

RADIO AGE

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING



JANUARY

1943

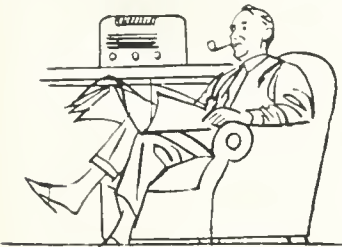
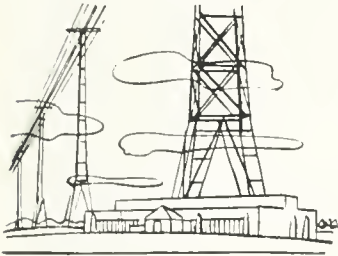
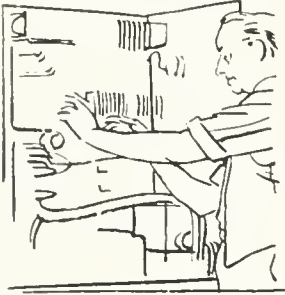


...IN THE CAUSE OF VICTORY

This is a war in which every minute counts. That's why NBC, in a recent typical month, devoted some 150 hours, an average of more than five hours a day, of its own time to realistic public service—keeping the nation informed of the progress of the war, mobilizing the nation's manpower, gearing civilian life to a war economy, aiding the sale of War Bonds, keeping the world informed of our war aims and effort, improving our international relations, furthering the cause of nutrition and health, etc., etc.

Every minute of this time has been devoted, directly or indirectly, to the cause of victory.

This is the NATIONAL BROADCASTING COMPANY



COVER — President Roosevelt hands Edwin C. Tracy the WPB's highest award, a Citation for Individual Production Merit, at the White House. Another RCA man, Stanley Crawford (left background) received a Certificate of Individual Production Merit.



RADIO AGE

RESEARCH · MANUFACTURING · COMMUNICATIONS · BROADCASTING

VOLUME 2 NUMBER 2

JANUARY 1943

CONTENTS

	PAGE
SARNOFF LAUDS RADIO'S WAR ROLE <i>by Col. David Sarnoff</i>	3
RCA VICTOR DIVISION <i>Unification of RCA, Manufacturing Subsidiary</i>	4
'43 TO SEE INDUSTRIAL POWER IN FULL FORCE <i>by Lieut. Gen. James G. Harbord</i>	5
RADIOTHERMICS SPEEDS INDUSTRY <i>by I. R. Baker</i>	6
RADIOMARINE WINS ARMY-NAVY "E" <i>Achievement in Manufacturing Radio Equipment</i>	9
ARMY TAKES THE AIR <i>by William Burke Miller</i>	11
ELECTRON MICROSCOPE ADVANCES <i>New Desk-size Model Is Announced by RCA</i>	15
BLUE TRY'S NEW PROGRAM IDEAS <i>by Philips Carlin</i>	18
IDEAS SPUR WAR WORK <i>by Elmer C. Morse</i>	20
2 HONORED BY PRESIDENT <i>RCA Men Receive WPB Awards at White House</i>	21
U. S. LEASES SHORT WAVES <i>Facilities Used to Off-set Axis Propaganda</i>	22
BOSTON SYMPHONY ON BLUE <i>Famed Orchestra Starts Series on Network</i>	24
PLANT WINS "E" WITH STAR <i>RCA Victor Division, Camden, Gets Third Award</i>	26
BROADWAY PLAY GIVEN TRY-OUT <i>Dramatic Experiment on Network</i>	27
SINGS AT 300 RALLIES <i>Lucy Monroe in Patriotic Work</i>	27
BUILDS NEW TIME CONTROL <i>Deviations Eliminated by NBC System</i>	28
REPORTING BY RADIO <i>by George Clark</i>	31

Radio Age, published quarterly by the Department of Information of the Radio Corporation of America, RCA Building, New York, N. Y., for the RCA services: RCA Laboratories, RCA Victor Division, R.C.A. Communications, Inc., Radiomarine Corporation of America, National Broadcasting Company, Inc., Blue Network Company, Inc., R.C.A. Institutes, Inc.





THE SPIRIT OF WAR PRODUCTION IS SHOWN IN THIS PICTURE OF (LEFT TO RIGHT) E. H. PANZNER, FACTORY SUPERINTENDENT; BRIG. GEN. C. R. HUEBNER, G. S. C., DIRECTOR OF TRAINING, S. O. S., AND NOWLAN TIMMON, WORKER, DURING A RECENT VISIT BRIG. GEN. HUEBNER MADE TO RCA VICTOR, INDIANAPOLIS.

Sarnoff Lauds Radio's War Role

RADIO PLAYED IMPORTANT PART IN TURNING TIDE OF VICTORY TO UNITED NATIONS; RCA PRESIDENT VIEWS SITUATION AS BRIGHTER, BUT WARNS AGAINST SLACKENING EFFORT.



By Col. David Sarnoff

President,
Radio Corporation of America

NO YEAR in radio history has been so packed with activity in communication and scientific research as 1942. From research to manufacturing, from domestic broadcasting to world-wide communication, all radio has literally operated under one three-letter call W-A-R.

All the wonders and skills of yesterday and today in radio, are consolidated in the war effort for Victory tomorrow. The war situation is far brighter than a year ago, but we have a hard road ahead. In 1943, there must be no slackening in the all-out effort. We must guard against over-confidence until the war is won and peace is made secure.

New inventions and important developments which in normal times

might require years to reach practical service, have been rushed to completion in months to meet the demands of war. The scientific achievements of radio in 1942 remain military secrets. When the service that radio has performed for the fighting arms of this country is made known after the war, Americans will be proud of the radio research workers and engineers, and of the production men and women, who have equipped the Army, Navy and Air Corps with apparatus unsurpassed in efficiency. Radio communication men will have dramatic and historic reports to make on their part in the war. Radio broadcasting, too, will have interesting facts to tell when Peace opens the microphone for wartime revelations.

In every branch of its activity, the art is far surpassing its historic achievements in World War I. In modern warfare the tide of battle flows to the side on which science, engineering and production are most strongly allied. Radio in 1942 played an important part in turning the tide of victory to the United Nations.

The press has published photographs of great ships being launched, massive tanks rolling down the production lines, fighter and bomber planes roaring aloft to combat, destroyers and submarines protecting great convoys and Commandos attacking an enemy-trenched beach. These pictures reveal that the warring monsters maneuver with remarkable precision. But the pictures give little or no clue that radio is an important segment in the brain of these engines of war. An antenna is usually the only evidence that radio is aboard. Yet, it is radio which gives these armored monsters their ears and eyes, and even their sense of direction. The equipment they contain, and how it is used, remains a

war secret within their iron hulks and hulls.

Radio gives eyes and ears to the Flying Fortress, to the under-sea craft, to the warship and to the mechanized infantry. The bomber can fly blind by radio, it can hear afar. In recognition of the plane's radio directional "instincts," broadcasting stations in enemy territory go off the air, falling like nine pins as it approaches, lest they serve as guides. The submarine has radio ears just as a fish has gills. To the warship, radio is indispensable in battle, in manoeuvring, and in tracking down the enemy.

Speeds Military Action

Ashore, the infantry operates radio as a lifeline of communication. Even the advance units supplement their portable radio stations with self-contained pack stations popularly called "walkie-talkies." The achievements of the AEF North African invasion demonstrated the efficiency of the U. S. Signal Corps and Navy Communications—both operating in perfect harmony were described as "immensely vital to such fast moving and spectacular offensive." Naval communications won high commendation for the efficiency and dispatch with which it handled American vessels in the armada of 850 warships and transports that reached the African shores.

Radio coordinates and speeds modern military action; it is the one factor which has made blitz possible in warfare, and then made possible an effective defense against that blitz. Radio in itself is speed. It travels at the speed of light. Its wavelengths cannot be cut, bombed or blasted. A "walkie-talkie" can project a message into the air from underbrush, from a forest, or a hill

top. No power on earth can stop its winged flight.

These are only a few of the parts played by radio in this war, but they indicate the vital role of this great new art. Without it global warfare would have many a "lost battalion," "lost fleet," and "lost battlefield." Radio coordinates the combined effort and brings the long and scattered battlefronts into focus. Admiral Halsey, in the southwest Pacific, is no further away in communication, from headquarters in Washington, than General Eisenhower, in Africa. Admiral Nimitz and General Emmons, at Hawaii are in the same quick contact with Washington as the Army men in the Aleutians, Iceland or Panama. Radio puts them all on a direct and practically instantaneous line. War correspondents have reported how the American army erected a powerful radio transmitter during the landing operations in Africa, first to calm the local population and enlist aid of the natives.

These illustrations of radio activity in the war may convey some idea of the scope of the work that has been in progress in the manufacturing plants and on the wavelengths during the past year. To equip every bomber, ship, motorized unit and field base with radio has been a herculean task. The American radio industry, which in peacetime produced millions of radio sets and hundreds of millions of radio tubes, has met the challenge superbly, as evidenced by the Army-Navy "E" flags flying over many radio factories.

Radio has been put on the many fighting fronts by the production workers. Throughout the year they have toiled day and night to equip the United Nations with the finest radio apparatus in the world. Radio manpower, working hours, production methods and communication were geared every day of 1942 to the winning of the war. Production of civilian radios ended in the Spring of '42. As early as 1939, following outbreak of the war in Europe, the RCA Victor Division had begun conversion from a commercial basis to war production.

The use of radio in the war and

RCA VICTOR DIVISION

Unification of RCA With Its Manufacturing Subsidiary

Coordinates Operations and Aids War Effort.

THE RCA Manufacturing Company, wholly-owned subsidiary of Radio Corporation of America, was consolidated with the parent company, effective December 31, 1942, David Sarnoff, RCA President, announced December 29 following a special meeting of the RCA Board of Directors.

The manufacturing organization, with its more than 30,000 employees, will be known as the RCA Victor Division of Radio Corporation of America. The management, personnel, operations and sales policies will continue as heretofore.

"The unification of the administrative, research and manufacturing activities of RCA will result in closer coordination and increased flexibility of operation," Mr. Sarnoff stated. "It is expected that this unity and coordination of services will facilitate the company's war effort."

Mr. Sarnoff also announced that at the meeting of the Board, George K. Throckmorton, former Chairman of the Executive Committee of the RCA Manufacturing Company, was elected a Vice President of the Radio Corporation of America, of which Mr. Throckmorton is a Director.

The principal plants of the RCA Victor Division are located in Camden and Harrison, N. J., Indianapolis, and Bloomington, Indiana, Lancaster, Pa., and Hollywood, Cal. The RCA Laboratories are located at Princeton, N. J.

of radio-electronic devices in the war-effort of industry, to speed production and increase efficiency, has brought new recognition to the word electronics, which was born of radio.

For years, the radio industry has manufactured more than 100,000,000 electronic tubes annually. Radio tubes which produce electrons, control them and harness them to service in communication and industry, have become the heart of electronics. These tubes have paved the way for major advance in the radio art for the past two decades, including broadcasting, short-waves and television. Tubes opened the micro-wave spectrum which borders on the frontier of light. In the electron microscope, they have even passed beyond this frontier, to utilize the electrons as "light beams" infinitely smaller than the rays of light themselves.

Television, operated by NBC in New York, has played an important role in air raid instructions and civilian defense. Its laboratory

status is a war secret, but those confident of the success that marks wartime developments, expect television to emerge from this war in such form as to make possible a great post-war industry.

