1947 it was transferred to the University Extension. It was in 1951, however, that the most drastic change took place. In that year, the Institute became the Workshop; the scene of its activities was moved from NBC to the Westwood campus of the University; it was made a part of the Theatre Arts department; and, with the university faculty working with NBC executives and department heads, it offered full college credits to students who took part in it.

Now, after a preliminary course of lectures on the

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Pat Kelley, NBC supervisor of announcers, explains microphone technique to students in the NBC-Barnard College Summer Workshop.

Workshop students attend a lecture on the mechanics of news-gathering in NBC's Radio City newsroom.

KPTV—First Commercial UHF Station on Air

(Continued from page 9)

use of these new pathways through the air by filling them with program traffic.

"We are happy to have had a part in blazing this trail across the continent, and are pleased to have KPTV affiliated with the National Broadcasting Company's TV network. I know NBC will do its best to bring you entertainment, news, education and sports from all parts of our great country, and from places beyond its borders. And we look forward to seeing programs and events from Oregon which you will send to us."

The construction permit for the station was received by The Empire Coil Company on July 11, 1952, soon after the lifting of the FCC "freeze." Then, the firm bought the transmitter and associated equipment which had been operating for more than two years in the RCA-NBC experimental UHF station, KC2XAK, near Bridgeport, Conn. This station had provided the industry with the opportunity to unravel the secrets of UHF broadcasting, and manufacturers with the means for developing and testing UHF receiving equipment. During this same period the RCA Service Company conducted field tests with various types of receiving antennas, transmission lines, UHF tuners, and selectors for TV sets.

On August 25, engineers from NBC, RCA, Adler Communication Laboratory, and Empire Coil Company began dismantling the 1-kw station for shipment, via truck and fast freight, to Portland. Some of the NBC engineering staff went along to help KPTV engineers assemble and install it in its new location.

On September 9, construction was started on a 250-foot tower atop Council Crest. A special RCA broadcast antenna, which left Camden by express on September 6, arrived in Portland September 11, and was installed the same day on the tower, which had already been completed.

By that same date, all the transmitting and related equipment had arrived from Bridgeport, and engineers and technicians were working around the clock to reassemble it.

Two and one-half days later, a cinder-block building had been completed to house the transmitter, which was then ready for operation.

The high quality of the initial test pattern on September 18 was matched in subsequent tests. The newspapers carried test pattern pictures on page one, congratulating KPTV on their clarity. The excellence of the reception made it abundantly clear that although the engineers and technicians had worked long, hard, and fast to put KPTV on the air, there had been no compromise with engineering standards. The station stood securely on its performance.

At 4:30 P.M. on Saturady, September 20—only two days after the initial test—the station offered its first commercial program. It was a televised showing of a film, sponsored by RCA Victor, depicting the growth and development of UHF television, and was titled "Success Hill." Commercial UHF television was a reality. This was followed by "live" programs picked up from the NBC network.

In the incredibly short space of three weeks, the country's first UHF station had been constructed and put on the air with sponsored programs.

The station is spreading a strong signal over the city of Portland with its present 1-kw transmitter, and 14-section antenna, providing effective radiated power of 17.6 kw. It is also putting a Grade A signal into the adjacent cities of Vancouver, Wash., and St. Helens and Oregon City, Ore. One of the first to report on the test pattern was a dealer in Salem, Ore., 42 air miles from Portland, who described the picture as "very good."

KPTV eventually will operate with a 5-kw transmitter, providing effective radiated power of 87.9 kw. For the present, the station will air network programs and local film shows only, but when studios in downtown Portland are completed, it will be able to originate "live" programs locally.

Tactful Technicians

(Continued from page 24)

vision Customers," are playing a large part in bringing about the sort of service RCA Victor television owners appreciate. This insistence on maintaining good customer relations is not limited to installation and service technicians. Even the telephone girls have a 28-page manual telling them the proper way to deal with callers. An excerpt from this manual sums up the company's attitude toward service. It reads:

Be cheerful. Remember — Service is our business.

Be courteous, sympathetic, and interested.

