

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

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APRIL

1949

NEW NOTE IN MUSIC



*Powerful RCA radio transmitter—Venezuelan Army
Part of a fleet of 80 mobile units, Radio Policial, Caracas*

VENEZUELA

expands its uses of modern RCA radio equipment

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Radio Caracas—completely RCA-equipped for radio at its best.



RCA INTERNATIONAL DIVISION

RADIO CORPORATION of AMERICA

745 FIFTH AVE., NEW YORK, N.Y., U.S.A.

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OVER

RCA's recently introduced 45-rpm record player and colorful, high-fidelity records are the result of 10 years of research.



Services of RCA are:

- RCA Laboratories Division
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- RCA Victor Division
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- RCA Communications, Inc.
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BUILDING A CAREER

EDWARD J. NALLY

*A Director of
Radio Corporation of America,
and its first President,
from 1919-1922.*



On his 90th birthday, on April 11, Edward J. Nally was asked if he had a message for youth that might be drawn from his long years of experience in the realm of communications. He turned to this brief essay of his, which appeared originally in the SATURDAY EVENING POST of 1896 and remarked that the thoughts it expresses are as pertinent today as they were 53 years ago.

There is a foundation stone to each man's success in business. In my personal experience this is represented by the first of the familiar graces, Faith, and with it is coupled concentration of purpose and energy.

In the years of youth opportunity is a secondary consideration; confidence is the important thing. My start was inauspicious. I began as a messenger boy. But I held firmly the conviction of success, even then; and this confidence never left me.

It is in Faith that courage is born. And thus is bred Hope, the energizer of work. Finally, out of work—constant, tireless, unremitting—is the fabric of achievement woven.

Definite objectives must be sought, and perpetually striven for, one by one, with each attainment the compelling force for the next.

Always, there must be a single aim, and concentration upon it.

In commercial life this objective is usually the job higher up, and it is always waiting for the boy who has utilized his spare moments to acquire knowledge outside the prescribed limits of his own routine duties; to familiarize himself with details of work regarding which he is not compelled to be informed.

The boy who is paid fifty dollars a month and earns what he gets, and no more, is the boy who sticks in a fifty-dollar position and is not advanced on the payroll. On the other hand, the boy who draws only fifty dollars but works as if he were being paid eighty is invariably the one to be chosen for promotion to the eighty-dollar place.

Jealousy of holidays and off-hours indicates in a boy the presence of the microbe of failure. The men who are given to signing petitions and round robins also betray the same defect. They petition for opportunities instead of making them.

If I would lay emphasis on one thing more than another, it would be obligation to duty, duty to one's self and to those about him; and, in the simple words of the Good Book, "Leaving nothing undone, and doing all things well, missing naught."

New 45-rpm Records and Record Players Acclaimed by Industry

Enthusiastic Response of Nation's Phonograph Retailers Hasten RCA Plans for Increased Production of High-Fidelity System



By J. B. Elliott

Vice President in Charge of Consumer Products, RCA Victor Division

ON the basis of the enthusiastic response from the country's phonograph retailers it is believed that between 2,500,000 and 3,000,000 instruments equipped to play the new RCA 45-rpm records will be produced and sold this year by the industry. To help meet this demand RCA Victor has planned for increased manufacturing facilities in its Indianapolis, Ind., plant. In addition, approximately 29 leading manufacturers are now incorporating 45-rpm record reproduction mechanisms in their instruments, or plan to do so.

Merchandising meetings arranged by RCA Victor's field staff had capacity turnouts wherever they were held. Nearly 12,000 dealers have demonstrated their approval of the new system with on-the-spot orders. Many dealers now handling instruments alone have expressed the wish to add records to their lines, because of the sales potentialities inherent in the high quality, convenient size, colorful appearance, and low price of the 45-rpm records.

A product of ten years of laboratory research and development, the new 45-rpm system represents the first records and players ever developed side by side as complemen-

tary units, with the specifications of each selected to meet the requirements of the other. This system offers music free from all discernible distortion and surface noise on a small, 6 $\frac{7}{8}$ -inch, non-breakable disc that plays up to 5 $\frac{1}{3}$ minutes, equal to the playing time of the standard 12-inch record. The new disc, offering a small, standard size for all classifications of music, goes a long way toward solving the consumers' record storage problem in the home.

A unique feature of the system is its unusual new record changer—the fastest ever developed—which has been designed to eliminate the traditional problem of chipping, cracking, and breaking records during changer operation.

Spindle Houses Mechanism

In a marked departure from most conventional systems, the drop mechanism is housed in the player's center spindle, which has been enlarged from the previous $\frac{3}{4}$ inch diameter to 1 $\frac{1}{2}$ inches. By centering the drop mechanism, RCA Victor found it possible to eliminate the usual outside record posts, speed up the changer cycle, simplify the changer mechanism, silence its action, reduce the overall size of the player, and eliminate many costly and intricate moving parts.

The new 45-rpm records have been designed with a raised shoulder between the playing area and the center rim, providing air spaces between the playing surfaces and center rim of stacked records. In most conventional systems, the record separating blades are required to force their way between the stacked records. This forcing action is often the cause of record damage. With RCA Victor's new design, the blades move into the air spaces provided by the raised shoulders of the records.

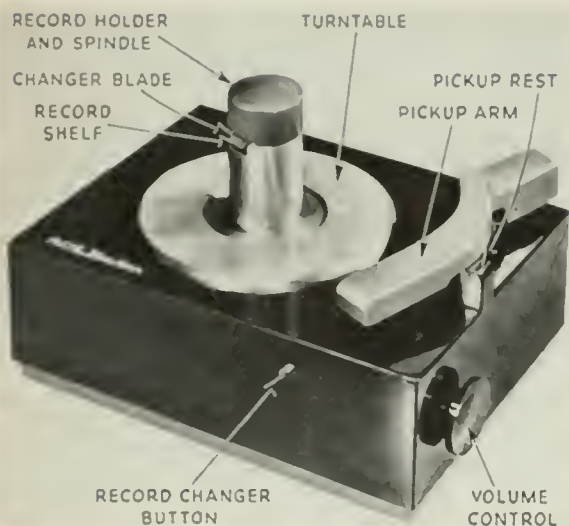
Departing from the varied-size black records, translucent plastic phonograph records in gay, cheerful rainbow colors are making their appearance in the 50-year-old record industry. Single-size discs for all classifications of music are featured, with the various categories identified by bright shades of red, green, blue, yellow, cerise, and other hues.

The selection of characteristic colors resulted from a study by a board of color and design experts headed by John Vassos, nationally known industrial designer. The color assigned to each of the seven classifications of recorded music represents, in the board's opinion, the psychological and aesthetic color connotation of the type of music represented—ruby red for classical music, midnight blue for semi-classical, jet black for popular, lemon-drop yellow for children's,

MAESTRO ARTURO TOSCANINI CALLED THE NEW RECORD AND RECORD PLAYER "A SIGNIFICANT ADVANCE IN THE FIELD OF RECORDED MUSIC."



[RADIO AGE 3]



THIS 45-RPM AUTOMATIC RECORD PLAYER ATTACHMENT PERMITS THE NEW DISCS TO BE PLAYED THROUGH CONVENTIONAL RADIO, PHONOGRAPH OR TELEVISION SETS.

grass green for Western, sky blue for international, and cerise for blues and rhythm. Labels for each category are of a color blending harmoniously with the hue of the vinyl plastic record material used.

The new colored records, which represent savings up to 50 per cent in record cost, will aid the consumer in classifying, storing, and identifying the various categories of recorded music in home libraries. The discs are packaged individually in cellophane envelopes.

For dealers, constantly faced with the problem of attractive record displays, the new gaily colored all-purpose discs, together with the 45-rpm record playing instruments, mark a significant merchandising departure from the varied-size traditional black records. For the first time, dealers will have a small, single-size record for all music classifications, and record filing will be merely a matter of matching colors on the shelves. Color indexing will insure permanently equalized displays—for at a glance the dealer will be able to determine which record classification requires supplementing.

It is expected that color indexing of records will also speed service in the store. A proper display of the musical classifications by color will enable the customer to locate easily

the type of music he prefers and serve himself. Each color category will bear a standard price, making it easy for the customer to determine the cost of his purchases, and helping the salesman to figure prices.

While RCA Victor's initial catalog of 45-rpm records—approximately 200 currently popular hits—is made up of repertoire transferred from conventional master recordings, it will be augmented shortly with new releases recorded on 45-rpm masters. RCA Victor will continue to make available on 78-rpm records all musical selections recorded for the new 45-rpm system. The 78-rpm releases will continue to be made in the customary black compound and in the special de luxe red vinyl plastic series.

Anyone may have the new 45-rpm system. To enable those who already have a conventional radio, phonograph or television combination to use it in playing the new records, RCA Victor has produced an automatic record player attachment, in addition to six other instruments incorporating 45-rpm facilities—three Victrola console models and one table model radio-phonograph, a television console combination, and a self-contained automatic pho-

nograph with built-in amplifier and loudspeaker.

The attachment comes with a cord and plug for use with a phonograph input jack, and is easily connected to the amplifier and loudspeaker system of almost any radio or television instrument already in the home. The four console instruments also provide AM and FM radio reception, and the television combination and one of the Victrola radio-phonographs include a second changer for 78-rpm records.

Enthusiasm for the new RCA Victor 45-rpm system has been expressed by many experts in the field of music including two of the world's foremost artists. Maestro Arturo Toscanini, conductor of the NBC Symphony Orchestra, said "I was very impressed with the speed and smoothness of the automatic record changer and consider both the record and the instrument a significant advance in the field of recorded music." Jascha Heifetz, celebrated violinist, declared that the 45-rpm system "is the most faithful reproduction of music on records I have heard so far. . . . I consider the new development the solution to the present-day problem of building a record library in a limited storage space."



ONE OF THE NEW RCA VICTOR MODELS HAS FACILITIES FOR PLAYING BOTH 78-RPM AND 45-RPM RECORDS, IN ADDITION TO FM AND AM RECEPTION.

Communications—Key to Victory

General Sarnoff, in Address to Armed Forces Communications Association, Envisages Enlarged Role of Television in Complex Modern Warfare and Tells Members Victory Could Well Go to Side Which Sees "Farthest", "Soonest"

COMPLEXITIES of modern war with supersonic speeds, guided missiles, danger of "surprise attack" and the extensive use of television as a military aid give a different meaning to far-sightedness. Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America, told members of the Armed Forces Communications Association at their third annual meeting in Washington on March 28. Because of the strategic importance of television, already demonstrated in naval, military and air operations, he proposed a revision of the old saying that the battle goes to those who get there "fastest" with the "mostest." In another struggle, he said, the victory could well go to the side which sees "farthest", "soonest."

In his address to more than 500 executives of the communications and photographic industries and members of the armed forces, General Sarnoff as retiring president of the Association, urged America's large corporations and small businesses, together with their best men, to "make company and personal sacrifices to come to the aid of preparedness planners in this country."

Projects Gain Needed Time

"My recent visit to Europe convinced me more than ever of the need for the Marshall Plan and the North Atlantic security pact," General Sarnoff said. "These may not prove to be solutions in themselves, but together they offer hope and encouragement to the peoples of Western Europe, a fact which amply justifies their existence. Moreover, through the combined operations of the two projects we are enabled to gain the time so sorely needed to work out the complicated problems which are astringent in a world that is neither at war nor at peace.

"Time also is required to gear our industry toward a mobilization



BRIG. GENERAL DAVID SARNOFF (CENTER), DWIGHT G. PALMER (LEFT), PRESIDENT, GENERAL CABLE CORP., AND ADMIRAL JOHN D. PRICE, DEPUTY CHIEF OF NAVAL OPERATIONS, AT THE SPEAKERS' TABLE AT THE ANNUAL MEETING OF THE ARMED FORCES COMMUNICATIONS ASSOCIATION IN WASHINGTON, D. C., ON MARCH 28.

plan that would be effective in the event that an emergency cannot be avoided—effective without confusion and without delay. But actually we need more than time, if we are to be fully prepared to meet successfully a possible emergency of modern dimensions. We need also, the interest and experience of the best brains in American research laboratories and in industry to work with our military planners.

Sacrifices Must Be Made

"I cannot emphasize too strongly that all the large corporations and small businesses, together with their best men, must make company and personal sacrifices to come to the aid of the preparedness planners."

General Sarnoff said that he knew from personal observation that communications were the key to success in our advance in Europe in World War II, and declared that they had an equally important role in the Pacific war.

Expressing assurance that Amer-

ican military leaders understand the importance of communications and will take care of their effective use, he added: "Our job in industry is to do all we can to assure that such advances as we make in the communications art are promptly made available to the appropriate military service and thus help to strengthen our national security. That is certainly one of the principal purposes of our Association and the main reason for its existence."

General Sarnoff recalled that at the meeting of the Association last year at Wright Field he had warned that to ignore the swift advances of science would court disaster, and had commented upon the probable use of television as an aid to victory in battle.

Since then, he said, it had been demonstrated by the aircraft carrier *Leyte*, at sea off New York, how television can be used to direct tomorrow's battles.

"In this first ship-to-shore tele-

(Continued on page 24)

THE STATUS OF TELEVISION

Extension of Television into Higher Frequencies, when Authorized by FCC, will not make Present Video Receivers Obsolete



By J. G. Wilson

*Executive Vice President in Charge of
RCA Victor Division*

PREDICTIONS that a future shift of television broadcasting to higher frequencies will make present receiving sets obsolete are absolutely unfounded, and are not based upon scientific or economic facts.

It is true that research scientists are exploring the higher frequencies in an effort to determine their possible usefulness in television. But these investigations have not reached the stage that will permit the establishment of commercial standards and the early opening of new channels for television, except for experimental purposes. If, eventually, it is found that television can operate successfully on the higher frequencies, then new equipment, new transmitters and new tubes must be developed on a commercial scale — and all that takes time.

But even if the higher frequencies are found to be practical for television broadcasting, present sets will by no means be obsolete. It already has been demonstrated that a suitable converter can readily be applied to sets now in use so that the sets will not only receive the twelve channels for which they are designed, but will tune in broadcasts on the higher frequencies as well.