Television, however, is not radio's only post-war promise. The useful services of radio will be broadened far beyond the communication field, into such realms as the RCA Electron Microscope, radio frequency heating, supersonics and no end of applications made possible by the development of new radio tubes, especially those designed to send and receive micro-waves—tiny waves measured in centimeters.

The application of radio frequency heating to speed industrial processes and at the same time increase their efficiency, is rapidly coming to the fore. Radio waves may now be used to heat, dry, glue, stitch, anneal, weld, rivet and even to deactivate enzymes. This new field is known as radiothermics. It can laminate an airplane propeller in minutes compared to hours re-

quired by ordinary heat and pressure methods. Radio high frequency "furnaces" are a post-war prospect. In them railroad ties will be seasoned quickly and "cakes" of textiles dried uniformly. Even rubber may be "radio-cemented" to wood or plastic; cloth stitched and seamed by radio heat; metals hardened; plywood glued and fresh vegetables deactivated without loss of flavor or color. The possibilities in this new thermic realm of radio are unlimited as indicated by remarkable advances in RCA Laboratories during the year.

Radio broadcasting in 1942 distinguished itself in many fields of useful service. From hour to hour it carried to every listener, the running story of the war. It has kept America informed.

The long distance voices in London or Cairo, Moscow or Melbourne, Algiers or Calcutta, have been as clear as if uttered in Radio City, New York. Radio reporting is one of the outstanding contributions of science in keeping the American people in contact with their allies overseas.

At home, broadcasting in 1942 vastly increased its program services. Thousands of announcements were broadcast urging war bond purchases or telling the public about the special needs of the Army, Navy, Marines, Air Corps, Red Cross, USO, the WPB, OPA and similar agencies. In addition, hundreds of entertainment and news

(continued on page 29)

(Official U. S. Navy Photo.)



'43 TO SEE INDUSTRIAL POWER IN FULL FORCE

Harbord Says Nation's Production Will Eventually Overwhelm the Enemy.

By Lieut. Gen. James G. Harbord

*Chairman of the Board,
Radio Corporation of America*

THE United Nations should look forward to 1943 as a year bright with promise in the war against the Axis. Here in the United States, after long, hard months of preparation, we are getting results scarcely believed possible a year ago. Millions of men are being equipped and trained in modern warfare. Our industrial capacity has been geared to a speed that will eventually overwhelm the enemy with its weight and power. With all its implications for final victory, this power should come into full force during 1943.

Real fighting is ahead. Wherever

RADIO OPERATOR IN NAVY PATROL BLIMP ON ANTI-SUBMARINE SCOUTING DUTY.

the battle lines are drawn, radio will be in the thick of the fight, for it is the lifeline of wartime communications on land, sea and in the air.

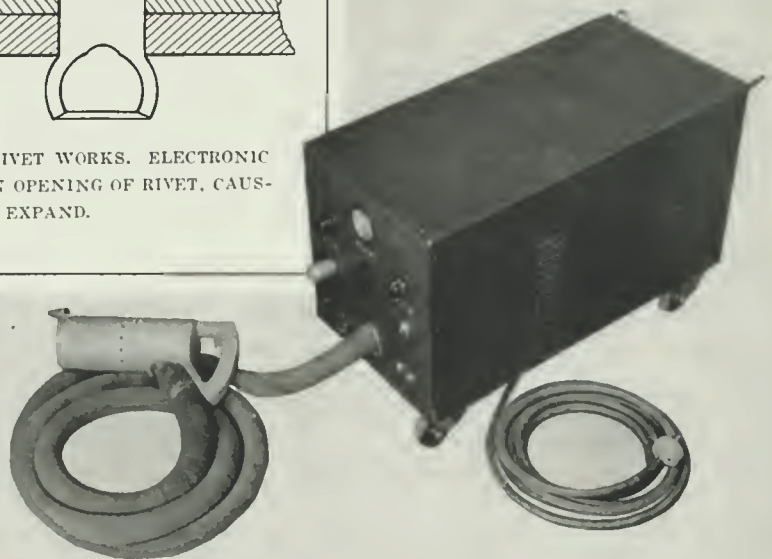
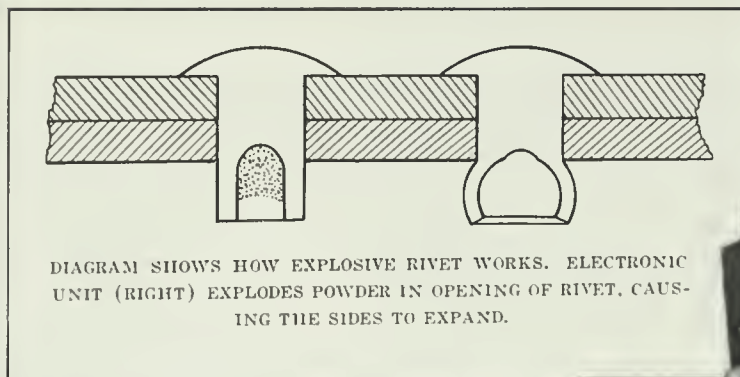
The war map today reveals that American soldiers, sailors and marines are lined up at more than sixty places on the world-wide fighting front. To unify them in communications is a mighty task. Without radio it would be a slow, almost impossible task. Every outpost, whether in jungles or on glaciers, no matter how remote, is linked to headquarters. American fighting men, almost a million of them, are focused in action by radio—the global lifeline of communications.

In World War I, the center of action lay in France. From that battlefield radiated the communication lines. Wireless was being given its first wartime test, but at no time did the demands upon it remotely approach those of World War II. In the intervening years, the development of the electron tube, of short waves, and of many other devices and services of radio have tremendously increased the efficiency of communications. The result has been that in 1942, radio was ready to play the vital role assigned to it on the many far-flung fronts.

These long-distance fighting fronts are bulwarked by the home front. In this war the military front and the home front are parallel. The home front is the production front and it runs through every street in the nation. Munitions and food, airplanes and tanks, rifles and radio, all move up to the front lines from the home front. Today, eighteen Americans stand behind every American fighting man. His success and the winning of this war depend upon the workers at home, for only one American in every nineteen will have a job directly in the combat forces in this war.

The road ahead to winning this war is rough. Every mile toward victory must be fought for with an all-out effort. The rapidity of the march, the turn in the tide of battle, hinge upon science and production, as well as upon direct combat with the enemy.

(continued on page 25)



Radiothermics Speeds Industry

NEW FIELD OF INDUSTRIAL SCIENCE APPLIES RADIO FREQUENCIES TO SHORTEN PRODUCTION CYCLES; APPLICATION OF RADIO HEATING IMPROVES PRODUCTS AND SPEEDS PROCESSES.

By I. R. Baker
*RCA Victor Division,
 Radio Corporation of America*

SINCE radio first attracted the attention of the world as a radically new system of signaling, its services have been broadening. From the dots and dashes of wireless evolved the radiophone and worldwide broadcasting. Research which developed such magic keys to progress as the radio tube, continues to open new horizons, some of them far afield of communications.

The first transatlantic signal in 1901 inspired many bold predic-

tions among scientists — perhaps some day wireless would transmit the human voice, maybe it would carry pictures. To the average person those were fantastic dreams. It was difficult enough to believe that messages could flash through space at the speed of sunlight. Certainly no Jules Verne appeared in the halcyon days of Marconi to predict that radio waves might be used to heat, glue, dry, case harden, anneal, rivet, weld and even deactivate enzymes!

All this and more too has come to pass through the development of man's mastery over tiny radio waves — high frequency currents, which open a wide new field of usefulness—radiothermics.

We normally think of radio frequency transmitters as a means of

making possible communication and entertainment. Today, high radio frequencies are being used to shorten production cycles, improve products and accomplish manufacturing processes which were previously impractical. Tomorrow, with additional development and higher frequencies, will come numerous new applications.

This new industry has grown rapidly since the start of the war and radiothermic equipment will be used extensively by the end of 1943. As a matter of fact, it is estimated that by that time more radio frequency power will find use in industry than the total installed power of all the broadcasting stations (approximately 3,712,000 watts) in this country.

When the first tubes and circuits

were developed, little did the experimenters realize the full significance of their findings and the possibilities of the radio industry. Likewise, we cannot predict today the future radio frequency applications in industry.

The research and development engineers of RCA have been working on applications of radiothermic principles for use in defense projects.

The principle of generating heat by radiothermic means is not new. The two fundamental ways in which this can be accomplished are dielectric heating and induction heating.

Non-conducting materials are best heated dielectrically. In this case the heat is generated from dielectric losses in an electrostatic field. Most people are familiar with the diathermy machines which are widely used in hospitals, clinics and by physicians. These radio-frequency machines generate heat deep within the body tissues because of dielectric losses. The same principle is now being used in industry in various manufacturing processes. Wood, paper, cloth, and various compositions are examples of material that can be heated in this manner.

One of the most important applications of this method is the manufacture of wooden aircraft parts such as propellers, spars, ribs, wing structures, etc., of laminated plywood. Laminated wooden propellers and parts are being widely used as a substitute for metal. Since radio frequency generates the heat uniformly within the part, the time required to bring the wood up to temperature is dependent only on the power used and not on the flow of heat from an external source.

The use of plywood for airplanes is, of course, not new. Plywood airplanes were used in 1925. All plywood had at that time limitations imposed upon it by the animal and vegetable glues then available. Moisture, age, temperature, and fungi growths weakened the glues and, in addition, plywood was a considerable fire hazard. Because of these difficulties, aluminum replaced plywood. It was not until the development of synthetic resin glues in 1935 that plywood became a practical material. Almost all of the objections were removed by the new synthetic resin glues. These

glues are fire-resistant, fungi-proof and practically water-proof. The bond is stronger than that of the wood itself.

Two different types of synthetic glues are available at present—the cold-setting urea formaldehyde type and the thermo-setting phenol formaldehyde type. Since rather high setting temperatures are required to properly process most phenol types (250° to 300° F) and from four to six hours in time is required for setting the urea type without heat, the advantage of radio frequency as a source of generating heat for bringing these glues up to temperature is obvious.

Use Saves Time, Labor

A lengthy period is required in the manufacture of laminated airplane propellers for the heat to penetrate when applied with the conventional steam-plate type press. Also, the outer surface heats faster than the center portions, which may set up residual stresses that affect the strength of the finished piece. Radio frequency provides a means of uniformly applying heat throughout and at a much more rapid rate than can be obtained with hot plates. The processing time, when radio frequency is used, becomes minutes instead of hours.

In producing other thick laminated "compreg" (impregnated and compressed) structures of wood, canvas, paper, etc., by ordinary processes, the time is exceptionally long, sometimes as long as twenty-four hours. With radio frequency

the time for heating can be reduced to approximately 30 to 60 minutes. This means not only a material saving in labor but also in press facilities. Where molding processes of the same materials are involved, this also saves duplicating expensive presses and dies to secure additional production.

In addition to the application of radio frequency power to the wood industry and other laminated materials, it is equally applicable to the plastic industry. Savings of from 15 to 1 in time and even more can be obtained by use of radio frequency. The ratio of time saving depends upon the thickness of the part.