Convince the customer that you want to be of service — that you represent a company that is vitally interested in providing the best possible service at all times.

Always keep a smile in your voice.

Answer promptly. Be attentive.

Always set a good example. Be understanding and friendly.

Progress in Electronics

(Continued from page 61

multiply and divide. Besides, they can memorize the results of these operations in such a manner that they are immediately available for another operation. There is every promise that these electronic systems can graduate from high-speed simple arithmetic to high-speed reading and writing too.

These modern robots promise to revolutionize and simplify the clerical operations of insurance companies, banks, tax bureaus, stock exchanges, and business in general. For example, in merchandising organizations, a single electronic computer can do the combined accounting of receivables, payables, purchases and stock control.

These possibilities and applications are by no means in the dream stage. During and after World War II, great impetus was given to these "super-brain machines" for use in the fields of aerodynamics, guided missiles and ballistics.

Future Possibilities of Electronics

We know that the electron has tremendous potentialities for development of new devices in the home appliance field. We already have electronic stoves and cookers, and we may have electronic air conditioners, refrigerators and many other useful appliances. The home of the future may be electronically heated or cooled, and life everywhere made more comfortable.

Already the power of electronics is being felt by motion pictures, the theatre and aviation. It is performing important tasks for the printing industry, and holds great promise for future developments in this field. For example, RCA engineers, in cooperation with the Interchemical Corporation have developed automatic electronic equipment which reduces by at least 50 per cent the time required to make color plates for printing. And the fidelity of the plates is materially improved.

This new process so speeds the manufacture of color plates that we may look forward to the time when daily newspapers will be able to print pictures of the day's events in color. It will be possible for weekly magazines greatly to increase their use of color pictures, and some of them eventually may be printed entirely in color.

Finally, let me refer to a question that is frequently asked by anxious people who watch the march of science. They ask: "Will the scientific machines make this a better world in which to live?"

Each man must himself give the answer to this vital question. For the answer depends upon man himself and not upon machines, for machines are not endowed by the Creator with minds and hearts and souls.

Science alone cannot guarantee security for civilization. Yet the problems facing man cannot be solved without science. Sometimes it seems as if the Lord challenges man to use his intelligence. He makes some lands fertile, others arid. He hides coal and oil in the rocks and fish in the seas. He makes the electron and the atom infinitesimal and the radio waves invisible. But man has proved that he can harness these forces for useful purposes.

Man is Tired by His Toil

Man has been on earth a long time; he has had to toil by the sweat of his brow and he is tired by that toil. He has had to go into the mines and into the forests for fuel; he has had to go into the fields to cultivate the soil and to depend upon the elements for his harvest. Much of his work is unproductive, for even in converting energy into electric light, most of the energy is lost in useless heat. Man cannot survive without food, shelter and clothing; yet, all people on this earth do not share equally in these basic needs of life. And this inequality breeds discontent, hostility and war.

It is man's excuse that he has too little opportunity for spiritual development because so much of his time is devoted to work and to sleep, to combating disease and to fighting wars. But has he not learned a lesson from the horror of this latest war? And has he not been given a new opportunity which may lighten his burdens? Is it not conceivable that in unlocking the secrets of the atom, science offers man a natural power to meet his basic needs with less drudgery and without conflict? May not the new mechanical slaves at his disposal give man the means and the time to obtain and to enjoy more of the spiritual and cultural values of life? Through atomic fission, it may become possible to facilitate the creation of raw materials so that all people will enjoy an abundance of natural wealth, and thus remove one of the age-old irritations that lead to war. Should all of these possibilities become realities, they, plus the great potentialities of the electron, will contribute greatly to the advancement of civilization.

Indeed, today man faces a thrilling opportunity as well as a great threat. The potentialities of science enable him to look bravely at the stars and to seek a finer destiny. He needs most the faith and the spiritual guidance that would lead him to apply his new knowledge to peaceful pursuits. For the hope of peace that is lasting and a world that is free, lies within the soul, the heart and the mind of man.

If man will exercise his imagination and work hard in the arts of cooperation, good will and peace, as he does in the field of physical science, he will find that the road ahead is one of progress.