Up to the present, neither the Federal Communications Commission nor any other group, technical or otherwise, has made a concrete and authoritative proposal as to which particular high-frequency channels may some day be opened for television.

Until it is definitely known which higher-frequency channels will be available for television it is impractical to design a set and unjustified to assert that it will efficiently pick up all channels by the mere adjustment of the tuning turret.

If, as, and when the Federal Communications Commission decides that the higher frequencies are to be utilized for television, then and only then can the proper sets be designed. But when that day comes, the simple converter can be used with present sets to extend their tuning range into the higher-frequency spectrum.

Ten-Year Old Sets Still in Use

It is interesting to note that RCA Victor television receivers first introduced to the public in 1939 are still in use, although more than ten years have passed. In that period television has made great and fundamental advances. Similarly, there is no indication today that receivers of 1949 design will be obsolete in 1959, or even later than that date.

Naturally, the majority of manufacturers in designing their television receivers have the public interest continually in mind, and they adhere to standards set by the industry and by the FCC. But they cannot build receivers today for the future when it is not known what channels will be used. Engineers must know which higher frequency channels will be allocated to television and what the standards will be to supplement those already in use, before they can design the set of the future.

Adaptation would be Costly

For any manufacturer to boast economic superiority for a television receiver that will not be obsolete eventually because it is provided with a few components for receiving higher frequency channels is unjustified and misleading. And to adapt such a set to receive higher frequencies would be an expensive job, probably more costly in total than the simple converter needed to keep present receivers in line with

progress. With such a converter no modifications whatever are required inside the set.

RCA Laboratories, one of the world's foremost centers of radio, television and electronic research, has led and continues to lead in the exploration of the high-frequency spectrum. As rapidly as discoveries are made and can be applied commercially, the RCA Victor Division will bring the new improvements to the public in the form of television receivers. Television will continue to advance, and every effort will be made by RCA to increase the service to the public.

Never in the history of wireless, radio broadcasting, or television have scientists and engineers been able to guarantee "positive built-in assurance" that a receiver *will not* be made obsolete by any contemplated changes in channels. Such a statement is no more true in radio and television than in the automotive, aviation, or any other field which thrives upon science and continually improves and advances in bringing new and added benefits to the public.

Research Achieves Progress

Every new art or business based upon the technical sciences must deal continuously with the factor of obsolescence. That is why American industry continues research to achieve progress and to lift the American standards of living. Every new development in radio and television, whether it be a device or system, involves some obsolescence of former methods, but obsolescence is nothing to be feared—for the American people know that through the ingenuity and creativeness of scientists and engineers, every effort will be made to keep pace with the new, while taking effective measures to keep the old in useful service.

The Federal Communications Commission has not proposed that the existing television channels be replaced by others. On the contrary, Chairman Coy stated on March 23, as reported by the Associated Press, that the twelve channels "will not be eliminated" and that "present television sets available on the market will get service from these channels continuously." Service on these channels is constantly expanding.

and thousands of new receivers for these channels are reaching American homes daily.

If and when additional channels in the higher frequency band are opened to television, their function will be to supplement, not to replace, the channels already in use. Instruments now in service will continue to serve, and new instruments also will come into American homes in much the same way that a new streamlined automobile takes to the road alongside cars that are 10, 20 and even 25 years old—and all continue to give service to the public.

The Radio Corporation of America has done more to investigate the ultra-high frequencies (UHF) than any other manufacturer or broadcaster. Its experiments go back many years, and have been on a virtually continuous basis ever since. These experiments, described in articles widely read throughout the industry, have provided the main basis for the consideration of television in the UHF band at the hearings held by the FCC. With this background of experience, unique in the industry, RCA presents the following facts regarding television today and its possible lines of development in the future:

Original Channels Retained

In 1945, the FCC established 13 channels for commercial television broadcasting between the frequencies of 44 and 216 megacycles. These channels have remained unchanged to the present day, with the exception of Channel #1, from 44 to 50 megacycles, which was transferred to another service before it was put into commercial use. The only commercial television authorized by FCC is on the 12 channels from 2 to 13, inclusive. All RCA Victor television receivers and nearly all other television receivers have been engineered and manufactured to these standards, the only standards authorized by the FCC. These frequencies are referred to as VHF (very-high frequencies) in contrast to UHF (ultra-high frequencies).

The continuance of channels 2 to 13 for television broadcasting is unquestioned. As previously mentioned, FCC Chairman Wayne Coy has stated positively that this is so.

It is well recognized in the industry that a need does exist for *additional* channels to supplement the present ones, in order that all sections of the country may have full enjoyment of television service. The only space available for these additional channels is in the ultra-high frequencies. Therefore, it is assumed that the FCC will authorize these frequencies for television use if and when experiments, including field tests, prove them practical and reliable for regular service to the public.

Where UHF Stands Today

Although UHF has been studied intensively, and numerous tests have been conducted by RCA and others, much information necessary to its practical operation is still to be developed. The situation as of last September was summarized in a report to the FCC by the Joint Technical Advisory Committee of the Institute of Radio Engineers and the Radio Manufacturers Association, as follows:

“JTAC finds that there is no commercial equipment for UHF television available at this time. It estimates that a period of not less than one year, possibly two or three years, will be required to develop and produce transmitter tubes suitable for short-range coverage, for the 475-890 megacycle band and UHF television receivers suitable for commercial production. The development of equipment, particularly receivers, must await the adoption of performance specifications, which in turn depend on the availability of further engineering information.”

It will be noted that this statement emphasizes the development period of UHF *transmitter tubes*—only one element of many involved in the establishment of a practical UHF television system.

RCA began its more recent UHF tests from the Empire State Building, New York, early in 1946. A second field test was conducted in the Washington, D.C. area during the Fall of 1948. During this test television programs were broadcast simultaneously on VHF and UHF to provide comparisons between these

two frequency bands. Full technical reports covering the operation of these stations have been published. The information needed is still far from complete and RCA is now undertaking the erection and operation of another UHF television station in Bridgeport, Conn., with the objective of obtaining solutions to remaining problems. This station is expected to begin operating for tests late in 1949.

It is impossible for anyone to predict with accuracy when UHF television will become a practical reality. The approval of FCC, the setting of standards, the designing of transmitters and receivers, all have to follow the solution of engineering problems.

RCA Victor television receivers are designed and manufactured to provide the customer with the finest obtainable television *at the lowest possible price*. While keeping the customer's future needs constantly in mind, nothing has been added to increase the cost of his equipment *today*. If a manufacturer has partially provided for possible conversion to UHF in current receivers, the customer is paying for such provision today for an arrangement which may prove inadequate tomorrow.

Facts for the Customer

The customer should be told these facts:

- (1) The *additional cost* to the buyer of equipment built by the manufacturer into receivers *today* for possible use on UHF *tomorrow*.
- (2) The *still further cost* of making this equipment usable when UHF comes.
- (3) Whether the UHF equipment built into the television receiver *today* will be sufficient to receive on any UHF channels which the FCC may allocate eventually.

To determine the real cost to the consumer of converting his receiver to UHF, it will be necessary for him to add these first two factors together—that is, the initial extra cost of built-in UHF equipment and the future cost of adapting it to actual use. In the RCA Victor method previously referred to, the

(Continued on page 27)

16-Inch Metal Kinescope

Teegarden Declares Field Tests Prove New Tube Has Numerous Features Advantageous to Television Set Owners

THE new 16-inch direct-view metal-cone kinescope tube, introduced recently by Radio Corporation of America after 13 years of research and engineering development, has been enthusiastically accepted by leading television set manufacturers, according to L. W. Teegarden, Vice President in Charge of Technical Products, RCA Victor Division.

During demonstrations of the tube at the Annual Convention of the Institute of Radio Engineers in March, Mr. Teegarden pointed out that the tube provides an ideal picture size between that supplied by the popular 10-inch kinescope and the large screen of projection models. In addition, he said, the metal kinescope has proved through extensive field tests that it possesses electrical and mechanical features that are specially advantageous from the view point of television set owners.

The use of metal as a material for the envelope of a large-size television picture tube, Mr. Teegarden added, was based on several factors. There is a plentiful supply of chrome steel; metal can be formed and shaped to exact dimensions with greater ease; the weight is substantially less; the finished product has greater durability and the tube assembly is more readily adapted to mass production. All this adds up to a bigger and better television picture at lower cost to

the television public.

The most unusual feature of the new tube is the glass-to-metal seal which joins the glass neck and glass face-plate to apex and base respectively of the metal cone. So perfect is this seal, applied through techniques developed and perfected at RCA tube plants, Mr. Teegarden said, that tests far more severe than would ever be encountered in actual use, have failed to rupture the joint. In one test, RCA engineers placed a metal tube in boiling water, then in liquid air at a temperature of minus 374°F., and once again in boiling water. Examination showed no effect on the seals from this treatment.

Gives Greater Screen Brilliance

Through the 16-inch tube it is possible to obtain a large picture size without sacrificing screen brilliance and contrast when operating the receiver from low-cost power supplies. Although the 16-inch metal tube functions with the relatively low voltages of present 10-inch tube sets, it was pointed out, its advanced design permits the application of much higher voltage to the tube with consequent increase in screen brilliance.

While the metal surface of the tube is electrically charged, receivers are so designed that it cannot be reached from the outside of the cabinet. The tube itself is covered with a permanent plastic hood hav-



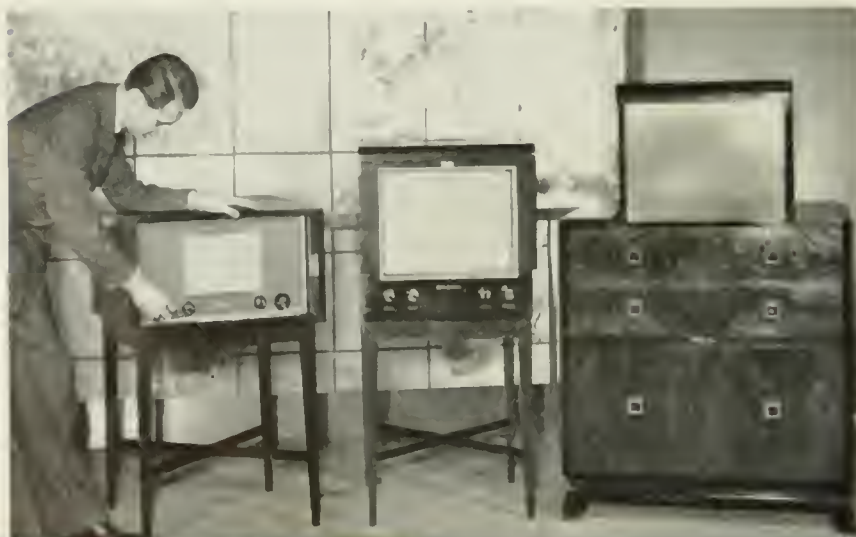
THE 16-INCH METAL-CONE TELEVISION PICTURE TUBE PROVIDES AN IDEAL PICTURE SIZE BETWEEN THAT OF THE POPULAR 10-INCH KINESCOPE AND LARGE SCREEN PROJECTION RECEIVERS.

ing high insulating properties. This safety precaution is in addition to the coat of insulating paint which is applied to the tube at points where electrical leakage might occur under operating conditions of high humidity. Receivers utilizing the 16-inch metal tube have received full approval of Underwriters Laboratories.

Envisaging the enthusiastic public acceptance of the new tube with its assurance of larger, clearer pictures, Mr. Teegarden said, RCA recently broke ground for an ultra-modern tube plant in Marion, Indiana, whose entire output will be devoted to production of the new 16-inch metal tube, supplementing the present production of the world's largest picture tube manufacturing plant, owned and operated by RCA at Lancaster, Penna.

"Our primary purpose," Mr. Teegarden said in conclusion, "is to produce the best possible tube at the lowest possible cost, and in the largest possible quantity to help meet the enormous public demand for picture tubes. We feel that the 16-inch metal tube represents an important step in this direction."

STANDARD RCA VICTOR TELEVISION RECEIVERS—LEFT TO RIGHT: TABLE MODEL WITH A 10-INCH GLASS TUBE; TABLE MODEL WITH A 16-INCH METAL-CONE TUBE, AND A PROJECTION-TYPE CONSOLE.



Electron Microscope in Industry

In Only Eight Years, this Versatile Instrument, a By-product of Television, has become Indispensable in the Research Laboratories of the Nation's Leading Manufacturers and Processors



By Paul A. Greenmeyer

*Scientific Instruments Section,
RCA Victor Division*

IN THE past eight years, electron microscopy has established itself as a basic science in the modern industrial research laboratory. From the day that the first RCA electron microscope left the factory destined for industrial use, this powerful electronic servant has become increasingly indispensable in the commercial world.

A by-product of RCA research into television, the electron microscope gradually took shape in the mind of Dr. V. K. Zworykin, Vice President and Technical Consultant of RCA Laboratories, as he brought electron lenses, power and vacuum systems to the required degree of refinement. Sufficient progress had been made by 1937 to place further development in the hands of a group of engineers and physicists headed by Dr. James Hillier. In 1940, this group of pioneers had perfected the first commercial instrument, forerunner of the more than 300 instruments in use in practically every part of the globe.

Microscopy has always played a significant role in the development of industrial processes and products. Since magnification under the electron microscope goes far beyond the limits of the light microscope, it found ready acceptance in industrial laboratories. Approximately 75 percent of the electron microscopes in the United States are in

commercial use. The remaining 25 per cent are employed by medical research scientists who, through their appreciation of the potentialities of the instrument, gave electron microscopy its greatest initial forward impetus.

The electron microscope is a versatile tool. As proof of this, American industry has put it to work on chemicals, ores, textiles, metals, plastics, rubbers, foods and drugs, dyes and colors, pigments and paints, dusts and fumes, polishes and finishes, soaps, greases, etc. In laboratory procedure, the microscope is used for: *basic research* (discovery of new principles and uncovering new knowledge); *development research* (finding the answer to specific problems); and *quality control* (forecasting the properties of a material or product).