In the fabrication of molded aircraft parts which are built up of thick wooden laminations, each layer of these laminations is tacked on the mold by small staples. As the successive layers are put in place, it is necessary that the staples be removed from the preceding layer. This is a tedious and lengthy process. A simpler and quicker method was devised by our engineers which eliminates the use of staples entirely. This method makes use of an oscillator, together with an applicator called the "gun." The glue that is used in these operations is generally a thermo-setting resin which requires heat to set. As this glue heats and before final polymerization takes place, the glue becomes "tacky." Therefore, if heat is applied locally to a small spot, a bond is formed sufficient to hold the laminations temporarily until the whole

METHOD OF GLUING AIRPLANE SPARS WITH RADIO FREQUENCY SHOWN IN THIS SCENE FROM THE TOLERTON LUMBER COMPANY, ALLIANCE, OHIO.



structure can be heated and the glue set.

Materials that are good conductors, such as metals, can be heated readily by radio frequency. When current flows in these materials, heat is generated by eddy currents and hysteresis loss. Thus by holding a piece of metal in the field of the coil, power is absorbed and the material heats rapidly. This type of heating is generally referred to as the inductive method. Case hardening, soldering, brazing, melting and other operations are accomplished readily by this method. The time required for a given soldering operation is greatly reduced since heat is actually induced in the part instead of being transferred from a hot iron or a gas flame. Individual soldering operations on terminals in transformer cans need not be done. By placing rings of solder under the terminals and placing the coil properly, soldering of all the terminals becomes a matter of seconds. Brazing operations can also be accomplished by inductive heating. The coil is shaped to the area to be treated and the power is applied. The rate of temperature rise can be controlled quite accurately by the power used. The temperature can be brought up instantaneously or slowly, as desired.

Most of us are familiar with the usual method of riveting, where one man drives the rivet while another man holds a tool against the end to flare it. This method has been used since the riveting process was developed. It is satisfactory except in confined spaces where it is difficult to reach the other end of the rivet. One aircraft company even resorted to employment of midgets to work in confined spaces. Even so, wing tips and other places present difficult problems. A skilled workman could rivet perhaps only one or two of the old-fashioned rivets in a minute simply because his helper could not manipulate the tools fast enough.

The du Pont Company developed an ingenious explosive rivet which did not require a helper to get at the other end. This rivet has a heat-sensitive explosive charge in one end. When the charge is fired, it expands the end of the rivet, forming a perfect, barrel-shaped



ELECTRONIC UNIT FOR SPOT GLUING,
USING RADIO FREQUENCY.

head that holds the two pieces of material firmly together. The advantage of using this rivet in inaccessible places is obvious. Almost anyone today can set 15 to 20 explosive rivets in a minute as compared to the one or two by the old method.



ELECTRONIC METHOD OF SOLDERING
TERMINALS ON TRANSFORMER CANS.

One method of firing explosive rivets is by means of a riveting iron which was developed specifically for this purpose. It is similar in construction to a soldering iron and has a silver alloy tip which conducts the heat to the rivet head. This rivet firing tool has the disadvantage that considerable time is required either to attain operating temperature or in changing from one tip temperature to another.

In order to find a more satisfactory solution for firing the rivets, particularly in large scale produc-

tion, RCA engineers, in cooperation with du Pont engineers, developed a radio-frequency rivet detonator. This unit consists of an oscillator together with a specially developed applicator to concentrate the current directly into the rivet head. As the current is induced into the rivet head, the rivet heats very rapidly and this heat fires the charge. This method has a number of advantages. Most important of all, better temperature control is obtained, since the power output control of the oscillator can be quickly changed to suit the requirements of the various sizes of rivets. A number of rivets can be put in place ahead of the riveter and held in place by scotch tape, since this tape does not interfere with the action of the radio frequency device.

The above are only a few of the possible applications. The solution of one problem always suggests the solution to another. Radiothermics is truly a time saver for industry. Short production cycles are always important, but never so important as today when material is so badly needed by the United Nations. RCA is also serving by helping others save precious hours.

"News for Mexico," a daily series of ten-minute Spanish newscasts provided for the exclusive use of station XEW and its 41 affiliated stations in Mexico, is being transmitted daily over RCA Communications, Inc., facilities. The Mexican outlets are affiliated with NBC's Pan American network.

PLYWOOD CLUB USED FOR TESTING AIR-
PLANE MOTORS IS SHOWN UNDER RADIO
FREQUENCY HEAT TREATMENT.





THE ARMY-NAVY "E" FLAG IS PRESENTED TO RADIOMARINE CORPORATION OF AMERICA. LEFT TO RIGHT—I. F. BYRNES, CHIEF ENGINEER, AND H. A. SAUL, PRODUCTION SUPERINTENDENT, RECEIVE PENNANT FROM BRIG. GEN. RALPH K. ROBERTSON AND REAR ADMIRAL WILLIAM C. WATTS (RET.).

Radiomarine Wins Army-Navy "E"

PRODUCTION AWARD FOR ACHIEVEMENT IN MANUFACTURING RADIO EQUIPMENT FOR WAR PRESENTED BY REAR ADMIRAL WATTS AND BRIGADIER GENERAL ROBERTSON; EMPLOYEES ARE GIVEN LAPEL PINS.

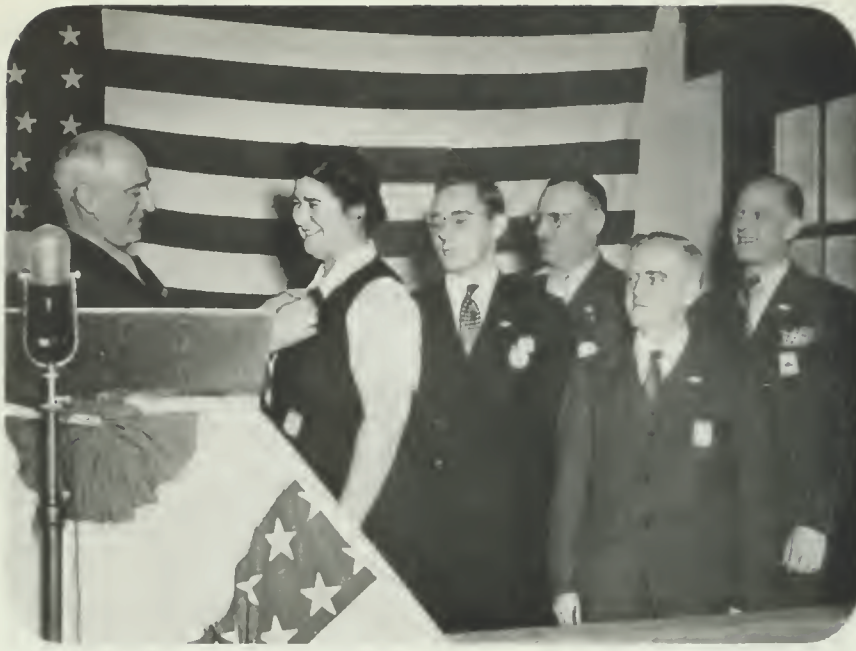
THE Army-Navy Production Award for achievement in manufacturing radio equipment for war was presented to Radiomarine Corporation of America by Rear Admiral William C. Watts, U. S. Navy (Ret.), and Brig. Gen. Ralph K. Robertson, Commanding General, Metropolitan Military District, in a ceremony December 19 at the company's New York general offices and plant. Lieut. John D. Lodge, U. S. Navy Reserve, acted as chairman of the program.

Several hundred employees of Radiomarine, whose work had been praised in a letter from Under Secretary of the Navy James Forrestal as a "remarkable production record" and as "helping our country along the road to victory," participated in the event. The Army-Navy "E" flag was raised, and each worker was presented with a lapel "E" pin "symbolic of leadership on the production front."

"When a company, in time of war," Rear Admiral Watts said, in

presenting the "E" pennant, "is engaged in the production and installation aboard ship of marine radio equipment of all kinds and various automatic alarms and safety devices, everyone knows, without a word of explanation, that that company is doing just about as vital war work as any industry in the country.

"When, furthermore, that company so performs its allotted tasks in the great, national war effort as to earn the government's highest



BRIG. GEN. ROBERTSON DECORATES MRS. E. P. SCHNABEL, GENERAL OFFICE, WITH "E" LAPEL PIN SYMBOLIC OF THE ARMY-NAVY AWARD. ALL EMPLOYEES OF RADIOMARINE RECEIVED THE PINS.

tribute to any industry, the Army-Navy Production Award, it is proof positive that it has been doing a thoroughly fine job. It goes without saying that it is *your* company which I have in mind, and as I am sure you realize all this, I will not take your valuable time to describe your many fine achievements or to emphasize the absolutely essential part that radio communications take in modern war."

Pointing out that the operations of Radiomarine are "widely scattered over all our country, in some sixteen centers of activity," Rear Admiral Watts said he was glad that all employees received the insignia of the award, the Army-Navy "E" pin, "for we want every member of the far-flung Radiomarine Corporation to realize our gratitude to him or to her."

Brigadier General Robertson made the presentation of the "E" insignia for individual employees.

"Today our nation faces grave peril," General Robertson said. "We are engaged in a life and death struggle to determine whether freedom or tyranny shall survive. For us there can be but one answer—WE SHALL WIN!

"Our men are fighting on many

fronts. Their skill and courage are unquestioned. But those attributes alone are not sufficient. With the grim determination to win, we must have armament and equipment for our forces.

"It is unnecessary to recite the kind of material you are producing requiring skill, accuracy and precision. But sometimes you may feel that your work is not important or that what you are doing is all mixed up with human selfishness and greed. You may feel that no one cares whether you produce or not. When you feel like that, take a look at this Army-Navy production pennant about to be hoisted over your plant, knowing full well for what it stands.

"When you wear the Army-Navy emblem, with its silver "E" for excellence, wear it with a feeling of pride. In a way, it is a military decoration, bestowed upon you for devotion to duty. It is an award for faithful service, as truly as if you were on the fighting line instead of the production line. Wear it with dignity. Remember that 'free labor' will win this war, and that you are fortunate to be free Americans."

Charles J. Pannill, president of Radiomarine, stated to the employees:

"The decision of the Army and Navy to reward our Corporation for excellent war production by presenting the 'E' pennant and suitable pins to our employees is an honor for which you should be justly proud. The continuance of your effort to help produce the communication requirements of the military forces is extremely important. Armies cannot move nor can ships sail without efficient communication apparatus. . . . I am counting on all of you, throughout our service, no matter where you are located. I am confident you will not fail."

I. F. Byrnes, chief engineer, and H. A. Saul, production superintendent, of Radiomarine, accepted the pennant on behalf of the company. In a brief acknowledgment, Mr. Saul said:

"It is indeed a high honor to receive such recognition from the military services as the award of the Army-Navy 'E' pennant. We are very glad to do our part in the production of necessary radio apparatus for your respective services, and we shall continue to bend all our efforts to do the job promptly and efficiently. We still have a long way to go to complete our commission, but you need not feel any anxiety about the employees of this very loyal and patriotic family falling down on the job.

(continued on page 31)

REAR ADMIRAL WATTS CONGRATULATES CHARLES J. PANNILL, PRESIDENT OF RADIOMARINE.





NBC MICROPHONES GO INTO THE FIELD ON A MILITARY PROBLEM WITH MEN FROM FORT BRAGG, N. C., TO PICK UP A BROADCAST FOR "THE ARMY HOUR."