"Victory at Sea"

(Continued from page 19)

needed 700 feet of 35 mm fine-grain film which, they had learned, was in the possession of the Indian Navy. At NBC's request, the Indian government airmailed the required footage but it arrived in the form of a 16 mm negative. The shipment reached Radio City from New Delhi via the Indian Embassy in Washington. NBC's editors noted the desired scenes and then returned the entire strip by diplomatic pouch to Bombay. Government officials there went to work tracing down the original 35 mm negative. It was discovered in various parts of the country, some in spots as distant as Simla in the Himalayas. From these negatives, the Indian government printed the 700 specified feet and forwarded the prints to New York.

The U. S. Navy gave the undertaking its full and official cooperation, both in supplying actual combat film and in providing technical assistance. Captain Walter Karig, Special Deputy to the Chief of Information, Department of the Navy, was assigned to the project as technical advisor. He brought to the task long experience as a writer of history, fiction, and non-fiction. During his naval service he wrote and edited the epochal "Battle Report", a five-volume series which comprises a narrative-history of the Navy in World War II.

Mr. Salomon, who is acting as producer of programs, served six years in the Navy, beginning as a seaman and eventually retiring from active duty as a Lieutenant Commander. During his service he was assigned to the office of the Secretary and served in the Pacific for three years. After the Japanese surrender he was sent to Tokyo as personal representative of Secretary Forrestal and the Chief of Naval Intelligence. He collaborated with Rear Admiral Samuel Eliot Morison, in writing the 14-volume, Bancroft prize-winning "History of the United States' Naval Operations in World War II."

Direction of the series will be in charge of M. Clay Adams, who came to NBC after many years in Hollywood and in producing films for the Armed Forces. Isaac Kleinerman, veteran motion picture director and editor, edited the film.

Officials of the U. S. Navy, Radio Corporation of America and the National Broadcasting Company attended a preview of two episodes of "Victory at Sea" at the U. S. Naval Air Station in Anacostia, D. C., on October 15. The special showing was arranged for Admiral William M. Fechteler, Chief of Naval Operations. Heading the visiting RCA-NBC officials were Brig. General David Sarnoff, Chairman of the Board of RCA, and Joseph H. McConnell, President of NBC.

In introducing the two episodes, "Design for War" and "The Pacific Boils Over," Robert Sarnoff described "Victory at Sea" as the most complete picture of sea power ever presented.

"In the 26 years of its existence," he said, "the National Broadcasting Company has had no more challenging task than the production of these 26 half-hour programs — portraying the story of sea power during World War II — which constitute "Victory at Sea." Without the assistance and splendid cooperation of the United States Navy, this story could never have been made available to television."

The series, it was announced, will also be telecast by the British Broadcasting Corporation beginning October 27.

Radio Workshop

(Continued from page 29)

university campus, the students do field work at NBC, where, in small groups of three or four, they work in various departments of the network, not only observing what goes on but actually taking part in the day-to-day activities of the news room, the program department, the publicity department and the rest.