Minute Particle Size Determined

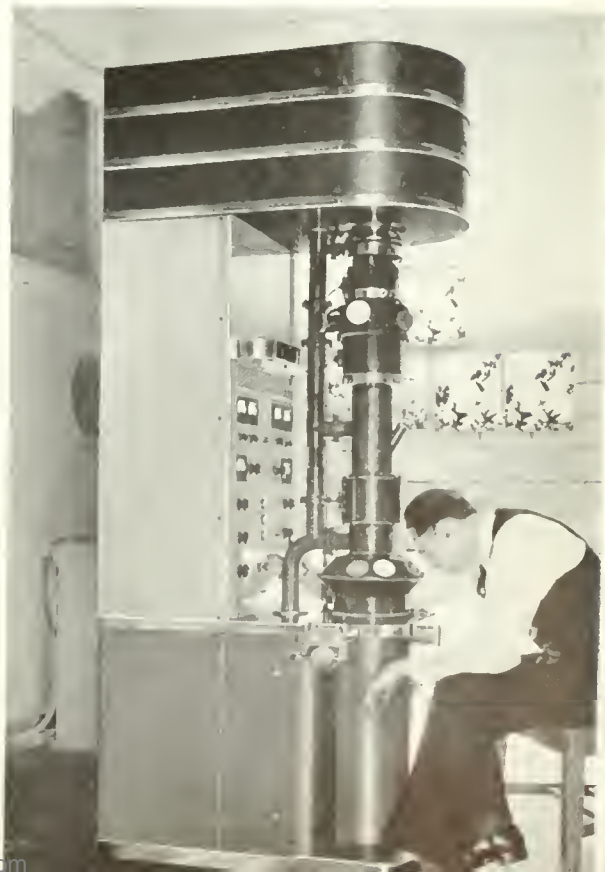
As the RCA electron microscope began opening doors to the unknown, research physicists were able to explore a wider universe and discover new facts. An amazing wealth of detail regarding the size of minute particles was uncovered, and characteristics of matter were discovered which have fundamental bearing on the quality and value of industrial products. Continued studies have proved the truth of some surprising and unclassified facts first revealed by the microscope. Industrial scientists have adapted this new knowledge to the development of more desirable raw materials, and to the improvements in the processing of finished products.

The Hercules Powder Company, a pioneer in electron microscopy, employed this new approach to its papermaking problems. Its scientists studied the penetration of pigments, the effect of cooking procedures on wood fibers, and the variations in particle size and shape of clays, fillers, sizes, binders, adhesives, impregnants and inks. By

this means they discovered ingredients which made finer and more economical chemicals for paper products. These discoveries, in turn, created a more profitable market for their chemicals. Today, these scientists are delving deeply into the minute structure of basic cellulose fibers, because the chemical behavior of cellulose during processing is closely related to the physical properties of its fibrils. Application of these studies achieves a more efficient use of cellulose during processing and a final product of superior quality.

Research physicists have long sought to discover the qualities in a "grade A" product that make it superior. The RCA electron microscope, with its enormous resolving and magnifying power offered fascinating possibilities for discovering the factors underlying these "superior" characteristics. In this

DR. LA VERNE WILLISFORD, GOODYEAR TIRE & RUBBER COMPANY, USES RCA ELECTRON MICROSCOPE IN HIS STUDIES OF NATURAL AND SYNTHETIC RUBBERS.



[RADIO AGE 9]



FIRST RCA ELECTRON MICROSCOPE TO BE BUILT (LEFT) WAS ACQUIRED BY THE AMERICAN CYANAMID COMPANY AND CONTINUES IN USE AS AN ESSENTIAL TOOL IN THE FIRM'S LABORATORY AT STAMFORD, CONN.

respect, the Goodyear Tire & Rubber Company was faced with two important questions: "Why does synthetic rubber exhibit so much greater mechanical stability?" "Why does synthetic rubber impregnate fabrics more readily than natural rubber?"

Goodyear scientists, through the electron microscope, found the answers. They discovered that natural rubber particles have dimensions from 4 to 160 millionths of an inch, while synthetic particles vary from 1 to 7 millionths of an inch. This information gave Goodyear and other rubber manufacturers the long-desired solutions to their important questions. With these new-found facts, it was possible to check for the particle size that results in a better product.

Assigned to Quality Control

Today, another rubber firm, the B. F. Goodrich Company, is discovering that the large research model RCA electron microscope is so frequently assigned to quality-control applications that it can be used only sparingly for research. It was for situations such as this that the budget-wise console model RCA electron microscope was introduced. Desk-like in appearance, this sim-

[10 RADIO AGE]

plified, convenient-to-operate instrument is completely self-contained and can be easily moved from place to place, bringing its great resolving and magnifying power close to the production line. Goodrich has found that this mobility speeds up both research and quality control.

Another leader in American industry that has responded to the challenge of new knowledge is the Aluminum Company of America. By means of the electron microscope, Aluminum Research Laboratories have disclosed hitherto unknown significant aspects of metal structures. In the same way, Dow Chemical Company metallurgists are conducting a tireless search for data relating to the structure and properties of metals and alloys, and are being aided by the RCA electron microscope's enormous capabilities. After Dow physicists had discovered the structure of pearlite crystals, through their microscope research, a steel company was able to improve surfaces of pearlitic steel because of facts disclosed under a magnification of 10,000 diameters.

Helps Setting of Standards

The record of industrial achievements through electron microscopy goes on almost unendingly. Through the "eyes" of the microscope Aluminum Ore Company scientists saw the detailed structure of alumina for the first time. They had known that a certain alumina made the best reinforcing pigment for rubber, because tests by rubber com-

panies had proven this fact; but after the electron microscope had identified the particle size, this information was used to establish standards.

The Calco Chemical Division of the American Cyanamid Company employs both the large research model and the desk-type electron microscope in developing new and improved dyes, pigments, and textile finishes. Calco scientists have found the microscope particularly well suited to the study of pigments and insoluble dyes. "For maximum hiding power, tinting strength, and coloring value" they have stated, "the primary particle size of pigments must be well below the dimensions that can be resolved with visible light." The electron microscope, using electrons instead of light waves, has a resolving power many times that of the ordinary light microscope, and shows with great clarity the outlines of the individual particles. It reveals not only the shape and surface smoothness, but frequently the structure of secondary aggregates. Calco scientists report that "studies made possible with the electron microscope have contributed materially to the development of pigments with improved properties and performance."

The West Virginia Pulp and Paper Company has found the electron microscope to be indispensable in its research on pulp, paper, and related by-products. In the manufacture of precipitated calcium carbonate, the shape and size of particles (none of which can be satisfactorily resolved with an optical microscope) determine its characteristics for a variety of applications. The direct observation of these chalk particles with the electron microscope has led to the



THE WEST VIRGINIA PULP AND PAPER COMPANY EMPLOYS THE DESK-MODEL RCA ELECTRON MICROSCOPE IN THE DEVELOPMENT OF BETTER PRODUCTS FOR ITS CUSTOMERS.

development of an ultra-fine calcium carbonate.

"What takes place when glass is polished?" was one of the questions facing the W. F. and John Barnes Company. Its scientists also sought to find those characteristics which affect the polishing power of materials such as cerium oxide, rouge, and rare-earth oxides. Answers to these questions were found in the study of particles with details approximately 1/50,000 of an inch in diameter—too small for any other type of microscope to reveal.

Aid to Customer Service

Godfrey L. Cabot, Inc., one of the instrument's more recent users, has installed the Universal model of the electron microscope in its Boston laboratories for increased service to the rubber, paint, ink and other industries using Cabot carbon black. Its scientists use the microscope both for research and as a part of the customer service program which it has followed for many years. Each day the Company's manufacturing plants, located in areas thousands of miles from Boston, send samples of their output to the Cabot Electron Microscope Laboratory. After the samples are photographed, the resulting micrographs are available for customers as a part of descriptive specifications. Such customer service is

MARY MARTIN, OF THE LABORATORY STAFF OF GODFREY L. CABOT, INC., BOSTON, STUDIES MICROGRAPHS OF CARBON BLACK PARTICLES OBTAINED WITH AN RCA ELECTRON MICROSCOPE.



DR. F. A. HAMM "FINGERPRINTS" DYED NYLON WITH THE LATEST MODEL RCA ELECTRON MICROSCOPE INSTALLED IN THE RESEARCH LABORATORIES OF GENERAL ANILINE AND FILM CORPORATION.

an invaluable business asset.

Taste, texture and appearance of many familiar food products are being improved with the aid of this powerful electronic "super eye". At General Foods Central Research Laboratories, scientists have found answers to many problems that have baffled food technologists for years. The physical and chemical changes which are exerted on natural foods as they are processed can now be viewed through the microscope.

By greatly increasing the range of research in many fields, the RCA electron microscope is helping industry to plan tomorrow's products. This is evident from the Libbey-Owens-Ford development called *Electrapane*. Ordinarily, glass provides high resistance to electric current, but *Electrapane* is a glass that conducts current. Libbey-Owens-Ford research achieves this anomaly by coating glass with an invisible, microscopic film. The Company's scientists carefully study specimens of experimental conducting films under the electron microscope, which clearly reveals the crystalline film structures formerly invisible under light microscopes.

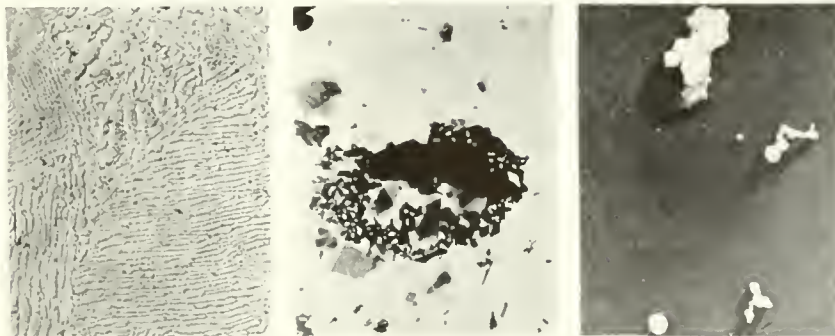
Makes By-Product Profitable

Another ease of how this remarkable instrument is helping develop products for the future is illus-



trated in an article which appeared recently in *Life* magazine. The U. S. Rubber Company used the RCA electron microscope in the development of a new and better starch, made of tiny plastic particles. The new liquid plastic, which keeps clothes starched through eight washings, doubles the life of garments. This is an interesting example of how a by-product has become extremely profitable for both the manufacturer and the American housewife.

The lasting shade of her nylon
(Continued on page 26)



THREE TYPICAL EXAMPLES OF ELECTRON MICROSCOPY MADE POSSIBLE BY THE RCA ELECTRON MICROSCOPE. LEFT TO RIGHT: FORMATION OF PEARLITE IN STEEL; SAMPLE OF FACE POWDER MAGNIFIED 15,000 TIMES, AND DUST PARTICLES WHICH CAST THEIR SUBMICROSCOPIC SHADOWS AFTER AN ENLARGEMENT OF 24,000 TIMES.

Education By Radio

Six Leading Universities Cooperate with NBC in Home Study Courses in Literature, Music and Economics



By Sterling W. Fisher

Manager
NBC Public Affairs and
Education Department

WHEN I was invited to speak last May at Ohio State University's annual Institute for Education by Radio, I decided to snap good-naturedly at critics who complain about radio's failure to help the public get educated.

Why talk about how little radio is doing in the educational field (I asked the professors) when what it is doing is not being utilized?

The greatest shortcoming, I said, has been the lack of provision for the organized and systematic use of broadcasts by listeners. Haphazard, unguided listening alone, on the basis of a dial turned at random when the listener happens to have a little free time, may prove at times informational, but hardly educational.

To my surprise, I found the educators and network officials in warm agreement. What's more, they wanted to help me do something about it. Mayor Charles P. Farnsley of Louisville, Kentucky, was on the phone offering money and assistance to experiment at the University of Louisville with a plan to bring college courses into listeners' homes. The result was that NBC, in cooperation with WAVE, our Louisville affiliate, and the University of Louisville, established last summer a home-study course in Anglo-American literature.—a course built around the "NBC University Theater" broadcast series. *Variety* heralded the experiment with a bold, prominent headline over a

page-one story, and the general press was equally enthusiastic. We three partners ran the initial test during the nine-week summer session at the University of Louisville, trying out a variety of teaching techniques. Encouraged by the results, we entered upon a full-scale experiment during the fall semester. The method followed was this: first, students who registered by mail with the Universee were required to listen to the "NBC University Theater" dramatizations; second, they read the novels that had been dramatized as well as the study guides sent them by the University; third, they prepared written reports based on their listening and reading and sent them to the University, which marked, graded and returned them. Participants who met University requirements received regular college credits for work done.

Other Universities May Join Plan

There are now six universities cooperating with the network in its home-study NBC University of the Air project, and we expect many others to join later.

Besides the University of Louisville, three other universities are

now offering college credits for a course in Anglo-American literature in connection with "NBC University Theater." They are the University of Tulsa, Washington State College, and Kansas State Teachers College at Pittsburg, Kansas.

The University of Chicago has built two courses—one in economics, the other in world politics—around the "University of Chicago Round Table" broadcasts. The University of Southern California has built a music course based on the network's "Pioneers of Music" series. Within two weeks after the first announcement that a listener's guide to this series was available at 50 cents, the first printing of 10,000 copies was sold out.

There are two ways for listeners to participate in these home-study courses. One is intended for those not interested in college credits or not qualified to obtain them; the other, which involves more work on their part, is for persons who want to acquire college credits without leaving their own homes. The non-credit students obtain certificates showing their successful completion of the radio course. The fees for students range from \$10 to \$30 for those trying for college credits; less for those who are not.

With some 1,750 inquiries coming in weekly from all parts of the United States and Canada, the success of the NBC University of the Air with listeners seems assured.