Army Takes the Air

"THE ARMY HOUR" ON NBC. "NOT A RADIO PROGRAM, BUT A MILITARY OPERATION," SECRETARY STIMSON SAYS.



By William Burke Miller

*Manager, Public Service Department,
and War Program Manager,
National Broadcasting Co.*

When it needed an army it drafted the cream of its manpower. When it needed airplanes and jeeps, it put the nation's best designers and engineers to work. When it undertook a military operation, it called upon the best tacticians and strategists. It called upon the men with the best "know how."

And when, some months after Pearl Harbor, the United States decided to produce an official radio program, it came to the National Broadcasting Company.

The plans were ambitious. What was wanted was no mean program about camp life, no melodramatic fanfare, no gags about soldiers:— but instead, a well-done, well-built program; a program truly representative of Uncle Sam's vast army in all its various phases; a program with sufficient dignity to represent the U. S. Army; a program that would explain the Army; a program

that would demonstrate truthfully to the nation what its sons and brothers and fathers were doing, whether they were in a Texas training school or a desert outpost.

That was the job NBC had to do. It was not an easy one. Production directors, special events and program experts, musicians, and engineers conferred. The time, the length, the format, the content had to be worked out. The result was "The Army Hour."

The first program was aired on April 5, 1942—the twenty-fifth anniversary of the entrance of the United States into the first World War. The initial "Army Hour" speaker was Secretary of War Henry L. Stimson, who proclaimed it "not a radio program, but a military operation of the United States."

"It is a weapon of war, and it is being heard and felt all over the world," said Secretary Stimson, "by you at home, by you on our remotest battle lines; by you, our enemies, wherever you may be. This is the Army Hour; let it be a potent weapon."

With that auspicious inauguration "The Army Hour" was on its way. Today the record of the nine-month old program is no less noteworthy than its beginning.

Outstanding feature of the hour-long Sunday program is its elaborate use of remote broadcasts. Wherever the soldiers of the United States, or its allies are to be found, there go NBC microphones. Thousands of miles are spanned in a single program, bringing messages from high-ranking officers and Private John Doe in every corner of the world.

"The Army Hour" has gone overseas for more than sixty "pickups"; to Chungking, to Panama, to New Delhi, Honolulu, Curacao, Cairo, London, Leopoldville, Moscow, Melbourne, Puerto Rico, Montreal and Algiers, broadcasting messages from the boys, speeches by generals, and actual reports from battlefronts.

Despite that frequent globe-hopping, "The Army Hour" has an amazing record. Only three remote broadcasts have failed to come through, although NBC producers

WHEN the United States discovered its security was endangered, it set out to defend itself against its enemies with the best of its resources.



THE "CONTROL ROOM" OF A REMOTE BROADCAST ON "THE ARMY HOUR," DURING ONE OF THE MANY DOMESTIC PICKUPS OF THE PROGRAM. WYLLIS COOPER, AUTHOR OF THE PROGRAM, STANDS AT THE TABLE.

love to talk of what "might have been".

Broadcasts from New Delhi have been their biggest headache. One week they looked forward to carrying a talk by Gen. Archibald P. Wavell, which would have been his first broadcast to this country. But reception conditions went bad.

Another time, arrangements were made to interview a British flier who had crashed within ten minutes flying time of New Delhi and spent thirty days getting through the jungle. Another swell broadcast that didn't come through!

The third pick-up that didn't, was scheduled for a Russian airport, and would have been the first Russian outdoors broadcast. Reception was fine up until two minutes after the broadcast began. Then a foreign station accidentally put an unscheduled program on the NBC channel, marking the end of those fine plans.

NBC production directors still dream of those plans that went awry. They don't talk about the fifty that did come through like clockwork, because America has

heard them, and they're water under the bridge.

In the domestic scene, "The Army Hour" has maintained just as vigorous a program of remote broadcasts. It's an extremely obscure point that an NBC microphone hasn't visited on an Army Hour pickup. In its nine months of broadcasting, the hour-long program has aired more than 100 remote broadcasts in this country, visiting army camps, training schools, depots, air fields, war plants, and maneuver areas. From Camp Edwards, Mass., to Camp San Luis Obispo, Cal.; and from Aberdeen Proving Grounds to Lowry Field, Col., "The Army Hour" has brought listening America a vivid picture of the Army in action, whether it was introducing V-Mail, or taking NBC listeners to a West Coast plane factory.

Here again, operating under the most difficult broadcasting conditions, NBC has given "The Army Hour" an amazing record of few failures. There have been a handful of near-misses on domestic pickups, but only one actual failure.

For one broadcast an NBC announcer turned up at a New England war plant an hour before the broadcast, and, with sinking heart, found only a night watchman behind locked gates. He called the studio, and hasty plans were made to fill the time in the NBC studios. But the war workers arrived ten minutes before the broadcast and the program went on as scheduled.

The one failure that did occur was a heart-breaking affair. A broadcast from deep in the heart of Texas was scheduled to bring an eye-witness account of the Third Army blowing up a 240-foot steel bridge to demonstrate demolition tactics. Immediately after the demolition of the bridge WPB workers were going to move in and remove the steel for scrap. It was a swell idea. In the NBC control rooms, with other portions of the program on the air, tests from Texas came through well. The announcer took his cue: "Go ahead Third Army in Texas." Nothing happened. The phone lines had gone bad fifteen seconds before air time!

Less hectic, but equally dramatic, is "The Army Hour's" presentation of high-ranking army officers. More than 90 important officers have been heard, half of that number generals. The roster of the nation's military leaders who have appeared on the program includes Lieut. Gen. Lesley A. McNair, commanding general of the American Ground Forces; Brig. Gen. H. L. George, of the American Air Forces Ferrying Command; Maj. Gen. L. E. Brereton, American Air Forces in India; Brig. Gen. James Doolittle; Brig. Gen. William C. Lee, commanding general of the Air Borne Command; and countless others.

High-ranking officials of the United Nations have also voiced "Army Hour" messages. Among them are Field Marshal Sir Archibald Wavell of Britain, Maj. Gen. of Aviation N. Sokoloff-Sokolienks of Russia, and Generalissimo and Madame Chiang Kai-shek of China.

A dramatic incident was the recent broadcasting of a message from Yugoslav General Drago Mikhailovitch. The message was got out of Nazi-occupied Yugoslavia by secret methods and read by George Putnam, NBC announcer, in New York.

Other noted persons to appear on the program, in addition to Secretary Stimson, include Undersecretary of War Robert Patterson, Secretary of Agriculture Claude Wickard; Col. David Sarnoff; Mrs. E. V. "Eddie" Rickenbacker; and Sergeant Joe Louis, to name just a few.

As "The Army Hour" grew in importance to the American public, listeners began to turn to the program for official war news. NBC producers were quick to recognize this need, and recently asked the Army to include an official war report each week. Col. R. Ernest Dupuy, Chief of the News Division of the Bureau of Public Relations, War Department, now reports each week from Washington. It is the only official "communique" regularly announced by an officer of the General Staff Corps.

With the Army of 1942 so vastly different from the Army of 1917, "The Army Hour" found itself with a reporting job to do—a job of acquainting the nation with its new armed forces, and their new weapons.

The problem of demonstrating the new army and its new weapons was a difficult one. But the Army offered its fullest cooperation, with certain wartime restrictions, and NBC offered its corps of experts for the problem of broadcasting loud-voiced cannons, thunderous flying fortresses, and chattering machine guns.

The program has done a comprehensive job, demonstrating more than fifty different weapons—"weapon" meaning anything from an echelon of pursuit planes to a new automatic pistol. From planes whizzing through the air, from bomb turrets using new sights, from monstrous tanks rumbling across the fields, and from rifle ranges, "The Army Hour" has shown the nation what its soldiers are using in the field of battle,—what their war bond money is buying.

But despite the record of the program to date, it hasn't been all milk and honey. "The Army Hour"

works under handicaps that probably have been faced by no other program in the history of radio—this despite the all-out cooperation of the Army and NBC.

The first obstacle is the inherent difficulty of handling a program that encompasses the world in scope, and has as its substance millions of soldiers and war workers. It was that inherent difficulty that made the cynics scoff when the program was first undertaken. Yet strangely enough, that is the least troublesome problem. Although it does remain a problem it is one with which "The Army Hour" is successfully coping. With NBC's expert knowledge of bringing in reports from every corner of the globe, vast distances have shrunk to insignificance, and with a horde of producers, writers and engineers scattered across the country—handling the large number of soldiers and machines is now almost a matter of routine.

Now, as the U. S. Army seizes the offensive, the "Army Hour" has a major problem in the time element. When American forces landed in North Africa, the "Army Hour" had to remake the program on last-minute notice.

Similar last-minute news reporting took place when Capt. Eddie Rickenbacker was rescued at sea.

The dramatic story of his rescue was flashed to the world on the morning of Saturday, November 14. The following day "The Army Hour" presented a stirring message from Mrs. Rickenbacker.

Today "The Army Hour" is accustomed to last-minute revamping of scripts, and plans to keep pace with the war news.

One problem that presents an outstanding bugaboo is censorship. A program that is as close to the armed forces as is "The Army Hour," stands in constant danger of revealing vital information. It is no slight tribute to the producers of "The Army Hour" that with hundreds of broadcasts from war plants and army camps, nothing of value to the enemy has been revealed, although sufficient information has been broadcast to be of dramatic interest to American listeners.

But it hasn't always been easy. For instance, a certain important airport is beset with bad weather conditions. (Wouldn't the Japs like to know which one?) "The Army Hour" went out to that airport to demonstrate a new pursuit plane. The weather at the start of the broadcast was fine. The planes took off and the NBC announcer—Joy Storm—prepared to describe them as they came in for a landing. Sud-



BILL STERN, NBC ANNOUNCER, TALKS ON "THE ARMY HOUR" FROM A PLANE.

denly the weather went bad. (Was it fog or rain or snow, Hirohito?) and the announcer found himself with nothing to describe because the planes had lost the field. But he described it anyway, pretending the planes were merely out of ear-shot. For fifteen minutes that announcer ad-libbed and never once did he give any inkling of what was wrong. In fact, the NBC engineers and producers in Radio City never suspected themselves what was happening.

That was just one of "The Army Hour" headaches,—and there are a lot of them.

Second major problem is wartime conditions. While the Army extends the fullest cooperation, it is still a wartime Army, and "Army Hour" producers never know when an emergency alert will send a squadron of planes, (and the broadcast) "scrambling".

The technical side of "The Army Hour" presents its problems, too. A microphone is a very accurate instrument, but also a very sensitive one. When a light finger tap on a "mike" will make V.I. meters go crazy, imagine what a cannon shot or a bomb will do. Wherever possible "The Army Hour" insists on reality—whether it be a thousand paratroopers staging a special attack for the broadcast, or a demonstration of a new machine gun. "Big sounds" have been licked by keeping them in the background. However, the "smaller sounds"—pistols, hand grenades, small bombs have had to be simulated. Generally a small charge of TNT does the job very well, and saves the microphone ribbons for future broadcasts.

Tough Problems Solved

All of these problems presented by "The Army Hour" transcend into the larger problem of organization and production. Stop and think for a minute what you would do if you wanted to present a program that would include a speech from London, a report from Cairo, an interview from Sydney, a demonstration of thirty planes in flight, aerial gunnery training in Texas, and a special new war song from New York City. Picture the maze of wires, phone calls, telegraph messages, and letters that would

have to be sent, multiply that about 100 times and you have a rough idea of the organizational work that goes into the making of one "Army Hour".