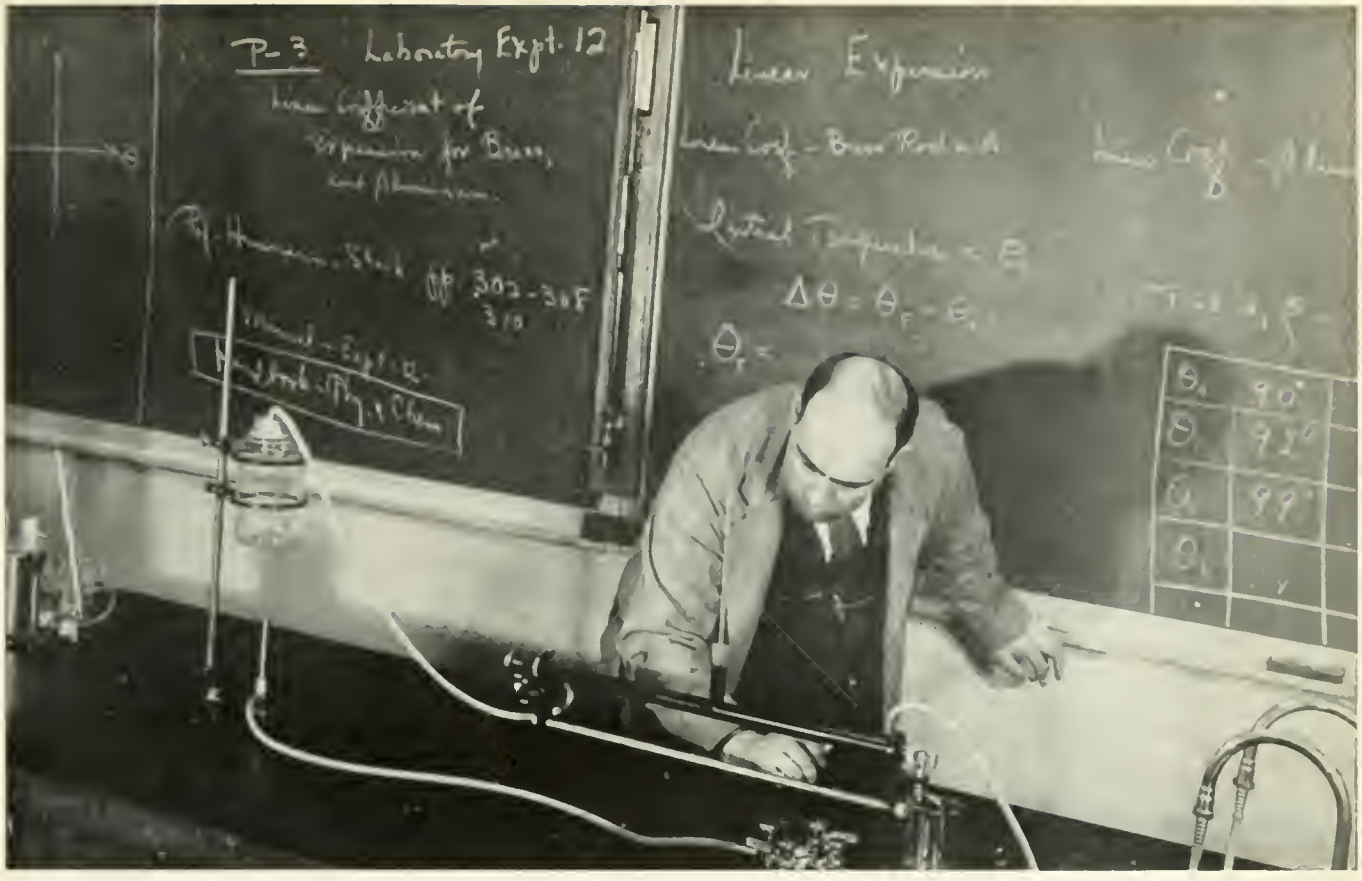
Each week on Friday the students of the Workshop present a mock broadcast in the studios of KCLA, the university's radio station. This program is heard only over a closed circuit, but it gives the students an opportunity to put into practice the things they have learned in the classrooms and at NBC.

Color Book

(Continued from page 25)

ten of which carry inch-square chips of graded color ranging from violet-blue-violet to light yellow. On each page, beside the related group of color swatches, is a Munsell chip embodying the shade of gray equivalent to the shade that will be reproduced at the black-and-white receiver when any hue or tint of the color group is televised.

As a reply to the obvious suggestion that scenery could be painted in the desired grays and costumes chosen in the same manner, rather than bother with colors, it should be pointed out here that the visual effects achieved by the use of color instead of gray do a lot to brighten the spirits of performers. Video directors have learned that actors are more at ease and happier in surroundings of normal colors.



A lecture and demonstration in physics

EXPERIENCED ENGINEERS give authoritative technical courses at RCA Institutes

RCA Institutes started its first small classes in 1909 to train "wireless" operators for the only radio service then known—marine communication. As the art developed through the years into the "electronic age," RCA Institutes developed with it. The school now trains large numbers of development laboratory technicians, servicemen, and station engineers—as well as a few radio telegraph operators.