ADVISORY BOARD FOR NBC UNIVERSITY THEATER: SEATED; LEFT TO RIGHT — LIONEL TRILLING, PROFESSOR OF ENGLISH, COLUMBIA UNIVERSITY; HARVEY WEBSTER, ASSOCIATE PROFESSOR OF ENGLISH, UNIVERSITY OF LOUISVILLE; AMY LOVEMAN, BOOK-OF-THE-MONTH CLUB; AND NORMAN COUSINS, EDITOR, SATURDAY REVIEW OF LITERATURE. STANDING — ROBERTSON SHAWN, PROFESSOR OF LANGUAGE AND LITERATURE, KANSAS STATE TEACHERS COLLEGE.



European Outlook Brighter

Returning From Business Trip Abroad, General Sarnoff Reports Less Evidence of "War Scare Psychology"

RETURNING aboard the S.S. *America* from a six weeks business trip abroad, Brigadier General David Sarnoff, Chairman of the Board of the Radio Corporation of America, reported upon his arrival March 5 that "provided the United States maintains the diplomatic initiative we now hold, the outlook for Western Europe is brighter than it seemed a year or two ago."

Strongly favoring both the Marshall Plan aid program and the proposed North Atlantic Security Pact, General Sarnoff explained in a shipboard interview that "American help toward Western European recovery is the basic factor in preventing the advance of Communism across Europe.

"Conditions in England, France and Italy are visibly better than they were a year ago, and the same is reportedly true of the other countries aided by the Marshall Plan," said General Sarnoff. "But the basic financial, economic and political problems of Europe as a whole remain unresolved. In my view sound solutions to these vital problems are not likely to be found so long as the 'cold war' between East and West continues and so long as Russia blocks the completion of the Austrian and German peace treaties."

During his trip General Sarnoff testified at the British Arbitration Tribunal on the nationalization of Cables and Wireless, Ltd. He also had private interviews with Prime Minister Clement Attlee, Winston Churchill, and heads of American diplomatic missions as well as leaders of the French Government and European businessmen.

The General said he found much less evidence of "war scare psychology" and a much calmer resolve among the peoples living under difficult conditions.

"My best impressions are not negative," he continued. "The very crises which Russia is creating by her actions on the Continent have brought about a closer affinity in

Western Europe than has ever been known before in times of peace.

"The five powers of Western Europe are today working on a central parliament, a single customs union, and a single defense plan. This has all come about, first, through the proximity of militant Communism and, secondly, through the common denominator of American aid. Therefore, I am strongly in favor of the principles of both the Marshall Plan and the North Atlantic Security Pact. These are not solutions in themselves, but combined into a single American program for encouragement and hope for the peoples of Western Europe they can gain the necessary time in which further progress can be made."

Does Not Foresee Recession

General Sarnoff warned that a serious setback in the American economy would have grave repercussions in Europe. He added that he does not foresee any major economic recession in America.

Speaking specifically of France, General Sarnoff said that any predictions on the political scene there are "as hazardous as ever." But he was favorably impressed with the success of the French Government's domestic loan which "increased the value of the franc and the strength of the center group parties, at the expense of the extreme Left and the extreme Right."

On Britain, General Sarnoff did not hesitate to point out that British Laborites would soon have the delicate choice between protection of human rights and expanding socialistic theory.

"I have no doubt that this experiment is not intended to deprive Englishmen of their individual rights nor to abolish democratic processes in that country," he continued. "However, it is radically altering the face and life of Britain and I seriously question whether the introduction of Socialism on so vast a national scale can in practice adequately preserve the human



GENERAL SARNOFF AND SON, ROBERT W. SARNOFF, RETURN FROM STUDIES OF ECONOMIC AND TELEVISION ACTIVITIES IN ENGLAND AND THE CONTINENT.

rights, including the rights of labor itself. Responsible leaders in Britain told me that recent election trends indicate the Labor Government probably will be returned to power next year by a somewhat smaller majority than it presently holds. Its policy of nationalization will go forward, and after steel—which is the industrial heart of Britain—it will probably nationalize the chemical industry, and others. This will take the socialistic experiment a considerable distance over its charted course of making the State a monopolistic employer, producer and trader."

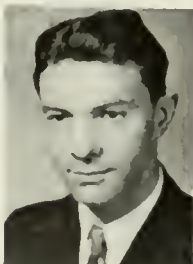
The General was accompanied on his trip by his son, Robert W. Sarnoff, Assistant to the National Director of Television Programs of the National Broadcasting Company.

"My son's mission was to make a detailed study of television in England and France," the General stated. "Every facility was afforded us by the British and French authorities to study the television situation in their countries. We feel progress is being made by British television and plans are also under way to advance television in France. However, we saw nothing in British or French television as far advanced as are the techniques and services in the United States. Britain and France are the television leaders of Europe."



Cutouts Aid TV Station Planners

Scale-Model Miniatures of Units for Television Transmitters and Studios Permit Engineers to Work Out Best Arrangement of Equipment.



By Marvin L. Gaskill

*Engineering Products Department,
Radio Corporation of America*

SCALE-MODEL paper cutouts are being used by RCA sales engineers to help broadcasters solve some of their television station planning problems. Each cutout—there are two books of them—represents a major TV broadcast unit in miniature, but in exact proportion and general appearance. The cutouts can be assembled or re-arranged in different groupings to permit accurate cost-and-space

studies of projected television stations.

Engineers, draftsmen, artists, photographers and writers collaborated in producing the realistic models. The cutouts were drawn, checked from blueprints and care-

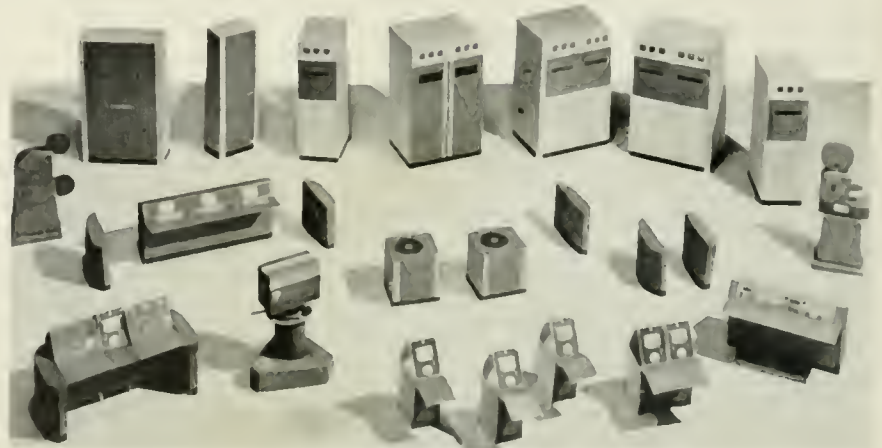
fully scaled to the proper height, width and depth of the actual equipment. Even the panels on the models are photographic reproductions of those on the original units. Reproduced in two tones of brown to resemble the umber gray shades of the actual equipment, the miniatures are printed on heavy paper that will withstand considerable handling.

Development of the cutouts can be traced to the use of working models by advanced RCA engineering groups. Later, dealers used television equipment miniatures, some of them elaborate and costly, for display and advertising purposes. These models, however, were designed primarily for window displays and little stress was placed on accuracy of proportions.

As the video industry grew, a greater demand for scaled models arose. Design engineers, faced with a variety of planning problems involving equipment needed realistic, proportional facsimiles that could be used to simulate studio scenes. These cutouts, scaled one inch to the foot, appear to solve the problem. The easily-assembled miniatures can be made even more durable when cemented to wooden blocks and coated with clear lacquer.

Since the amount of equipment required for a television studio installation varies widely, depending on the type of station, the size of the community in which it is to be

(Continued on page 15)



PAPER MINIATURES INCLUDE CORRECTLY-SCALED REALISTIC MODELS OF ALL MAIN UNITS OF RCA TV EQUIPMENT. TRANSMITTER UNITS, VIDEO CONSOLE UNITS AND RACKS MAY BE GROUPED IN ANY TENTATIVE ARRANGEMENT.

Admiral Wynkoop Elected Head of Radiomarine

ELECTION of Rear Admiral Thomas P. Wynkoop, Jr., United States Navy (ret.), as President of the Radiomarine Corporation of America was announced March 11. His retirement from the Navy became effective on March 1.

Admiral Wynkoop served in the Navy for 31 years, most of which time he was active in the construction and design of warships. His assignments included eight years in the Navy Department, Washington, D. C., and duty in some of the Navy's largest shipyards. His last office was that of Commander of the Naval Shipyard, Long Beach, Calif., where he served from November, 1946 to January, 1949.

While Production officer at the Naval Shipyard in Norfolk, Va., during World War II, Admiral Wynkoop supervised construction of the noted aircraft carriers *Tarawa* and *Lake Champlain*.

A native of Philadelphia, Admiral Wynkoop attended the United States Naval Academy at Annapolis and was commissioned an Ensign on June 7, 1918. He served on a U. S. destroyer out of Queenstown during World War I, and following the Armistice took a postgraduate course in Naval architecture and



THOMAS P. WYNKOOP, JR.

warship design at the Massachusetts Institute of Technology from which he received a Master of Science degree in 1922.

The following year, Admiral Wynkoop joined the staff of the Navy Yard at Mare Island, in San Francisco Bay, where he served until 1926. After a detail aboard the *U. S. S. Rigel*, he was transferred to Cavite Naval Station in the Philippine Islands.

In 1931, he returned to the United States for a tour of duty in the Bureau of Construction and Repair, Navy Department, Washington, D. C., remaining there until 1935, when he was assigned to the Puget Sound Navy Yard. From 1939 to 1941, he was a member of the United States Naval Mission to Brazil and assisted that country in its construction program for which he was decorated with the Order of the Southern Cross.

Shortly before the United States entered the war, Admiral Wynkoop was detailed to the Shipbuilding Division of the Bureau of Ships in Washington, where he served for the next four years. During the latter part of the war, he was Production Officer at the Norfolk Naval Shipyard. He was promoted to the rank of Rear Admiral on June 28, 1943.

Admiral Wynkoop has received many honors and awards for his distinguished service. They include the Victory Medal with Bronze Star, World War I; American Defense Medal, American Area Medal, World War II Victory Medal, the Cruzeiro de Sul of Brazil, Secretary of the Navy Commendation Medal and the Legion of Merit.

Cutouts Aid TV Station Planners

(Continued from page 14)

located and the scope of operations, studio planners have adopted the cut-out system to great advantage.

The tiny models give engineers and planners a completely accurate picture of how studios and entire stations can be arranged for best acoustical and space results. They also are made to give the prospective customer an idea of what his money will buy. Since television calls for large expenditures, station owners naturally want some idea of what equipment they will require, and what method of installation is best.

As architects, shipbuilders, designers, and decorators have discovered in the past, the lowly cutout is an ideal solution to the problem.



TWO BOOKLETS OF SCALED PATTERNS PROVIDE ALL MATERIAL NEEDED IN THE ASSEMBLY OF MODEL LAYOUTS.

[RADIO AGE 15]



1 Sheets of translucent plastic are reduced to proper thickness under the heated rolls of this huge machine.



2 A 45-rpm record complete with labels is removed from one of the many powerful presses in the Indianapolis plant.

Making the 45 rpm and Record



3 Excess plastic material, called "flash," is stripped from the outer rim of the recording following the pressing process.



4 Each of these semi-automatic machines punches out the record's large center hole at the rate of 30 discs a minute.

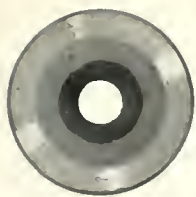
THESE scenes show the steps in the production plant of the RCA Victor record company. The steps include increasing quality, increasing diameter, and increasing record-changing speed.



5 Exact centering of a 45-rpm record is assured by checking the movement of the outer rim under a microscope.



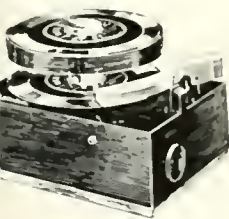
6 Here the finished records are placed in envelopes and then packed in containers for shipment to dealers and users.



The new records

players

From the Indianapolis, Ind., Victor Division reveal some of the steps followed in producing the new, colorful, 45-rpm records, only 6 7/8 inches in diameter. The fast, quiet, trouble-free mechanisms.



Maximum performance of the 45-rpm record player is assured by testing its operation with a sensitive oscilloscope.



Quantity production is achieved on the assembly and testing lines for the new 45-rpm record players at the RCA plant in Indianapolis.



Record players undergo a listening test, one of the final steps in the manufacture of the high-fidelity instruments.



Assembling one of the basic components of the trouble-free automatic changing mechanism of the 45-rpm record player.



5 An inspector checks the operation of the disc-changing cycle of a record player.



6 A moving conveyor separates the assembly group on the left from testers and inspectors of the finished product on the right.

Television Bolsters U.S. Economy

Expanding Demand of Video Industry for Wide Range of Basic Materials and Component Parts Will Act as Powerful Stimulant to Many Other Industries



By John K. West

*Vice President in Charge of
Public Relations,
RCA Victor Division*

Excerpts from an address by Mr. West before the American Management Association in New York, March 17.

DURING the war, our economists figured that it would be necessary to hold our national income at 208 billion dollars to keep us out of trouble. Last year we hit somewhere between 225 and 250 billion. Now, with some economic factors giving evidence of being spent, we are fortunate in having television as a jack to help hold our economy up—an industry that will be the sturdiest of any since the automobile was invented.

Television, America's greatest new industry, is bolstering our economy in many ways. It stimulates supplier industries. It is a vast business of itself. And all this is dwarfed by television's ability to move goods. First, let's see how television stimulates other industries. Television, as a market, is still taking shape. 1949 marks only the third full year of its postwar activity. Yet we are quite confident that the industry will produce over 2,000,000 television receivers this year. The annual rate of production is stepping up so rapidly that, barring unforeseen restrictions, by 1953, television should hit an annual going rate of around 5,000,000 receivers.

Television a Boon to Industries

This means a great deal to the mines and mills and factories in our country. It means a vigorous, growing market for industries as far apart as New England textile mills weaving intricate cabinet grille cloths and Southwestern silver mines whose product is used for television tuner contacts.