Each remote broadcast within the United States (and there have been as many as fifteen on one program) requires an announcer, a



BRIG. GEN. JAMES H. DOOLITTLE, AS HE APPEARED ON "THE ARMY HOUR" SHORTLY AFTER HIS FLIGHT TO TOKYO.

production director, one or two engineers, at least one microphone, a "remote" outfit, a field 'phone direct to Radio City, Army passes for the proper people, plus all the advance arrangements so that the right soldiers and equipment will be at the right place.

In New York an orchestra, choir, and actors (for action and "stand-by" duty) plus the usual array of announcers, engineers, etc., must be on hand.

For the overseas broadcasts, NBC reporters must be advised, radio channels cleared with RCA Communications, Inc., and tests conducted. In addition, the entire program must be integrated into one script, cues must be exchanged with overseas and remote domestic points, and important information cleared with international censors. As if that isn't enough work to cram into one week's time, the entire thing must be rehearsed and timed, and all set to go to air time.

It is not an easy job, nor a simple

one. To do it, Eddie Dunham, NBC Production Director, and Wyllis Cooper, civilian writer for the Army, have made close to 2,000 long distance calls (excluding the overseas conversations conducted mainly by shortwave) and sent about the same number of teletype messages, Telegrams, radiograms, and letters are literally innumerable.

The overseas problem falls squarely in the lap of Lathrop Mack, manager of NBC's Department of Special Events, who calls London or Cairo as casually as you'd call the corner drug store. It is he who sees that "Go ahead London" (or Cairo, or Ankara, or Leopoldville) will bring "Hello America" in reply. At work, he is a dervish of activity, speaking to Australia, while Egypt is on the air,—giving cues, orders, cuts. It is his wizardry in setting up channels and emergency alternates that accounts for the few failures of remote broadcasts on "The Army Hour."

Hears His Own Voice

It is all in a day's work to Mack to have his voice circle the globe several times over. In fact, he is greatly amused by a recent two-way circuit with Australia. As he speaks overseas giving pre-broadcast information, he wears headphones to hear what they have to say from the other end. But while he is speaking he hears his own voice coming back from the down-under continent. Despite the fact that his voice travels with the speed of light, the vast distance of the round-trip journey from his microphone back to his headphone was so great, that there was a "time lag" of about 1/7 of a second, and Mack sounded to himself as if he were stuttering.

His work and "The Army Hour" reached a new climax on December 7. The Army had concluded its first year of war—a year of tremendous progress.

With a lavish abandon, the program commemorating the first anniversary of Pearl Harbor spanned thousands of miles, broadcasting from a dozen overseas points, wherever U. S. troops are stationed.

And like the Army, "The Army Hour" and NBC look forward to a bigger and better year of military operations in 1943.



DR. V. K. ZWORYKIN (LEFT) AND DR. JAMES HILLIER OF RCA LABORATORIES EXAMINE THE NEW DESK-SIZE RCA ELECTRON MICROSCOPE. DEVELOPMENT OF THE INSTRUMENT WAS ANNOUNCED IN NOVEMBER AT CHICAGO. IT IS CAPABLE OF THE SAME HIGH DEGREE OF RESOLUTION AS RCA'S STANDARD MODEL.

Electron Microscope Advances

INSTRUMENT DEVELOPED BY RCA LABORATORIES, DOING IMPORTANT WAR WORK, BRINGS ABOUT SUDDEN SPURT IN PROGRESS OF SCIENCE; NEW DESK-SIZE MODEL ANNOUNCED.



By M. Charles Banca
*RCA Victor Division,
Radio Corporation of America*

IN 1942, the RCA Electron Microscope's usefulness to science in general and to the war effort in particular was greatly increased. The instrument itself was substan-

tially improved in design and operational simplicity, and the technique of applying it to the varied problems of scientific research was considerably advanced.

So great is the knowledge-gathering potentiality of this new tool of the research worker—an instrument that penetrates far into the ultra-microscopic mysteries of nature—that Dr. V. K. Zworykin, Associate Director, RCA Laboratories at Princeton, N. J., declared recently that it already has brought about a sudden acceleration in the progress of science.

At present, the RCA Electron Microscope is rated at from 50 to 100 times more powerful than the best light microscope. There is reason to believe, according to Dr. Zworykin, under whose supervision the microscope was developed, that

—eventually—further improvements in electron microscope lenses will extend this ratio to something like 1,000 to 1.

When these improvements occur, some time in the future, atoms and molecules and the more intimate structures of large molecules and viruses will become visible to research workers. The transition between the realms of living and non-living can be closely observed. Furthermore, the gap between the elemental building blocks of matter and the gross structures of every day life will then be completely filled.

Meanwhile, research is going forward in more than two score laboratories with the standard RCA Electron Microscope introduced two years ago. Scientists agree that their new-found ability to resolve

and magnify the infinitesimally small particles of matter, bacteria, and viruses is producing information extremely valuable to the United Nations' war effort and to America's health, science and industry.

This fact was brought forcefully to public attention during November and December when the first exhibitions and demonstrations of the RCA Electron Microscope were held in Chicago and Washington, D. C. In Chicago, the instrument

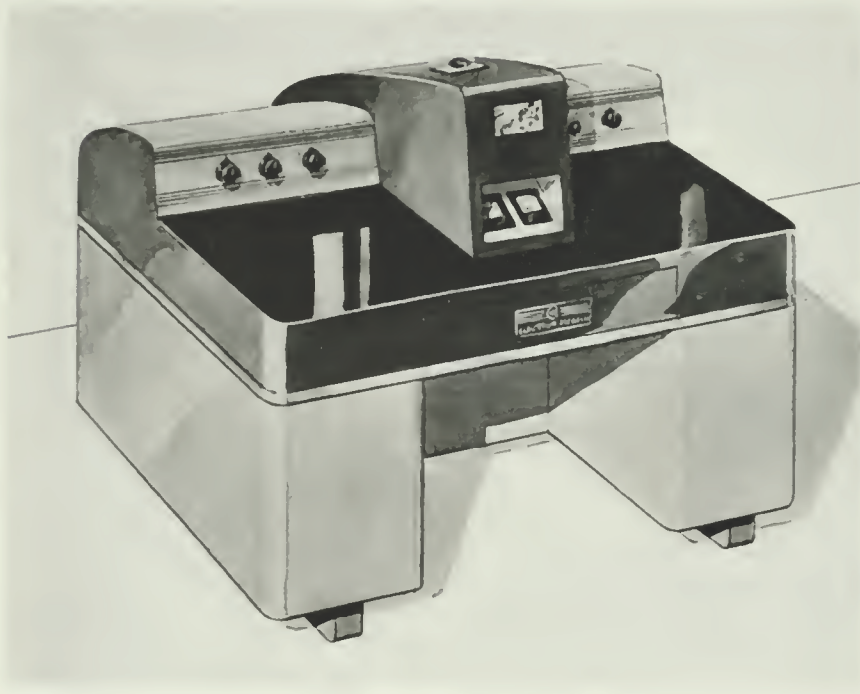
which, while not as versatile as the large standard model, gives the same high degree of resolution and magnification. In this small model, the electron microscope becomes available—after the war—to literally hundreds of medical, university, and industrial research institutions. The other development was the "stream-lining" of the large standard model to effect a 35 per cent reduction in weight, in electronic tubes and in other components. Operation was substantially

the delivery of the first commercial electron microscope. This instrument was delivered to the American Cyanamid Company's research laboratories in Stanford, Conn., and is known as the RCA Type B Electron Microscope, or the standard model.

Since that date, forty-six of these instruments have been delivered. Of this number, nine have been exported to our Allies and the remainder were installed in laboratories in this country.

Soon after the first instruments were placed into use, it was realized with the higher magnification available that necessarily the field to be examined was limited. Therefore, it became increasingly difficult to interpret the results obtained with increased magnification. A practical example of such a case was the study of the calcium carbonate where the calcium carbonate (aragonite) was photographed at a total magnification of 85,000 times. Upon examination of this micrograph, it is easily seen that the separate crystals are elongated, porous and quite uniform in shape. However, studies of this same field at low magnification with the light microscope showed what appeared to be large particles. Therefore, it was assumed that there must be some value of intermediate magnification that would tell the full story. As a result of these conclusions, experimenters expanded the range of the electron microscope to cover the region from approximately 200 diameters to 20,000 diameters by varying the length of the specimen holder. These pioneers of electron microscopy soon discovered that the seemingly large particles visible under the light microscope were actually a "Burr" cluster of the crystals visible in the electron micrograph taken at 85,000 diameters. The work of these men and many others soon established the fact that high magnification in itself was not the true answer, but that even low magnification must be covered in order to obtain a comprehensible result. The present instruments, therefore, are capable of magnifications below 1,000 diameters and, by minor adjustments to the instrument, can be carried below 600 diameters.

The magnetic lens used in the



THE NEW DESK-SIZE RCA ELECTRON MICROSCOPE, AS IT WILL APPEAR IN ITS COMMERCIAL DESIGN. IT WILL BE BUILT BY THE RCA VICTOR DIVISION.

was the feature exhibit at the joint meeting of the National Industrial Chemical Conference and the Chicago Section, American Chemical Society. More than 24,000 persons registered at this conference. In Washington, approximately 3,500 high Government officials, representatives of the Army and Navy, the diplomatic corps, and leading educators and scientists saw the microscope as guests of RCA Laboratories.

Two outstanding developments in the design of the microscope were announced at Chicago. The first one was a small desk-type instrument,

improved, both as to simplicity and efficiency.

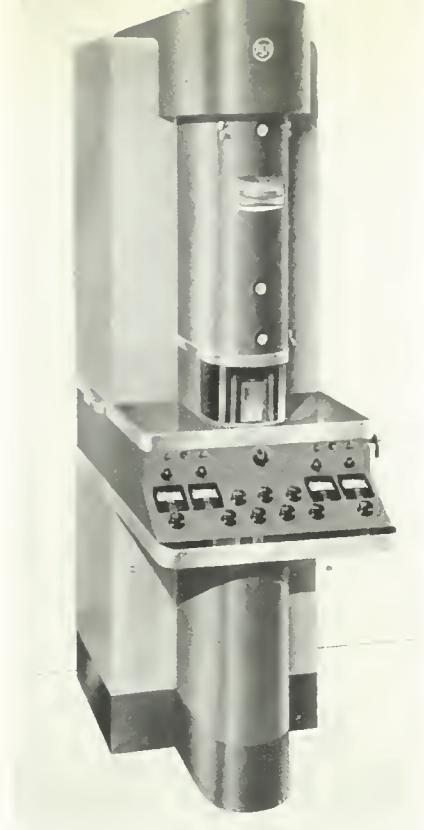
Since practically all of the work being done today with the RCA Electron Microscope is directly related to the war, secrecy guards most of its accomplishments. However, it is permissible to review the progress made in developing the technique of the instrument's application. It is also possible to show how widely distributed the microscope is among hospitals, universities, research laboratories and industry.

The month of December, 1942, marked the second anniversary of

instrument has a depth of focus of more than ten microns (.0004 inches) as compared to an oil immersion lens on a light microscope which has a depth of focus of somewhere in the order of .08 microns (.0000032 inches). A practical example of the extreme depth of focus is illustrated in a micrograph of aluminum oxide monohydrate where two of the crystals are standing on end and one on its side, the total field being in focus. This naturally lends itself to third dimensional studies by stereoscopic pictures and so a specimen holder was designed and applied to the instrument.