SCHOLASTIC RECOGNITION

RCA Institutes is . . . licensed by the University of the State of New York . . . an affiliate member of the American Society for Engineering Education . . . an affiliate member of the Greater New York Council for Foreign Students . . . approved by the Veterans Administration. The Advanced Technology Course is approved by the Engineers' Council for Professional Development.

ADVANCED TECHNOLOGY COURSE

The Advanced Technology Course consists of 2610 hours of classroom and laboratory work. It requires two and a quarter years (50 weeks per year) in the day school, or six and three quarter years in the evening school. Subject treatment is at professional level; the textbooks are standard college and engineering texts. This course covers such subjects as . . . college physics . . . advanced mathematics and its application to electrical and communication problems . . . English in industry . . . drafting and shop work . . . vacuum tubes and their associated circuits . . . circuit design for receivers and transmitters . . . audio frequency circuits and practice . . . circuit design for television receivers, transmitters and studio equipment. The course omits purely academic and cultural subjects so that competent technologists may be trained in the shortest possible time.

The Advanced Technology Course is specially attractive to . . . high school graduates . . . engineering school graduates wishing a more specialized knowledge of the radio-television field . . . junior college graduates seeking a superior technical-school preparation for entrance into the radio-television industry.

VOCATIONAL COURSES

RCA Institutes also offers shorter, specialized courses in . . . Television and Radio Broadcasting (1½ years, days; or 4½ years, evenings) . . . Television and Radio Servicing (9 months, days; or 27 months, evenings) . . . Radio Telegraph Operating (9 months, days; or 27 months, evenings). A correspondence course in Television Servicing is available.

EMPLOYMENT OF GRADUATES

Graduates of the Advanced Technology Course are readily placed in leading radio-television-electronic manufacturing companies, development laboratories, broadcast stations, and many U. S. and foreign government agencies. Graduates are employed in such positions as . . . engineering aide . . . instructor . . . laboratory technician . . . transmitter engineer . . . intelligence officer . . . electronic technician . . . field engineer . . . technical writer . . . announcer-engineer. Graduates of the vocational courses are in great demand in the fields indicated by the course titles. Many companies interview graduating students at the school by arrangement with the Placement Director.

GENERAL INFORMATION

New classes in all courses are started four times each year. Day classes meet Monday through Friday; evening classes meet on alternate evenings. Prospective students and employers are invited to visit classrooms and laboratories of the school, or to write for a descriptive catalog of courses.

RCA INSTITUTES, INC.
A SERVICE OF RADIO CORPORATION of AMERICA
350 WEST FOURTH STREET, NEW YORK 14, N.Y.
Tel: WAtkins 4-7845

The wings of a hummingbird beat 80 times a second. Transistors, developed experimentally by RCA, oscillate electrically *300 million times a second.*

300 million times a second!

Now science has discovered a new and magic tool—a major advance in electronic research—*the transistor.* Tiny as a kernel of corn, a speck of germanium crystal embedded with wires in plastic can perform many of the functions of the electron tube.

Because it has no heated filament, no vacuum, requires no warm-up and little power, the transistor is a device which has long been needed in electronics. It is also rugged, shock-resistant, unaffected by dampness and—properly made—it will serve for many years.

Despite these advantages, the transistor, until recently, was limited to a frequency region below 50 million oscillations a second. Experimentally RCA has now increased this to *300 million times a second* and even higher goals are sought—to increase the transistor's uses.

Higher frequencies for transistors point the way to their use in television, radio, communications and more efficient electronic controls for airplanes and guided missiles. The small size, long life, and low power requirements of transistors suggest entirely new electronic devices—as well as use of transistors as working partners with electron tubes.

* * *

Expanding the research in electronics of solids, and the possibilities of transistors, is another example of RCA pioneering at work for your benefit. This leadership means finer performance from any product or service of RCA and RCA Victor.

RADIO CORPORATION OF AMERICA

World leader in radio—first in television