A television receiver has about 1100 components. That's ten times as many parts as the ordinary radio. Television absorbs the products of hundreds of component manufacturers and sub-assembly manufacturers directly and those of thousands of suppliers indirectly. This means business for business all over the country.

The receiver and the antenna on the roof take around 40 pounds of steel. Multiply that by 5,000,000 units a year, and you find television using 200,000 tons of steel, per year.

There are so many little pieces of copper wire connecting parts in a television receiver that, if they were all put together, they'd make a single piece over 100 feet long. All told, each receiver requires about 9½ pounds of copper. At the 5,000,000 going rate television will soon reach, television's annual copper requirements will hit 47½ million pounds! Add 40 million pounds of aluminum and the 83 million pounds of glass which will be used in picture tubes alone and the proportions of this industrial giant begin to be seen. In cabinets, television will use enough wood every year to make an inch-thick dance floor of four square miles!*

There's a pound of rubber in each set. There are plastics, ceramics, mica, carbon, nickel, tungsten and paper.

All of these figures are only the slightest indication of the real economic effect of television's material

* Over 103,000,000 board feet.

requirements. This raw material must be fabricated into billions of component parts before it becomes a part of your home entertainment.

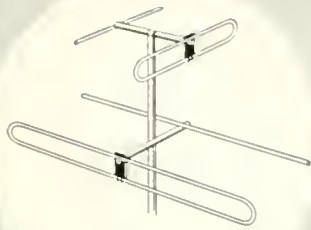
We mentioned previously that over 2,000,000 television receivers are forecast for this year. Let us translate that to dollars. At the retail level, these 2,000,000 television receivers add up to around \$650,000,000 worth of business. There will be approximately \$25,000,000 spent on television by advertisers this year. Some 40 new stations will go on the air during 1949 to bring the total past 90. Each of these new stations represents an investment approximating a quarter-million dollars. A.T.&T. is expanding television networks this year to link thirteen more cities to the present fourteen on the East-Midwest lines and is increasing the number of circuits joining the most important television cities.

Billion Dollar Industry in 1949

Add it all up and we see that television, in 1949, only its third full year, should account for business activity totaling over a billion dollars! Imagine how big this baby will be when it really grows up!

Industry, as well as agriculture, has always been involved with the cycle of planting seed, working to assist growth, and then harvesting the results. Television has grown so rapidly that it's easy to see this cycle in it. There was investment needed—investment in men, laboratories, intricate equipment; investment in dollars, energy, genius and time. RCA alone spent \$50,000,000 on television in research, experimentation, development and facilities. Its harvest is the phenomenon of commercial television.

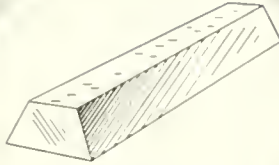
It is as an advertising medium that television's impact on marketing methods has been most felt and recognized. We learn how, in three weeks, two \$35 spot announcements weekly resulted in 2,270 New York outlets taking on a new food product. We hear about Macy's at Christmas time offering a \$9.95 doll, fashioned after the little NBC marionette, "Howdy Doody" — selling 10,000. We see the "Texaco Star Theatre" getting the incredible sponsor identification of 95½ percent! We find Donald Stewart, ad-



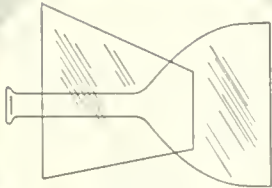
STEEL
200,000 tons



COPPER
47½ million lbs.



ALUMINUM
40 million lbs.



GLASS
83 million lbs.



LUMBER
103 million
board feet

ESTIMATED MATERIALS REQUIREMENTS OF THE TELEVISION RECEIVER INDUSTRY FOR 1953, BASED ON A PREDICTED ANNUAL PRODUCTION OF 5,000,000 RECEIVING SETS.

the Unique line sold out. Last season this company enjoyed the greatest demand in its history. Unique has now signed a long-term television contract to make the toy business a year-round instead of a seasonal one.

Brand Name Strengthened

Disney Hats, in contrast, used television to strengthen its brand name by having the company's distinctive trade-mark "come to life" at the beginning and end of its network newsreel. Local retail outlets in each city were encouraged to use the time spot following the network show. During the last three months, hat sales in general have been slipping. During those same three months, John David, the New York dealer who tied in with the broadcast here, has increased its Disney hat sales by 49 percent.

Esso conducted a survey to find the percent of television owners using its products. Then Esso used television to tell its complex product story of "controlled volatility". Later the audience was surveyed again. Esso users were found to have increased by 10½ percent! Television makes messages easy to remember.

There were only 42 advertisers using television in February, 1947. They'd grown to 210 by January, 1948, and 1099 by January, 1949. Television has proved itself as an advertising medium, and its career is only beginning.

Here is television's promise: to be an increasingly effective force for favorable influence on the distribution pattern of consumer goods and services

In New York today, television receivers are already in the hands of nearly 14 percent of the families. By next January 1, they should be in over 21½ percent of New York homes. And let's see how many are expected to be in other cities by then: in Philadelphia, 20 percent; Washington, 19; Los Angeles, 15½; Baltimore, over 18. Here are some cities which should have more than 13 percent of their families equipped with television by next New Year's Day. Boston, Chicago, Cincinnati, Cleveland, Detroit, Milwaukee and St. Louis.

vertising manager of the Texas Company, writing "the most amazing thing is the number of people — about 75 percent of those writing in — who say they are going to switch to Texaco products."

When results like these get around, we're forced to devote some study to advertising's modern Merlin. Television simply refuses to be ignored.

Still we must retain our perspective. This year the industry will manufacture over 2,000,000 television receivers. This same year it will manufacture over 11,000,000 radios. The circulation of newspapers and magazines remains high and effective. Billboard space is still scarce — and radio is still America's greatest means of communication.

All these established advertising services still continue to do their jobs. At RCA Victor we still use

them all. But we recognize that now is the time for extra effort in advertising and promotion. That's why we've added television. Just as radio carried many little-known or unknown brands to the top brackets, so will television create new brand names. Forty-two percent of the advertisers using network television during 1948 were not radio advertisers.

Let's watch it in action.

Can you picture a youngster going into a store and asking for a toy, not by its name, but by the general name of its manufacturer? A manufacturer — Unique toys — started using a children's program before Christmas to plug its line of merchandise. Soon the small fry were asking for them in stores, visits to Santa Claus, and Christmas hints to their parents by the manufacturer's name. An item that had been notably slow-moving in

NEW TUBE HAS "MEMORY"

Graphechon, Developed at RCA Laboratories as a Teleran Adjunct, Can Store Visual Information for More Than a Minute.

RADAR signals or oscilloscope traces, which occur in less than a millionth of a second and which remain in view only a few seconds on fluorescent screens, can now be "stored" for more than a minute by a new electron tube that has "visual memory".

The tube, called the Graphechon, is based upon the discovery that certain materials may be used both as insulators and conductors of electricity. It was described by Louis Pensak, research physicist of RCA Laboratories, Princeton, N. J. at the March convention of the Institute of Radio Engineers in New York. The first major use of the tube will be in Teleran, the television-radar air navigation system under development by RCA.

The Graphechon is a "booster" device which is employed between the stage where a radar beam is received and where it is reproduced on a television kinescope. It retains for more than a minute images that have a life of less than one-millionth of a second.

With the Graphechon the radar signal is kept in the form of an electrical charge, which is "written" on the tube target by the radar beam and "read" from it by an iconoscope-type beam, similar to that used in telecasting. The signal is

then amplified and applied to the kinescope, the television viewing screen. Here it can be observed, or monitored, and picked up from the kinescope, by the television camera, retaining the brightness and good contrast of the screen image.

The Graphechon makes it possible to observe a radar pattern on a bright-screen kinescope, instead of the dim radar scope, in a normally lighted room and without any special preparation.

Electrons "Write" and "Read"

The heart of the Graphechon is a metal target, 3 inches square, coated on one side with a layer of pure quartz, 20 millionths of an inch thick. In the original model, two beams in the legs of a V shaped tube are aimed at this target. One is the radar beam, which "writes" on the quartz surface: the other is the iconoscope-type beam — such as is used in a television camera — which "reads" from it. Unlike a fluorescent screen, the target is not light sensitive, but is sensitive to electrical charges.

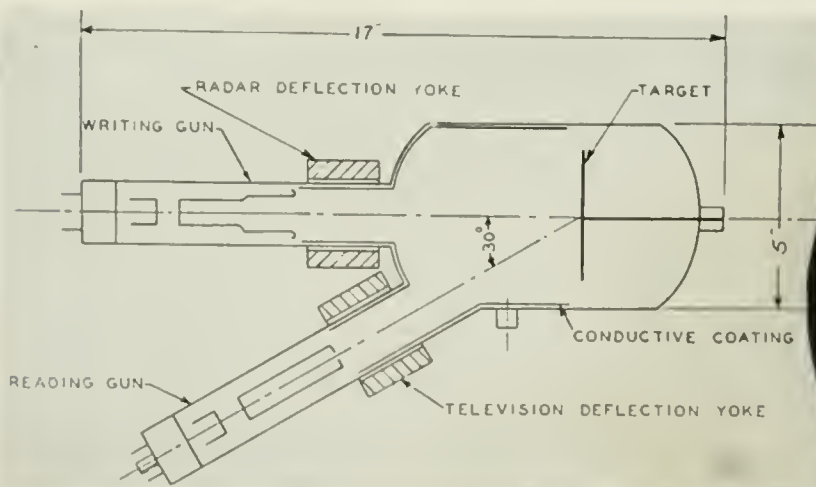
The beam of electrons from the "reading" gun strikes the target and every electron knocks off secondary electrons, which fly to the conducting coating that lines the tube. Removal of negative electrons

builds an increasing positive charge on the target surface, until a maximum point of equilibrium is reached. When this occurs the excess of secondary electrons, over the beam current, returns to the target, maintaining the electrical status quo. The quartz coating is now acting as an insulator and permits the charging of the surface to a higher voltage than the metal sheet.

At this point the iconoscope beam has prepared the target for the radar beam, which will "write" on it. When the radar receiver picks up a reflection — of a plane, some point of the terrain, etc. — the signal turns on the radar beam of electrons which crashes through the quartz layer, makes it conducting at that point, and there discharges the voltage.

In short, the action of the iconoscope type beam is to put a uniform positive charge over the entire surface of the insulating film. The action of the radar beam is to make the insulator conducting at the points of impact, and so discharge the film in some pattern. The iconoscope type beam then proceeds to charge up the film once more.

The iconoscope scanning beam then knocks secondary electrons
(Continued on page 27)



CROSS-SECTION OF Y-TYPE GRAPHECHON TUBE SHOWING RELATIVE POSITIONS OF "READING" AND "WRITING" ELECTRON GUNS.



LOUIS PENZAK OF RCA LABORATORIES HOLDS ORIGINAL MODEL OF GRAPHECHON TUBE WHICH HAS A "VISUAL MEMORY."

NBC Documentaries Extended

Network Expands Public Service Features through New "Special Programs" Project. Hour-Long Problem Dramas are Widely Acclaimed

ON the second floor of New York's Radio City, NBC has established headquarters for the network's new project called, simply, Special Programs. Its business: to build and supervise the network's "Living—1949" series and "NBC University Theater" as well as full-hour documentaries and other "special" shows.

Special Programs reflects the increasing importance of high-quality public service broadcasts on the NBC log. This is a trend which had its beginnings late in 1947, and resulted in radio's first and only documentary-a-week series. The program was called "Living—1948," and was supervised by Wade Arnold, who now heads Special Programs, and directed by James Harvey, now assistant to Arnold.

Currently the series is known as "Living—1949," but its aim remains the same as it was at the start: to set Americans thinking more about currently important issues and arouse them to intelligent action. Its carefully researched subjects have ranged from mental health to elections, and each broadcast has mirrored Arnold's two cardinal rules of programming, viz., be adult, and never be dull. The response from both public and press has reached a high-water mark of enthusiasm.

Out of "Living" grew the realization that some subjects need more extensive treatment than 25 minutes allow. This important series has been supplemented, therefore, with a series of full-hour drama-documents. The first was "Marriage in Distress," a reasoned and challenging study of the status of marriage and the family in a

changing society. The program was aired last September 1 under Arnold's supervision and was rebroadcast a week later in response to appeals from listeners and critics. At year's end it won an award from the National Council on Family Relations.

The second hour-long documentary, produced December 19 under the aegis of Special Programs, was "Mother Earth," a study of the problem of world hunger.

Pioneer in Documentaries

"The increasing popularity of the documentary is one of the significant phenomena of the radio scene today," Arnold said, "but the format is nothing new. As long ago as 1933, NBC pioneered in the hour-long documentary field. That year the network did at least three: 'The New York Sun: 100 Years of American Journalism'; 'Headquarters,'

a report on the working of the New York City Police Department, and 'Chapter One: the Story of 1933,' a dramatic account of Roosevelt's first year in the Presidency."

Another current Special Programs enterprise is "NBC University Theater." It was this series of which the *New York World Telegram's* radio critic Harriet Van Horne said: "I think it would be nice today to bow our beads briefly and thank heaven (not to mention NBC which foots the bill)."

This series, constructed much like a college course in British and American fiction, has recently presented dramatizations of novels of E. M. Forster, Aldous Huxley, John Dos Passos, Ellen Glasgow and Graham Greene, among others. It attempts not only to convey the story and basic ideas of each novel, but also tries to lead the listener to the novel itself for an intimate discovery of the writer's method and style. It forms the core of an NBC education-by-radio project at the University of Louisville and will be similarly adapted for other schools.



WADE ARNOLD, HEAD OF NBC SPECIAL PROGRAMS, STUDIES A "DOCUMENTARY" SCRIPT AS JAMES HARVEY, HIS ASSISTANT, AND NANCYANN WOODARD, MEMBER OF THE RESEARCH STAFF, LOOK ON.