In the beginning, there was one standard specimen preparation wherein a 200 mesh etched screen was used to support .01 micron (.0000004 inches) collodion film. This film was prepared by floating a small drop of 2 per cent collodion dissolved in amyl-acetate on water, placing the screen on this film and picking the screen with its film up by means of a specially designed hook. Upon this film was placed the specimen solution. This method was suitable for ordinary work covering particle study and bacteria. However, this placed great limitations on the fields of application of the instrument and studies were made into the matter of various specimen preparations. Since that time, many different plastics have been applied as specimen supports. Other methods have utilized mixing the specimen directly in the film material so as to obtain better dispersion. Con-

CRYSTALS OF ALUMINUM OXIDE MONOHYDRATE, AS SEEN BY THE ELECTRON MICROSCOPE.



THE "STREAMLINED" DESIGN RECENTLY CONCEIVED FOR THE STANDARD MODEL RCA ELECTRON MICROSCOPE.

siderable and detailed work has centered about obtaining better dispersion, since the finer the particles the more difficult becomes this problem. Many new and interesting techniques have been developed.

In the study of bacteriology, there has been considerable discussion as to the effects of the electron beam and the vacuum upon the bacteria themselves. Obviously the bacteria cannot be studied in motion since the vacuum removes any liquid, the medium through which the bacteria is able to move. As to the bacteria itself, the vacuum necessarily causes all the moisture to evaporate off its surface. However, this does not necessarily mean that all moisture must be given up from the internal portions of the bacteria. As a matter of fact, bacteria have been left in the microscope under the vacuum for extended periods of time before visible

DIFFRACTION PATTERN OF ZINC OXIDE OBTAINED WITH THE ELECTRON DIFFRACTION CAMERA ATTACHMENT OF THE MICROSCOPE.

changes occurred. This rule is not absolute for in some cases changes have been noted in very short times. As to the matter of the electron beam producing a change, it is generally believed that the electrons bombarding the nuclei are fatal to the bacteria. Just recently a paper has been published abroad claiming that bacteria have survived photographing in the microscope.

Some work has been done on the application of heavy-metal germicides which react selectively with certain components of protoplasm but as yet no systematic study of the factors involved has been carried on and results so far obtained show definite promise of an interesting field of study.

At first, it was believed that the electron microscope would not be too successful in the study of solid surfaces. The metallurgist was in great need of an instrument of higher resolution than the light microscope for broadening his study of the surface of metals. There was soon developed the now famous replica method for adapting this instrument to special work. The original method consisted of preparing the surface to be studied, then evaporating a thin coat of silver onto this surface in a vacuum. This silver film was then stripped from the surface and a thin collodion film applied to it. The silver film was then dissolved from the collodion film with acid, leaving

(continued on page 30)





"BREAKFAST AT SARDI'S" IS ONE OF THE PROGRAM INNOVATIONS OF THE BLUE NETWORK. HERE, TOM BRENEMAN, HOST, IS SHOWN INTERVIEWING ONE OF THE GUESTS IN A HUMOROUS SEQUENCE.

Blue Trys New Program Ideas

CARLIN SAYS BROADCAST SCHEDULE ON NETWORK IS HIGHLY FLEXIBLE STRUCTURE; ADJUSTS OFFERINGS TO COINCIDE WITH CHANGES AS PLANS ARE MADE TO TEST DIFFERENT SHOWS.



By Philips Carlin

*Vice President in Charge of Programs,
Blue Network Company, Inc.*

STEPPING out onto new paths while keeping its hand on the pulse of public opinion, the Blue Network Company has tried and proved an entirely new conception

of network program structure in the eleven months of its existence as an independent entity.

To us, the program schedule is a flexible structure for which the needs and wants of the public are as the breath of life.

Just as a good chef keeps his mind on satisfying the myriad and shifting tastes of his customers—today's and tomorrow's customers—without regard for what somebody wanted last week or last year, so the BLUE is constantly offering programs in line with changing conditions, changing thinking, changing habits. We have eagerly welcomed new ideas and new techniques, feeling certain that a live network must be always ready to take a change.

This vision of the BLUE as a medium always alive to change is in line with the whole trend of

thoughts today in every field, and we look on radio as one of the most important methods of helping people to adjust themselves to the revolutionary changes that are accompanying the war.

Looking ahead to 1943, we are already working on plans for more of the new type of daytime show, such as "Broadcast at Sardi's," and the service programs which will be of vital necessity to every citizen. One kind of program intended to help solve the food problem, with gas rationing and meat and butter shortages revising cook books, and dehydrated foods replacing canned goods ("Mystery Chef") is already on the air. Conservation will continue to be an all-important theme. The BLUE may also enter other fields as dictated by public necessity. These may well include the

medical, clothing and household appliance fields. Even such things as patterns, with their sale increasing by the thousands, might be the subject of a program.

Never afraid to tackle something new, we have tried out an average of ten or more shows a month during the last year. With such variety, there have been some "flops" which were instantly recognized and thrown out but a majority have proved their worth and built up a public following.

Since radio's first aim is the winning of the war, the program structure throughout the year has been imbued with a definite war flavor. A recount of the total amount of time devoted to the war effort on the BLUE from January 1 through October 30 shows that 525 hours of sustaining time, and 80 hours of sponsored time (not including local programs on WJZ) were used for this purpose. Of this total 232 hours of network time were devoted to programs presented in cooperation with Government agencies.

Aside from Government programs, contribution to the war effort was made in sustaining shows presented by other organizations.

One of this type, "This Nation at War," presented by the National Association of Manufacturers, pictured the work being done on the home front. Another "Men, Machines and Victory," presented by the National Safety Council, dramatized the danger to the war effort of accidents in war production plants. In addition, there were a host of other sustaining shows presented by the BLUE itself.

Alive to the public's hunger for news, the BLUE has built up an impressive list of commentators and news reporters which now includes H. H. Baukhage, Earl Godwin, John Gunther, William Hillman, James G. McDonald, Drew Pearson, Roy Porter, Raymond Gram Swing, Lowell Thomas, Dorothy Thompson, Edward Tomlinson, John Vandercook and Walter Winchell.

In the field of children's programs the BLUE has forged ahead, too, with Hop Harrigan, Jack Armstrong, Captain Midnight, Don Winslow of the Navy, the Lone Ranger, Scramble, Little Blue Playhouse and The Sea Hound.

Realizing that to achieve a varied offering the program department must draw on every source of ideas,

the BLUE early in its career opened the door to the independent producer, gave him air credit, encouraged him to submit new ideas and talent. This cooperation resulted first in good shows at the lowest practical cost and then in commercial sponsors.

Another new idea, whereby the BLUE gets the aid and counsel of its affiliated stations, was the inauguration of weekly "closed circuit" broadcasts on which we speak with station staffs and ask for an expression of opinion on programs.

The results of this aggressive desire to cooperate in seeking ideas and opinions can be seen in the affiliated stations' quick acceptance of sustaining shows, quick sponsorship by advertisers, and in rising ratings. For the first half of 1942, the BLUE's total of rating points is well over those for the same period in 1941, and many of the shows did not start until the Fall.

On the whole, we feel that the BLUE has done a good job of giving the public what it wants, which means giving the advertiser what he wants. And the changing world of 1943 will find the BLUE flexible and sensitive to its every need.

ACTIVITIES OF THE ARMY AIR FORCE ARE BEING DESCRIBED IN THIS SCENE FROM A BROADCAST OF "THIS NATION AT WAR," AT ALBUQUERQUE, N. M., BY THE BLUE NETWORK.





ROBERT SHANNON (RIGHT CENTER), GENERAL MANAGER, RCA VICTOR DIVISION, PRESENTS SUGGESTION SYSTEM AWARD TO JOSEPH ECKERT. OTHER AWARD WINNERS IN THE GROUP ARE (LEFT TO RIGHT) B. J. MC CORMACK, PETER KRUSS, THOMAS MUCKENFUSS, DAVID RYAN, DAVID SMITH, PAUL LEDYARD, LEO DENSON.

Ideas Spur War Work

SUGGESTION SYSTEM AT RCA VICTOR DIVISION PROVES HIGHLY EFFECTIVE; 23 WORKERS WIN NATIONAL WPB HONORS.



By Elmer C. Morse

*Personnel Manager,
RCA Victor Division,
Radio Corporation of America*

AMONG industrial programs to increase war production and improve quality of war equipment for the armed forces, none has proven itself more effective than the Suggestion System.

In addition to its effect on production, a successful suggestion system has an important influence on employee morale. The worker is made to feel that his ideas about his work or about the company and its work are welcome. He is made to feel that he, personally, counts in a large organization and that he can make a real contribution to his own as well as to his company's progress through ideas over and above the direct responsibility of his everyday job.

In peace-time, the Suggestion System has as its objective more efficient operation, lowered costs and better quality, so that products and services can be more competitive. The employee benefits as the company benefits and is able to promote more employment, better security and more opportunity for advancement.

In war-time, the main objective of the Suggestion System is to produce vital radio and sound equipment for our armed forces in larger quantities, with better quality, and with the fullest utilization of plant, equipment, machinery, tools, materials and man-power.

The value of employee suggestions in the battle of production is clearly recognized by the War Production Board which, early this year, set up a system of awards for outstanding suggestions that aid the war effort.

During the year, thousands of workers' suggestions were sent to Washington by the Labor-Management War Production Drive Committees in the Nation's industrial plants. A high-powered awards committee, made up of scientists, industrialists and labor leaders, sifted them and sent the most meritorious to war industries throughout the country for application in those plants. The War Production Board award committee then selected six most outstanding of the total submitted and awarded their authors citations. Fifty-five Certificates for Individual Production Merit were also issued, together with eighty-seven Honorable Mentions. Fifty-five companies were represented in the awards.

Among the 148 winners, twenty-three were from the RCA Victor Division. One RCA worker, Edwin C. Tracy, a field test engineer from Camden, received the highest award, a citation. Nine other RCA workers were awarded Certificates of Individual Production Merit and thirteen other RCA men were accorded Honorable Mention.

Since the Citation is the highest honor the War Production Board confers, it has been considered by many as comparable in industry to the Distinguished Service Medal of the armed forces. The six war Production Heroes who earned it, were called to Washington on December 10, to receive their awards from President Roosevelt. Accompanying them were four men who had earned Certificates. The latter were selected because their recommendations had been most widely adopted by war industries. Among the four was another RCA man, Stanley Crawford, a materials inspector from Camden.

Thus, out of ten men honored by the President in the White House ceremonies, RCA was the only company to have two representatives in the group.

Although the application of the suggestion system to the war effort has given strong impetus to war production throughout the Nation, the basic idea is not new. RCA recognized its merits fifteen years ago and put it into operation. It was received with enthusiasm at each of the company plants and has been an effective means of cementing closer understanding between management and employees ever since.