[RADIO AGE 21]



DR. HARRY F. OLSON



WENDELL L. CARLSON

Receive I.R.E. Fellowships

TWO scientists of the RCA Laboratories, Princeton, N. J., and one from the RCA Laboratories, Rocky Point, N. Y., received their certificates as newly-elected Fellows of the Institute of Radio Engineers at the Institute's annual banquet in the Hotel Commodore, New York, on March 10.

Honored for distinction in the profession were Dr. Harry F. Olson, director of the acoustic research laboratory, and Wendell L. Carlson, supervisor of the radio receiver research laboratory, both of Princeton, and Philip S. Carter, research engineer at Rocky Point.

Dr. Olson was cited "for his outstanding developments and publications in the field of acoustics and underwater sound". His association with RCA research goes back to 1928. He pioneered in the development of directional microphones, which are now almost universally employed in radio, television, sound motion pictures and other sound systems, and, in particular, the velocity microphone. He developed the first successful electronic phonograph pickup and has done outstanding work in the field of sound absorption.

Important contributions were made during the war by Dr. Olson's group in the fields of air and underwater sound under contracts with the National Defense Research Committee, the Naval Ordnance Laboratory and the Bureau of Ships. Sonar systems, microphones

and loudspeakers were developed, along with other devices still classified as secret.

He received his education at the University of Iowa, where he took the Bachelor of Engineering, Master of Science, Doctor of Philosophy and Electrical Engineering degrees. In addition to the IRE, he is a member of Tau Beta Pi, Sigma Xi, and the American Physical Society, and is a Fellow of the Acoustical Society of America. Dr. Olson was chosen as one of America's Young Men in 1939 and, the following year, received the Modern Pioneer Award. He has received 35 patents and is the author of three books and many technical papers.

The IRE Fellowship was awarded to Mr. Carlson "in recognition of his contributions over many years to the development of radio receivers and their components". Mr. Carlson was a pioneer in the early development of broadcast receivers; starting with the first RCA superheterodyne-type home receiver in 1924. Under his supervision an international shortwave receiver which set the standard for home use was developed in 1933, and in 1940 his group devised the first RCA personal-type radio receiver. During the war Mr. Carlson supervised important developments for the Navy on radar altimeters.

He was born in Jamestown, New York, and was graduated from the Bliss Electrical School, Washington, D. C. He is a member of Sigma

Xi and in 1940 received the Modern Pioneer Award. He has received over 60 patents, most of which relate to broadcast receivers.

Mr. Carter's citation was "for his many contributions in the fields of radio transmission and communication systems". He is an expert on antennas, developed the folded dipole antenna for television and FM reception, which is a common sight in most of the nation's cities. It is estimated that 40 per cent of all the TV and FM antennas used in the U. S. are of this type.

Associated with RCA since 1920, Mr. Carter has been issued more than 60 patents and is the author of a number of technical papers. He is a member of the American Mathematical Society and Sigma Xi, and received the Modern Pioneer Award in 1940. Mr. Carter was educated at Stanford University, receiving a Bachelor of Arts degree in Mechanical Engineering, and served as a lieutenant in the Signal Corps in World War I.

Following World War II, he received a Certificate of Appreciation from the Air Force for his work on counter-measures employed against German V-2s and, he was awarded a similar certificate by the Army and Navy.

Communication Service To China Extended

Radiotelegraph service to Tientsin, Tangshanhop, Tangku, Tsinghai and Chinwangtao, via Shanghai, has been resumed, RCA Communications, Inc., has announced following receipt of information from the Chinese Ministry of Communications at Shanghai.

According to information received, a censorship is being imposed on all messages. Code and cipher messages, as well as reply-paid service, are still suspended. All messages must be prepaid, the report said, noting that these restrictions also are being imposed on traffic for Peiping. It was further reported that, due to unsettled conditions in China, messages for Northern China points, which are beyond RCA terminals, are accepted only at the sender's risk.

Kinescope Recordings

*Thirty Hours of Video Programs on Motion Picture Film
Syndicated Weekly by NBC Television*



By Carléton D. Smith

*Director, Television Operations,
National Broadcasting Company.*

THE production of kinescope recording motion picture film at the National Broadcasting Company has far outstripped on an annual average the total production of the major motion picture studios.

In an operation which has increased by over 100 per cent since January and which saw a comparable 100 per cent increase from Nov. 1948, to January, the kinescope recording system now regularly syndicates 28 commercial and sustaining NBC Television programs a week with a total often reaching 30 hours a week.

The total output of film by the major motion picture companies in 1948 was 369 feature length films—or about 550 hours of product. At the average rate of nearly 14 hours a week of kinescope film, NBC Television is producing an average of almost 700 hours of entertainment product per year. This is virtually 50 per cent more than the Hollywood studios' output.

By far the greatest producer and distributor of kinescope recordings in the television industry, NBC is currently shipping an average of 223 prints a week to video outlets from coast to coast. This compares with the shipping schedule of a major motion picture exchange.

Installed at a cost of \$250,000, the new equipment in use by NBC includes four kinescope recording cameras, two of which record on the double-system only (sound and

picture films made separately), and the other two of which can record either double- or single-system (sound and picture recorded on same film).

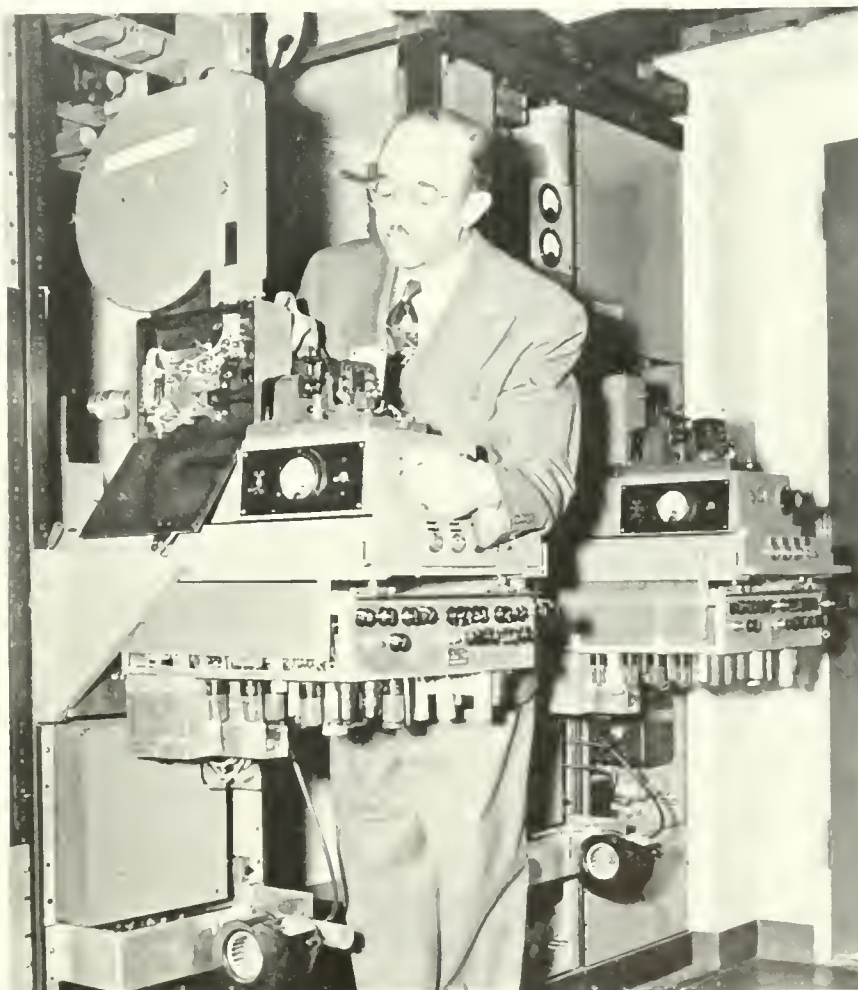
NBC Television is the only video concern which makes and develops its own film.

From an operation which one year ago produced one kinescope recording on an experimental basis a week, the system has burgeoned into a nation-wide service to television in which 28 programs are regularly recorded and shipped each week.

Except for a special job done on the LIFE-NBC coverage of the national political conventions last June, the kinescope operation was not put into regular commercial service until September, 1948.

At that time, seven programs were recorded each week. As technical progress was made and more equipment was pressed into service, the system jumped from the original seven to double that number in a matter of weeks. Advertising agencies, program sponsors, and new television stations created a tremendous demand for the recordings which in a short time leaped from an experimental film process to an essential part of video programming.

The number of prints and the amount of footage doubled from November, 1948, to January, 1949,



O. B. HANSON, NBC VICE PRESIDENT AND CHIEF ENGINEER, STANDS BETWEEN TWO KINESCOPE RECORDING UNITS IN THE NETWORK'S HEADQUARTERS, NEW YORK.

[RADIO AGE 23]

and increased another 100 per cent from January to the present.

As of now, the scope of the operation can only be compared in size, speed, and efficiency with normal motion picture processes of recording, processing, editing, and distributing. In terms of rapidity of recording and speed of reproduction, few if any film operations in the world can approach it.

Because of the close time schedules the operation from the laboratory in New York to television screens in such faraway places as Albuquerque, N. Mex., plane, train, bus, and motoreycle schedules have played an important part in the operation. Often one can of recording must be completely re-routed from a grounded plane, to a bus, to the nearest railroad terminal, and even back to another plane to make certain of its arrival at the destination at the appointed hour. Multiply this single can of film by the 35 prints which leave NBC Television nightly and the shipping operation becomes, indeed, a vital factor.

NBC uses two developers for processing the film, one of which develops the sound track, the other the picture. The processing time is approximately 2 to 1. In other words, one hour of program requires two hours of developing.

In addition to the regular commercial weekly programs kinescoped by NBC are the so-called rush "specials." One such special was the kinescoping of the Presidential inauguration January 20. The event took five hours on the air but had to be edited down for out-of-town stations to one hour and twenty minutes of programming. Working round the clock NBC Television film editors developed the early portion of the film in the afternoon and the afternoon portion was in the laboratory until 10:15 p.m. that night. By that time, the entire production of an eighty-minute negative had been completed and the film was rushed to the printer.

By eight o'clock the following morning fifteen prints has been completed and rushed to the airport for delivery to outlying stations. The films were seen Jan. 21 in every television city outside the range of interconnecting facilities.

After the picture and sound track are carefully edited and synchronized into one strip of negative film, the film is sent to an outside laboratory where test prints are made. Using the "step-light" printing method, film technicians in the laboratory can then increase the light intensity in any frames to bring about an equality of light in the entire film. In this way, the finished print often looks better in light quality than the image on a television screen of the original production.

Employed in the project currently are five men at the Film Exchange at Radio City; two cutters

and editors at Radio City; seven library men; and three at the Film Exchange at NBC's 106th Street studios. In addition, a total of 15 engineers and technicians are employed in the kinescope recording laboratories in Radio City.

The kinescope recording division of NBC is under the direct supervision of N. Ray Kelly, assistant director of the film division. Frank C. Lepore, manager of film operations, and Victor Borsodi, assistant manager of film operations work under Kelly's direction. On the engineering staff, Herbert deGroot is technical supervisor of film recordings.

Communications—Key to Victory

(Continued from page 5)

cast in history," he continued, "an estimated two million viewers in the East, including high-ranking Naval personnel in Washington, D. C., watched the flat-top, some 200 miles away undergo a mock attack by its own planes in maneuvers known as TASK FORCE TV.

"The Navy noted officially that the unrehearsed action, from the briefing of pilots to the return of the planes to the ship, was presented with a smoothness and technical perfection which made the experimental nature of the telecast all the more impressive and significant.

"The strategic importance of television in naval, military and air operations in this modern age was thus revealed dramatically. The event was declared by the Navy to be 'a milestone of technical achievement and patriotic service to the Navy and the citizens whom it serves.'

Takes on New Meaning

"Far-sightedness takes on a different meaning in the great complexities of modern war, with supersonic speeds, guided missiles, and the danger of 'surprise attack'. It used to be said that the battle goes to those who get there 'fustest' with the 'mostest'. The victory, in another struggle, could well go to the side which sees 'farthest', 'soonest'."

General Sarnoff paid high tribute

to former Prime Minister Winston Churchill, with whom he conversed privately during his recent trip abroad. General Sarnoff, describing Mr. Churchill as a keen student of military history and a brilliant World War II leader, said he was pleased to learn of the British statesman's intimate understanding of the part communications must play in modern military action.

General Sarnoff congratulated members of the Association upon their selection of Fred Lack as their next President. He praised Mr. Lack as a veteran in the field of communications who has shown keen interest in the Association since its inception and predicted continued progress under his leadership. Sincere appreciation was expressed to Major General Harry C. Ingles, retired Chief Signal Officer of the Army, through whose vision the Armed Forces Communications Association was conceived and through whose encouragement it has steadily advanced. He also expressed appreciation to Brig. General S. H. Sherrill, U. S. Army (ret.), for his success as Executive Secretary of the Association.

"We pledge anew to our Country, and to all services of the Armed Forces," concluded General Sarnoff, "the wholehearted cooperation of the industry and its workers towards helping to secure the blessings of peace for our own Nation and for freedom-loving peoples everywhere."



FRAN ALLISON, RADIO AND TELEVISION STAR, IS THE ONLY "LIVE" CHARACTER FEATURED REGULARLY WITH "KUKLA" AND "OLLIE", THE DRAGON.

"KUKLA, FRAN & OLLIE"

Television Puppet Show, Sponsored by RCA Victor, Appeals to Old and Young in Areas Served by 17-Station Network.

A WIDE-EYED, bald little fellow, about a foot high with a nose shaped like a billiard ball, stands before the television cameras and captures the affection of hundreds of thousands of viewers. He is Kukla, the almost legendary puppet personality starring on the RCA Victor-sponsored program, "Kukla, Fran and Ollie."

The strange little character and his fellow Kuklapolitan Players began their present series of telecasts in October, 1947, as "Junior Jam-boree" under the sponsorship of the RCA Victor Distributing Corporation in Chicago over Station WBKB.