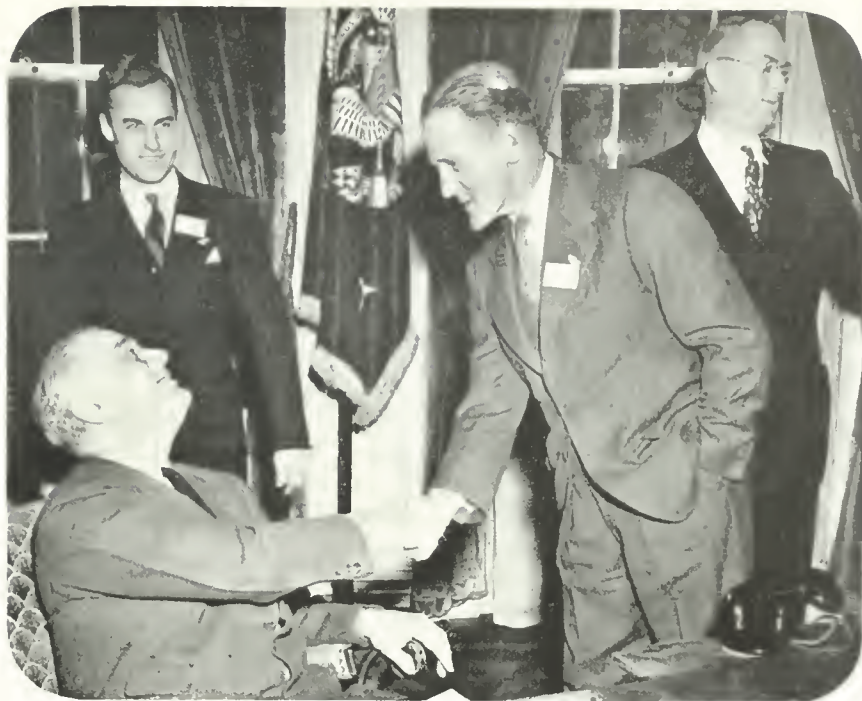
At the Camden plant, for example, its general usefulness has increased year by year. In 1938, a total of 2,562 suggestions was submitted, and 454, or 18 per cent, were found usable. The following year suggestions increased to 10,298 with 16 per cent acceptances. In 1940, the number of suggestions was 11,031 with 18 per cent accepted. In 1941, 25,701 suggestions were received and 15 per cent accepted.

In November of 1941, a concerted drive was made to place emphasis on quality, rather than quantity suggestions. Nevertheless, 23,064 suggestions were turned in up to the end of October 1942. Of these, 7,582 or 32 per cent were accepted.

Camden's joint Labor-Management War Production Drive Committee has had an important influence on the improved results from the Suggestion System. They have appointed a sub-committee with an equal number of management and labor representatives. This committee has made many valuable suggestions for encouraging suggestions from workers, for making suggestion boxes and suggestion blanks more attractive and, above all, for improving the speed and efficiency with which suggestions are routed through the organization for decisions.

The RCA Suggestion System has five basic objectives: to stimulate thinking among employees; to obtain employee ideas that will lead toward better production and lowered costs; to create better understanding and improve relations be-

(continued on page 25)



PRESIDENT ROOSEVELT SHAKES HANDS WITH STANLEY CRAWFORD OF RCA, WHO WAS ONE OF TEN TO RECEIVE PRESIDENTIAL RECOGNITION FOR WAR PRODUCTION MERIT. IN THE BACKGROUND ARE EDWIN C. TRACY OF RCA (LEFT) AND DONALD NELSON, HEAD OF WAR PRODUCTION BOARD.

2 HONORED BY PRESIDENT

Edwin Tracy and Stanley Crawford, RCA Men, Among Ten From Nation Receiving Special WPB Awards in Ceremony at White House.

TWO RCA Victor Division war workers whose outstanding suggestions are materially furthering the war effort received recognition usually accorded military heroes at a series of ceremonies in Washington, climaxed by the presentation to them of awards by President Roosevelt at the White House on December 10th.

The awards, the first to be made by the President to industry's "heroes", were under the auspices of the War Production Board and were conferred on the RCA employees on recommendation of the plant's joint management-labor War Production Drive Committee to Beat the Promise.

Stanley Crawford and Edwin Tracy were the two men whose home front contributions to the war effort received Presidential recognition. Crawford, previously award-

ed the War Production Board's Certificate of Individual Production Merit, is a materials inspector in the Camden plant and lives at Woodlynne, N. J. Tracy is an installation and service engineer whose home is at Rockville Center, L. I.

Crawford's contribution was a simple caliper which salvages fourteen out of sixteen castings formerly rejected, thus saving valuable semi-finished material. It is now being used in war plants throughout the country, avoiding enormous metal waste previously regarded as unavoidable.

The contribution by Tracy is a highly technical electrical apparatus to test radio equipment destined for fighting planes. It accomplishes in three minutes, with higher accuracy, a job that formerly required eight hours.

(continued on page 31)



FRED BATE, MANAGER OF THE NBC INTERNATIONAL DIVISION, AT HIS DESK IN RADIO CITY, NEW YORK.

U. S. LEASES SHORT WAVES

Union of Private Broadcasters with Government Agencies Means Closer Coordination in Job of Off-setting Nazi Propaganda, According to Royal.

ON November 1, 1942, the United States Government leased all of the nation's short-wave transmitters, including NBC's powerful 50,000 watters, WRCA and WNBI, located at Bound Brook, N. J.

The contract signed with the Government calls for a five years' lease but may be cancelled by Washington before the expiration of that period. Shortwave broadcasters, according to the pact, continue to operate their transmitters without profit in return for which Uncle Sam will pay the cost of operations.

This union of private broadcasters with the Office of War Information and the Coordinator of Inter-American Affairs means a closer "coordination between practical radio operators and those of the Government agencies who can give proper directives," said John F.

Royal, NBC vice president in charge of international broadcasting.

Furthermore, Royal declared, coordination and consolidation of American short-wave stations means that this country will be in a more potent position to help crush the short-wave efforts of the Nazis and their totalitarian henchmen.

Shortly after the Government stepped into the picture, NBC's transmitters increased their service to Latin America by many hours a day. Programs in Spanish were extended from four hours and forty minutes to eight and one-half hours. Portuguese broadcasts, directed to Brazil, were increased from two

ELI BUCK IS DIRECTOR OF LATIN AMERICAN PROGRAMS FOR THE NBC INTERNATIONAL DIVISION.

hours and fifteen minutes to six and one-half hours.

Spanish features are transmitted from 5:30 p.m. to 2:00 a.m. over NBC's station WNBI, General Electric's WGEA and WCEO, Westinghouse's WBOS and World Wide's WRUW, all with 50,000 watts. Portuguese programs are now heard from 5:00 p.m. to 11:30 p.m. EWT. over NBC's WRCA and Columbia's WCBX. The first three hours of these programs for Brazil originate in NBC's studios, while the remainder of the Portuguese schedule is programmed from CBS studios.

With the increase in broadcasting to Latin America, there will be a definite trend toward a more complete and varied program schedule, covering all phases of inter-American collaboration. Especially will this be true in the special events field, where NBC will broadcast an increasing number of addresses by visiting Latin American personalities and also special ceremonies from all parts of the hemisphere. Affiliate stations of NBC's Pan American Network are also contributing an important share in inter-American cooperation by regularly rebroadcasting in their respective countries many of the shows offered to our neighbors through NBC International, and by sending us special musical and cultural programs for rebroadcast in the United States.

Material now being short-waved to listeners South of the border consists of many old, established programs as well as several new fea-



tures. Among the programs that are being continued are the commentaries of Alejandro Sux: Sunday, Tuesday and Friday at 8:30; El Baron Eje: Fridays at 8:45; Americanos Todos: Monday, Wednesday, Friday and Saturday at 9:00; Radioteatro de America (plays by Arch Oboler): Wednesday at 8:30; La Marcha del Tiempo (March of Time): Thursday, 9:30; Epopeya del Nuevo Mundo: Monday, 8:30; Fernando Ortiz Echague: Monday and Thursday, 7:00; Tributo a los Heroes: Sunday, 8:15; NBC Symphony Orchestra: Sunday, 9:30; Contraespionaje (Counter Spy): Tuesday, 9:30.

Some of the new features are: Nuestro Sur (Our Southland): Sunday, 10:45; Industrias del los Estados Unidos: Sunday, 8:45; Poems of Walt Whitman: Monday at 9:15, and the transcribed music of Al Roth, Glenn Miller, Dinah Shore and Bing Crosby.

Four new shows have been created for transmission to Brazil. They are: Latin American Artists; New World Music; "What D'Ya Know?", quiz show; and Fighting America, all broadcast in Portuguese.

In addition, a series of 15-minute vocal and instrumental recitals are broadcast every week-day at 8:15. Among those participating are Mario Silveira, baritone; Rey de la Torre, guitarist; Marcella Uhl, mezzo-soprano; and Albert Cazen-
tre, tenor.

The full cooperation with Government agencies that Mr. Royal spoke of was evident on Saturday, November 7, when President Roosevelt sent his personal message to the French people. OWI arranged to have NBC's short-wave transmitters beamed to Europe to carry the statement. The stations continued to function in this manner 24 hours a day, repeating the presidential message and including important declarations that explained the purpose of the American expeditionary force in French Colonial territory. When the emergency subsided, NBC's transmitters returned to more normal broadcasting, with special emphasis placed on news reports in the German, French and Italian languages.

Before the signing of the contract



SECTION OF THE NEWS ROOM IN NBC'S INTERNATIONAL DIVISION. HERE COPY IS RECEIVED FROM PRESS ASSOCIATIONS AND TRANSLATED INTO VARIOUS LANGUAGES BY NEWS COMMENTATORS.

with the Government NBC's English Section in the International Division had 34½ hours weekly on the air. The English Section now has 35 hours weekly, broadcasting daily from 1:00 to 6:00 p.m., EWT. While the number of broadcasting hours remains substantially the same, the time of NBC's transmissions have been adjusted so that programs can reach the areas for which they are intended at the best possible listening time.

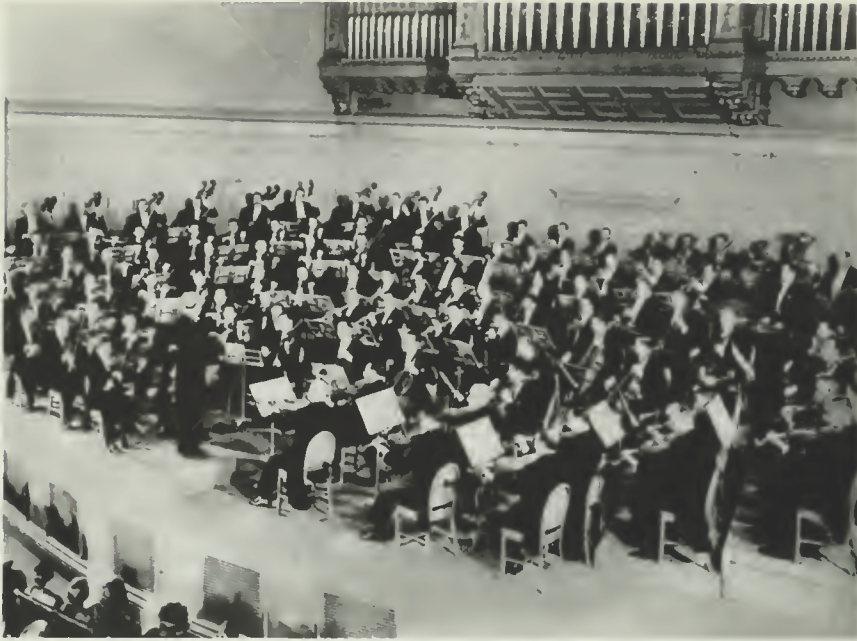
As the schedule is now arranged, the English language programs may be heard in the British Isles from 6:00 p.m. to 11:00 p.m. These hours are considered ideal for members of our own armed forces stationed in this area and also for the British people. While the United Kingdom is the focal point for these broadcasts they may also be heard

throughout the West Indies, North Africa and the Middle East. However, in the past, NBC broadcasts beamed at England, have been heard in such far separated places as Alaska, India, British South Africa and Australia.