When Kukla protested to his audience that television station executives wouldn't let him operate the cameras, the station officials were swamped with indignant letters in childish scrawls demanding that their favorite television performer be permitted to run a camera any time he pleased.

When a distinguished milliner first saw Madame Ophelia Oglepuss, a haughty-visaged interpretation of

an ex opera star, he was so delighted that he made an assortment of elaborate little hats for the miniature artist.

Adult Audience Attracted

Tens of thousands of letters, thousands of gifts, and a wide variety of awards—ranging from recognition by the Chicago Advertising Club as the outstanding television program of the year, to a police department citation for the show's valuable lessons in safety—all testified to the standing of the program, easily the most popular television fare in Chicago. One of the most impressive revelations was that the subtle humor and preposterous situations of Kukla and his puppet friends attract an audience that is about 60 percent adult!

One tremendously important factor in the show's success is the highly telegenic stage, radio and television star, Fran Allison—the only live "regular" appearing before the cameras on the show. Her

adroitness in integrating her conversation and action with the puppet troupe lends realism to the little people. Her conversations with the Kuklapolitan Players are expertly ad libbed and she and Puppeteer Burr Tillstrom are ideal personality foils for each other.

Lends Realism to Programs

Tillstrom, who prefers to be thought of as the "Manager" of the Kuklapolitans, is the crew-cut, youthful-looking man whose brains, voice and actions regulate the entire group of miniature mummies. Each tiny figure has a distinctly delineated personality which Tillstrom has enacted for so long that it never steps out of character and grows in realism.

In addition to Miss Allison, Kukla and Madame Oglepuss, the cast includes Ollie, Kukla's sad-eyed, fuzzy-topped little dragon pal (not a fire-eating dragon because his father inhaled while swimming the Hellespont); the bewildered-looking Cecil Bill Ryan, who speaks in a language intelligible only to Kukla; Fletcher Rabbit, a hard-working, flop-eared cottontail; Colonel Crackey, a bespectacled Southern Gentleman addicted to loud plaid shirts; Beulah Witch, whose professional techniques employ modern electronics rather than old-fashioned potions, and Madame Coo Coo, who came directly to television after personal appearances in a coo-coo clock in Santa Claus's workshop.

Many Strange Situations

Together on television, this merrymaking group gets involved in all sorts of situations ranging from Ollie's efforts to make pear-shaped tones under Madame Oglepuss's tutelage, to Fletcher Rabbit's impassioned protests to Colonel Crackey that, since rabbits don't go around shooting people, why should people go around shooting rabbits?

When Kukla's invention, an electronic permanent wave machine, took off all of Ollie's hair, the audience set about solving this prob-



PUPPETEER BURR TILLSTROM VIEWS THE CAST OF MINIATURE MUMMERS TO WHOM HE GIVES VOICE AND ACTION.

lem with mighty enthusiasm. They sent all types of hair restorers, wigs and even grass seed—appropriately green and hairlike for dragons. Kukla chose the latter device for rectifying Ollie's coif, put seed on the dragon's head, watered it with a sprinkling can—and up sprang flowers. Eventually the electronic permanent wave machine that caused all the difficulty was brought out again. Since, when turned on, it took the hair off, with Kukla-politan logic, when thrown into reverse, it put the hair back.

Shenanigans like these are always presented ad lib from outlines worked out by daily program staff discussions.

Busiest Man in Television

Once the program outline is firmly set in all the participants' minds, the show is ready to begin. Burr goes backstage and becomes the busiest man in television. In addition to being puppeteer, he watches the show on a television receiver, notes time, switches characters and voices with lightning speed. Hundreds of props are stored within his convenient reach. Agile, adept and versatile, Tillstrom has gained a reputation as the nation's top puppeteer from these superlative performances.

The wholesome nature of the program has particularly attracted attention from parent-teacher, safety, civic, and other groups, more than

a dozen of which have presented the show with citations. Kukla's Clean Plate Club, an exclusive organization with membership restricted to those who eat their entire meals, has won the gratitude of parents throughout the listening-looking audience. Health, safety, neatness and other desirable habits are "sold" to the children without preaching at them. And no violence or action even approaching the borderline of poor taste ever appears on the show.

This canny evaluation of how to both entertain and hold public favor has been developed by Tillstrom through more than 15 years of professional puppetry, beginning when he was a high school student in Chicago. He studied the work of the nation's foremost puppeteers and also engineered marionette shows. During one of these shows, 12 years ago, Kukla was born.

For a production of "Saint George and the Dragon," in which the noble-nosed little man played Saint George, a dragon of comparable whimsy was needed. That was when Ollie joined Tillstrom's troupe, and he's been an indispensable part of the activity ever since.

Performed at World's Fair

The redoubtable team and many of its fellows first performed in behalf of RCA at a 1939 department store television demonstration in Marshall Field & Company.

Chicago. In Spring, 1940, Tillstrom went to Bermuda, again for RCA, to participate in the Company's first overseas television demonstration.

Immediately recognized as television "naturals", Tillstrom and his little people were brought by RCA to the New York World's Fair. There the tiny troupe presented some 2,000 shows, a few of which were telecast over the NBC station in New York.

During the war Kukla became a favorite in bond drives, service encampments and with Red Cross units. Tillstrom still carries on this between-shows activity by entertaining at such places as orphans' homes and hospitals. He finds this direct contact with audience stimulating and secures many of his ideas for programs from the material that brings unexpectedly rewarding laughs from these audiences.

Electron Microscope

(Continued from page 11)

stockings is also an important matter to the average woman. In order to improve the color fastness in stockings and countless other nylon fabrics, the General Aniline and Film Corporation studies the structure of dyes and pigments through the RCA electron microscope. Dr. F. A. Hamm, of General Aniline reports that micrographs of dyed nylon before and after steaming substantiate the two following theories: first, that post-dye steaming increases the average size of dye crystals in nylon, which accounts for a decrease in their hiding power and an increase in their fastness to fading; and second, that the larger crystals on the surface can be "rubbed off" more easily than the smaller crystals, with a consequent loss in fastness.

Dr. Hamm has successfully unlocked secrets of "color fastness" by combining American ingenuity with knowledge obtained through the RCA electron microscope. He is, in this respect, representative of the many scientists who daily labor in research laboratories everywhere to improve the products of everyday living.



New Television Antenna Reduces Interference

PERFORMING like a traffic policeman in a one-way street, a new television antenna has been developed which will receive signals from only one direction at a time and will greatly improve reception of set owners in fringe areas which lie between stations on the same channel. Development of the antenna was reported by O. M. Woodward, Jr., research engineer of RCA Laboratories, Princeton, N. J.

Consisting of an array of four eight-foot dipoles in the form of a square, with the opposite members eight feet apart, the antenna can be made to receive from one direction or the other by flipping a switch placed near the receiver. Interconnection of the dipoles through a diplexing network makes this one-way effect possible.

The Woodward antenna, it has been emphasized, is not an answer to any and all antenna difficulties, but is effective in cutting down co-channel interference when the re-

O. M. WOODWARD OF RCA LABORATORIES STAFF MAKES ADJUSTMENT ON COMBINATION HIGH- AND LOW-BAND TELEVISION ANTENNA WHICH HE DEVELOPED.

ceiver is located between two stations and on the fringe of their transmission areas, and to reduce interference of adjacent channel stations where the receiver is insufficiently selective.

Interference experienced in Princeton between Channel 2 stations in New York and Baltimore and between Channel 4 transmitters in New York and Washington has been largely eliminated by the new array.

Efficient reception on high and low bands is achieved with the new device by attaching short pieces of wire in the shape of "V's" to each leg of the four dipoles. This, in effect, "shortens" the dipole, which is designed for low frequency reception, and permits optimum reception of high frequency signals.

Tube has "Memory"

(Continued from page 20)

from that spot on the target in an effort to bring it back to equilibrium. This removal of the electrons produces a signal on the target which is amplified and applied to the kinescope.

The iconoscope scans 30 times a second and can take as long as 2,000 scans to bring the signal area of the target back to equilibrium — or read off the signal completely.

The Status of Television

(Continued from page 7)

total conversion cost will not exceed, and may be less, than if partial conversion equipment were included in present receivers. None of this cost will be incurred by the customer until UHF television broadcasting becomes a reality in his community, and then only if he elects to make the conversion, assuming that he may need it at all. Moreover, a converter will enable the receiver to pick up programs on any ultra-high frequency channels which the FCC may allocate eventually.

RCA Victor considers it economically unsound to add to the price of existing equipment, costs that might not eventually be justified. This includes turret tuners or any other

device built in to provide only *partial* coverage of the full range of ultra-high frequency channels which may be allocated by the FCC in the future.

In any method of converting sets for UHF, the services of a trained television technician will undoubtedly be required. This will be true not only for installation or activation of the UHF tuning unit, but also for the probable antenna changes that will be required for satisfactory UHF reception. Changes in antenna, lead-in or antenna location would apply equally to the product of any manufacturer. With its nation-wide organization of television service experts, RCA can and will provide its customers with conversion service as efficient and

as economical as can be obtained.

In summary, the Radio Corporation of America has been active in the exploration of the ultra-high frequencies, and has contributed more to their development, than any other company. Its leadership is as pronounced in this field as it is in all other phases of television, where the sum total of its experience in manufacturing, in field testing, in the design and construction of both television transmitters and receivers, and in television servicing, is unequalled. RCA will continue to pioneer in UHF and, as in the past, to make its findings available to all for the advancement of television as an art and industry in service to the public.

Dr. Zworykin to Receive Lamme Medal for 1948

Dr. Vladimir Kosma Zworykin, Vice President and Technical Consultant, RCA Laboratories Division, Radio Corporation of America, has been named to receive the Lamme Medal for 1948, awarded annually by the American Institute of Electrical Engineers for "meritorious achievement in the development of electrical apparatus or machinery." Dr. Zworykin will receive the medal during the Summer General Meeting of the Association in Swampscott, Mass., June 20-24.

The Lamme medal was established 20 years ago by Benjamin Garver Lamme, then Chief Engineer of the Westinghouse Electric Corporation. Mr. Lamme assigned to the Institute the responsibility of selecting the recipient and presenting the award.

Dr. Zworykin, who joined RCA in 1928, has made many notable contributions to electronics, among them the invention of the iconoscope television camera tube and the development of the kinescope television picture tube.

Dr. Zworykin was cited specifically by the A.I.E.E. for "his outstanding contribution to the concept and design of electronic apparatus basic to modern television."

RCA Radios for Caracas

A high-frequency radio network employing the latest equipment developed by the Radio Corporation of America has been set up by the Police Department in Caracas, Venezuela.

In addition to two 250-watt transmitters at central police headquarters, the network comprises six 60-watt fixed stations at other points in and around the city that are operated by remote control from police headquarters.

Sixty patrol cars of the Caracas police force are equipped with RCA two-way radios linked to the network. A mobile criminological laboratory also forms part of the radio-equipped law enforcement body in Caracas, as do vehicles of various departmental chiefs. The system is under the direction of Inspector Miguel Angel Padilla.



HEADQUARTERS OF CARACAS POLICE DEPARTMENT, CONTROL CENTER OF THE CITY'S RCA-EQUIPPED RADIO NETWORK. POLICE INSPECTOR MIGUEL ANGEL PADILLA IS AT EXTREME LEFT.

Work Begins on New Tube Plant

GROUND-BREAKING ceremonies for a new manufacturing center for the mass-production of RCA 16-inch metal-cone picture tubes for television were held March 3 in Marion, Indiana. Construction of the first unit of the center will begin at once.

The new Marion plant is to serve as a major "feeder" plant supplying kinescopes or television picture tubes to the industry.

The new building will provide 100,000 square feet of manufacturing space. This is exclusive of the 160,000 square feet of factory buildings already acquired by the RCA Tube Department in Marion.

According to present schedules, the new building is tentatively expected to be completed by early Fall. In the meantime, plans are underway to install temporary production machinery in plant buildings already existing on the site. These facilities are scheduled to produce their first 16-inch metal picture tubes by summer. The entire new plant, with its high-speed automatic machinery, is expected to begin full-scale output of the large metal tubes early in 1950.

In appearance, the new building will be a low-lying one-story ultra-

modern brick and steel structure, air-conditioned and fluorescent-lighted throughout. An extensive landscaping program will be undertaken to provide an exterior view in keeping with the modern character of the new building. Machinery to be installed will be similar to the high-speed automatic equipment especially designed and developed by RCA engineers and now turning out television picture tubes at the rate of more than one a minute at the Tube Department's Lancaster, Pa., plant. The Marion plant will utilize conveyor belts in moving tubes from one operation to the other.

Language Course Recorder

A recorded language course prepared by RCA for teaching English to Spanish-speaking people has been announced by Meade Burnet, Vice President of the Radio Corporation of America and Managing Director of the RCA International Division.

Entitled "English in the United States," the two album course is designed to introduce students to American speech, customs of American life and the essentials of English grammar.

Suppresses TV Interference

Electronic Device Developed by Capt. Reinartz Traps Signals Which Sometimes Affect Quality of Television Pictures

RADIO amateurs who have been forced to restrict their dot-dash or vocal conversations with other hams because their signals interfered with the operation of nearby television receivers are likely to find relief through the development of an effective "harmonic suppressor" by Capt. John L. Reinartz of RCA's tube department, Harrison, N. J.

Essentially, the Reinartz device consists of a system of electrical circuits, connected into the transmitter, which "trap" certain trouble-causing frequencies called harmonics, and dissipate them before they can reach the antenna and spread through the "ether".

In describing the procedure that amateurs should follow in making their transmitters harmonic-proof, Reinartz pointed out that an amateur station may be operated in full conformance with FCC regulations on harmonic radiation and still interfere with nearby video receivers. With the Reinartz suppression circuits in effect, the "ham" is able to police his own transmitter with benefit to all concerned.

To demonstrate the effectiveness of his system, Capt. Reinartz assembled a typical amateur transmitter and operated it only ten feet from a television antenna and receiver. Even under such rigorous conditions, all six television channels in the local area were sampled and found to be clear of transmitter interference to a degree previously considered unattainable.

Harmonics are not peculiar to radio. They are present in many media where vibrations or oscillations are present. In music, for instance, harmonics are the supplementary tones or frequencies that give distinctive timbre to different musical instruments. Without them much of the delicate shadings of musical tones would be lost.

But the presence of harmonics in radio is not always such a fortunate circumstance. If they are permitted to go out on the air from radio transmitters, they are more than



CAPT. JOHN L. REINARTZ HOLDS ONE OF THE HARMONIC SUPPRESSORS WHICH HE DEVELOPED TO ELIMINATE INTERFERENCE BETWEEN AMATEUR STATIONS AND TELEVISION RECEIVERS.

likely to interfere with some of the other radio services. Television is particularly sensitive to their presence.

Although the desirability of suppressing harmonics in amateur transmitters has been recognized for many years, it was the upward public surge of television in 1946-47 that focused attention on these spurious radiations because of their

serious, sometimes disastrous, effect on television pictures. When harmonics were found to be present in excessive strength in the amateur's signal, he was required to reduce the interfering waves below a figure established by FCC as a safe level. Until Reinartz introduced his simple method of suppression, amateurs often had difficulty in reaching this objective.

NBC and Northwestern Join in Summer Radio Courses

In collaboration with the National Broadcasting Company, Northwestern University will offer twelve courses in professional radio training during sessions of the Summer Radio Institute from June 27 to August 6. In making the announcement in the University Bulletin, it was stated that the subjects covered will include station management, publicity and promotion, sales, dramatic writing and announcing. The faculty will be comprised largely of NBC personnel.

Admission to the Institute is limited and members are selected on a competitive basis. Anyone whose educational background meets the regular admission re-

quirements of Northwestern is eligible to apply for membership.

Institute members normally will be enrolled for a maximum of nine quarter-hours in the six-weeks session. All courses carry three quarter-hours of credit, with the exception of radio production procedures which represents six quarter-hours. The normal program will consist of three courses in addition to twelve lecture-discussion sessions featuring prominent guest speakers.

The tuition fee for nine quarter-hours will be \$115. However, students registering for fewer than nine-quarter hours will be charged \$12.50 a quarter-hour with a minimum tuition of \$45.

Television Projector Suspended from Ceiling

Provides 6- by 8-Foot Picture Suitable for Auditoriums

A NEW life-size television projection system, featuring an optical barrel which can be suspended from a convenient ceiling mounting, has been announced by RCA.

The system is especially adaptable for use in night clubs, hospitals, taverns, clubs, hotels, industrial plant recreation and lunch rooms, custom-built home installations, churches, schools, and in television broadcast studios for monitoring, sponsors' viewing rooms, and overflow audiences. The optical barrel which is focused on a screen up to 6 by 8 feet in size, of either front

or rear-projection type, is connected to the control console by a 40-foot cable. The console, containing television and audio components, as well as controls, can be built-in if desired, or placed in an out-of-the-way location.

The unit has a 30-watt amplifier, with facilities for microphone and phonograph inputs so that the installation may be used as a public address system when television programs are not on the air.

ADJUSTMENT OF TELEVISION PICTURES FROM CEILING-MOUNTED PROJECTOR IS CARRIED OUT BY A CONTROL CONSOLE LOCATED AT ANY CONVENIENT PLACE IN ROOM OR AUDITORIUM.



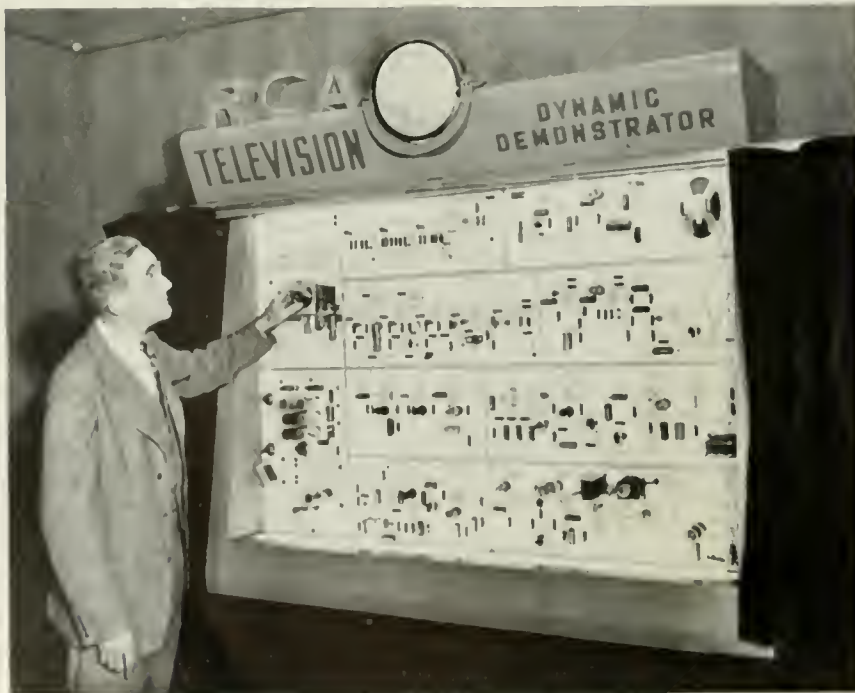
Tubes in "Clusters" Increase Power for Television

A NEW method of combining transmitting tubes in groups or "clusters", which materially increases the power of television stations operating on ultra-high frequencies (300 to 3000 megacycles),

has been developed at RCA Laboratories. The new method makes it possible to handle the normal band of frequencies involved in television transmission with greater signal strength than has heretofore been

attained. G. H. Brown, W. C. Morrison, W. L. Behrend, and J. G. Reddick of the Laboratories staff collaborated in the preparation of a paper describing the system which Mr. Brown read before the Institute of Radio Engineers.

In the RCA method, two transmitter tubes—or two complete transmitters—are teamed through a special network called a duplexer, which permits the combined outputs of the tubes to be fed into the same antenna, thereby doubling the effective power output without narrowing the width of the frequency band transmitted. Since the output of the duplexer with the combined power of two tubes acts as a single unit, it is possible to combine two or more duplexers to multiply the output proportionately. This process can be continued to any extent desired.



OPERATION OF A TELEVISION SET CAN BE CLEARLY EXPLAINED TO SERVICEMEN THROUGH THE USE OF THIS DYNAMIC DEMONSTRATOR, A COMPLETE 30-TUBE RECEIVER COMPRISING STANDARD PARTS ARRANGED FOR QUICK INTERCHANGE AND ADJUSTMENT. JOHN R. MEAGHER, RCA TELEVISION SPECIALIST WHO DEVELOPED THE DEVICE, IS AT THE TUNING CONTROL.



"Madame X" was the code name, during research and development, for an entirely new system of recorded music . . . perfected by RCA.

The remarkable background of "**Madame X**"

Now the identity of "Madame X," the *unknown* in a long search for tone perfection, has been revealed. From this quest emerges a completely integrated record-playing system—records and automatic player—the first to be entirely free of distortion to the trained musical ear . . .

The research began 11 years ago at RCA Laboratories. First, basic factors were determined—minimum diameters, at different speeds, of the groove spiral in the record—beyond which distortion would occur; size of stylus to be used;

desired length of playing time. From these came the mathematical answer to the record's *speed*—45 turns a minute—and to the record's size, only 6⁷/₈ inches in diameter.

With this speed and size, engineers could guarantee 5¹/₂ minutes of distortion-free performance, and the finest quality record in RCA Victor history!

The record itself is non-breakable vinyl plastic, wafer-thin. *Yet it plays as long as a conventional 12-inch record.* The new RCA Victor automatic record changer accommodates up to 10 of the new records—1 hour and 40 minutes of

playing time—and can be attached to almost any radio, phonograph, or television combination.

Not only records are free of surface noise and distortion—the record player eliminates faulty operation, noise, and cumbersome size. Records are changed quickly, quietly . . . RCA Victor will continue to supply 78 rpm instruments and records.

This far-reaching advance is one of hundreds which have grown from RCA research. Such leadership adds *value beyond price* to any product or service of RCA and RCA Victor.



RADIO CORPORATION of AMERICA

World Leader in Radio — First in Television

It's easy to navigate in Storm, Fog or Starless Night...

with **RADIOMARINE'S** new **Radio Direction Finder** (Model AR-8711)

Enables you to determine your exact position in relation to:

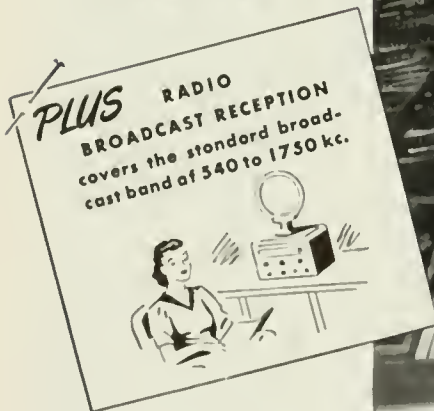
RADIO BEACONS



RADIO BROADCASTING STATIONS



VESSELS EQUIPPED WITH RADIOTELEPHONES



Dependable For Navigation In Any Weather. This Radiomarine Model AR-8711 combination high-grade Radio Direction Finder and Radio Receiver is both useful and entertaining aboard your boat.

It makes navigation easier and safer, regardless of visibility or weather. Enables you to fix accurately your boat's true position. You also can use it as a homing device, steering a true course by radio alone. A movable compass rose and azimuth scale mounted on top of the cabinet give you the direction of the radio beacon signal. Easy to operate.

In addition, you and your guests can listen to radio programs, latest news, weather reports.

Model AR-8711 is designed for mounting on a shelf or table, using either an inside or outside loop. It is sturdy and compact. 28" high, 12" wide, 12" deep. Weight 14 lbs. Operates from 6, 12, 32 or 115 volts power supply.



RADIOMARINE CORPORATION of AMERICA

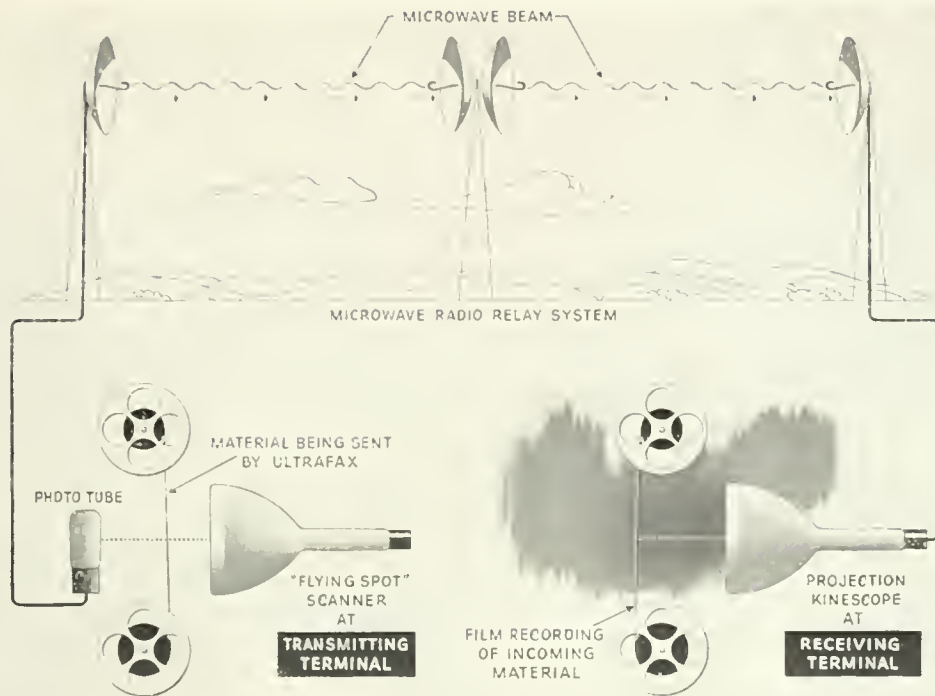
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PERIODICAL DEPT.

SIMPLIFIED DIAGRAM OF A COMPLETE ULTRAFAX SYSTEM SHOWING THE PRINCIPAL ELEMENTS WHICH MAKE POSSIBLE THE MILLION-WORDS-A-MINUTE TRANSMISSION SPEED OF THE NEWLY DEVELOPED MEDIUM OF COMMUNICATION.

Ultrafax: Million Words a Minute

Sarnoff Foresees Ultrafax Opening New Era in National and International Communications—He Urges Study Looking Toward the Establishment of a New National Communications Policy

ULTRAFAX, a newly developed system of television communications capable of transmitting and receiving written or printed messages and documents at the rate of a million words a minute, was demonstrated publicly for the first time by the Radio Corporation of America at the Library of Congress, Washington, D.C., on October 21.

Brigadier General David Sarnoff, President and Chairman of the Board of RCA, declared that Ultrafax, which splits the seconds and utilizes each fraction for high-speed transmission of intelligence, is as significant a milestone in communications as was the splitting of the atom in the world of energy.

Among the possible developments which General Sarnoff foresaw were:

1. The exchange of international television programs achieved on a transoceanic basis.

2. A service of television and Ultrafax by which the same receiving set would bring various types of publications into the home, or a newspaper for that matter, without interrupting the program being viewed.

3. A system of world-wide military communications for this country, scrambled to the needs of secrecy, which with ten transmitters could carry in sixty seconds the peak load of message traffic cleared from the Pentagon Building in twenty-four hours during the height of World War II.

4. The establishment of great newspapers as national institutions, by instantaneous transmission and

reception of complete editions into every home equipped with a television set.

5. The transmission of a full-length motion picture from a single negative in the production studio simultaneously to the screens of thousands of motion picture theatres throughout the country.

6. The possibility of a new radio-mail system with the vast pickup and delivery services of the Post Office Department.

Representatives of the United States Armed Forces, Government agencies, industry and the press witnessed the introduction of this advanced communications system. RCA presented the demonstration as a "progress report" to show that the system has reached a stage of development where plans can be