The technical handling of the English short-wave broadcasts is so arranged that programs are originated in the Radio City studios, sent through the master control board, and then routed to the OWI headquarters at 224 West 57th Street, New York. The OWI then sends the programs to selected transmitters.

While a large majority of these English language programs are designed especially for Americans serving overseas in the armed forces, many of them are built for

(continued on page 28)



THE BOSTON SYMPHONY ORCHESTRA, WHICH IS BEING HEARD IN A SERIES OF PROGRAMS BROADCAST EXCLUSIVELY BY THE BLUE NETWORK.



SERGE KOUSSEVITSKY

the finest in the world. Its conductor for the past twenty-eight seasons, Dr. Koussevitzky, has the reputation of being the greatest living exponent of Russian music, and the most consistent champion of modern music. He is completely the perfectionist, demanding nothing short of an inspired performance.

Firmly espousing the cause of the contemporary composer, Dr. Koussevitzky has declared: "We cannot refuse a careful performance and a fair hearing to the composers who are working in our own time." No other conductor in this country has brought forth so many new works by the world's composers.

BOSTON SYMPHONY ON BLUE

Famed Orchestra, with Serge Koussevitzky Conducting, Has opened 46-Week Series of Broadcasts, Including "Pops" Concerts.

MUSIC in its most lyrical and ethereal flights is said to serve a war-torn world, offering a spiritual analgesia to revitalize the tired nerves of a hard-working people on the home front. In appreciation of this view, the BLUE Network has added the Boston Symphony Orchestra, conducted by Dr. Serge Koussevitzky, to its growing list of cultural music programs, which already includes the Saturday afternoon broadcasts of the Metropolitan Opera.

To many millions of war workers and soldiers in training on American soil, the BLUE program executives believe, surcease from the pressing demands of war will be found in great measure in the new orchestral series, which opened December 26 to be heard each Saturday thereafter from 8:15 to 9:15 p.m., EWT.

In these broadcasts, the Boston Symphony Orchestra will be heard over a coast-to-coast hook-up for the

first time in five years. Mark Woods, president of the BLUE, is responsible for its return to the radio audience of the BLUE Network.

The long term contract, providing the radio public with the concerts of the orchestra weekly through its long season of 46 weeks each year is unprecedented. The majority of the concerts will originate in Symphony Hall, the orchestra's own auditorium in Boston.

At the expiration of the regular season, May 1, the BLUE Network will bring to its vast audience the "Pops" concerts under Arthur Fiedler until early July and the open air concerts on the Charles River Esplanade which follow. It is hoped conditions will permit the resumption of the Berkshire Symphonic Festival at Tanglewood, in Lenox.

According to published acknowledgments, the Boston Symphony Orchestra unquestionably is among

The Boston Symphony Orchestra, under the direction of Serge Koussevitzky, has signed a new long-term contract to make Victor Red Seal recordings, according to Frank B. Walker, of the RCA Victor Division. The contract also calls for the exclusive recording performances of the Boston "Pops" Orchestra, with Arthur Fiedler as conductor.

Just 25 years ago, the first Victor records of the Boston Symphony were released. These discs were history-making in the phonograph art, because for the first time an orchestra of 100 men was recorded. Up to this time, the size of an orchestra for records was limited to forty men. Since 1917, the records of the Boston Symphony Orchestra have sold in the millions. With Dr. Koussevitzky as conductor, the orchestra's records have attained their greatest popularity.

Ideas Spur War Work

(continued from page 21)

tween management and employees; to identify progressive workers to the management; and to stimulate all the workers to a better appreciation of the important role which they play as individuals in shaping their own future with the organization in direct proportion to their contributions to the well-being of their company.

Distinctively colored suggestion boxes are placed throughout the plant and in the offices. At each box is a supply of suggestion blanks. Every means of communication is employed to encourage suggestions. Messages are recited over the plant sound system; posters are put on walls and bulletin boards; awards for outstanding suggestions are played up in the company house organs. Big awards are made personally by top management representatives. Public presentation of awards are made at plant rallies and on special occasions. All-expense furloughs to famous vacation spots are offered as incentives in addition to the cash awards (payable in War Bonds and Stamps) which are made in direct proportion to the estimated value of the suggestions.

The suggestion blank is in three parts, each numbered identically. On the main section, the suggestor outlines his idea. On one of two perforated stubs attached he writes his name, clock number, department number and building number. The second stub he keeps as evidence that he has put in a suggestion.

Suggestion boxes are regularly emptied not less than three times each week. All suggestions are read by the Suggestion Supervisor and his staff who are members of the Personnel Department. They are then assigned to five full-time investigators who check the employee's idea with his foreman and others who may be interested. After that, the recommendation is expedited with all possible dispatch. The identity of the suggestor is known only to the Suggestion Supervisor to assure unbiased consideration for every idea submitted.

If the suggestion has possibilities of adoption, the investigator clears the idea with the Engineering Department where blue-print changes are made, if necessary, and comments about practicability are obtained. Next, the idea is checked with the Process Department for additional comment and whatever process changes are needed. The investigator then checks the production orders on which the suggestion applies and obtains a report on quantities in order to estimate the savings.

The suggestion now is tentatively adopted. It becomes effective after consultation with the Control Department where labor and material savings are recorded. The idea is finally returned to the Suggestion Supervisor where the extent of an award is determined.

Records are Kept

If the suggestion is rejected, the investigator attaches comments giving specific reasons for the rejection. The decision is entered in a master book opposite a serial number. The suggestion then is forwarded to the suggestor's foreman who explains the situation, thanks the employee for his interest and encourages further submission of ideas. If the employee is dissatisfied with the rejection, a reinvestigation of his suggestion may be opened by the Suggestion Supervisor. The employee also is free to reopen his suggestion at any time.

After a suggestion has been adopted, if it is considered to be of value to the war effort, the Suggestion Supervisor sends it to the Labor-Management War Production Drive Sub-Committee for certification and transmission to the War Production Board in Washington. There it is reviewed by the Committee on Awards which notifies the plant War Production Drive Committee of whatever action is taken.

Ninety per cent of all suggestions made at RCA's Camden plant since Pearl Harbor, have been in connection with war work. Among them have been recommendations for the conservation of essential materials, elimination of rejects, quality improvements, methods for decreasing production and test time, simplification of operations, elimination of

bottlenecks, increase of efficiency, and improvement to morale.

Industrial Power Rising

(continued from page 5)

Science, through development of the electron tube, put radio in the fight and made it indispensable to the modern mechanized army, to the air corps, to the fleet, and to the merchant marine. Without the radio tube so wonderfully developed since World War I, radio could not play the important role it now has in warfare. The electron tube made radio equipment compact, portable, mobile, efficient and extremely dependable. That was not so with the cumbersome wireless apparatus that used the spark transmitter and crystal detectors in the first World War. It was not until the final period of the conflict that the radio tube began to find service in the Army and Navy.

Radio now qualifies as the voice and ear of the Army Signal Corps, of Naval Communications and of the Air Corps. We have but to look at the global war map to realize the great importance of radio. Its definite assignments and achievements necessarily are military secrets. But when we compare the present demands upon communications with those of the first World War, it is easy to understand that radio's present role is a thousandfold more important. The airplane, the worldwide transport problem, and blitz warfare, all of which call for utmost speed and efficiency in communication, have multiplied the demands and responsibilities of radio.

Within the past year—a year of tireless effort in the manufacturing plants—the men and women on the production front have given the American armed forces the finest radio equipment in the world. As the war rages into 1943, every American finds himself and herself linked in some way with the battle. There must be no let-up on the home front. Every day in the New Year must find production rushing full speed ahead to the battlefronts. Then, and only then, will the last battle end in our victory.



COMMANDER J. F. BATES, USN, PRESENTS THE ARMY-NAVY "E" FLAG WITH STAR TO THE RCA VICTOR DIVISION'S CAMDEN PLANT. RECEIVING IT ARE ARNOLD WEBER AND GILES C. FRAZIER.

PLANT WINS "E" WITH STAR

RCA Victor Division Receives Army-Navy Flag at Huge Rally; Pennant is Third Award to Camden Plant from Armed Forces.

THE Army-Navy "E" Flag with Star was presented to the RCA Victor Division's Camden, N. J., plant during a huge rally of RCA war workers in Johnson Park, adjacent to the plant, on December 7.

The award was the third to come from the armed forces of the United States to the Camden group. The first was the pennant of the Navy's Bureau of Ships. This was followed by the Navy "E" Flag. The star on the latest award—the Army-Navy "E"—indicates an additional six months of outstanding performance in the production of war equipment vital to the Navy.

Commander J. F. Bates, Resident Inspector of Naval Material at RCA Victor, presented the Army-Navy award in the December 7 cere-

monies. It was received by A. K. Weber and Giles C. Frazier, who represented the labor-management War Production Drive Committee of the plant. A. L. Pipper, RCA Victor executive, acted as master of ceremonies.

Blue Wins 6 Firsts

Six first places were won by Blue Network performers or programs in the seventh annual poll conducted by *Motion Picture Daily*. More than 600 radio editors and columnists participated in the voting. Five BLUE performers or programs scored in second places, and four in third places.

War Programs Increase

NBC's increasing participation in the war effort is strikingly demonstrated in preliminary statistics on program makeup for 1942, which show a gain of 23 per cent in public service programs and 28 per cent in newscasts.

Statistics, projected for the full year on the basis of actual figures for the first ten months, show that public service programs increased from 30 per cent of program hours in 1941 to 37 per cent for 1942.

News programs, including reports, analyses, foreign pick-ups and special events, increased from 10.5 per cent in 1941 to 14.2 per cent of all program hours for 1942. In other words 2,653 of the year's 7,175 hours for all programs on NBC in 1942, were allotted to public service. Of the 2,653 hours, 1,015 hours were devoted to news.

BROADWAY PLAY GIVEN TRY-OUT ON NETWORK

Radio and Stage Techniques are Blended in Novel Dramatic Experiment.

RADIO played host to Broadway last week when representatives of the two entertainment media sat down together to witness the birth of a novel experiment, which is expected to make theatrical history.

The occasion was the premiere broadcast of "Audition Preview," a new method of dramatic production for trying out plays for Broadway managers, picture companies, and playwrights.

Brainchild of Fritz Blocki, radio-writer-director, the program, which was launched over the nationwide BLUE Network, "lend-leased" radio's facilities and techniques to the theater in an effort to give producers more assurance of the quality of a scrip before risking thousands of dollars in hiring a theater and obtaining scenery.

On hand as master of ceremonies was Eddie Dowling, actor-manager, who is famous for his innovations in the theater world. Dowling, who played host and narrator during the performance, introduced the new idea and set the stage with verbal scenery.

"The Wind Is Rising", by Harry Kleinert, of Philadelphia, was the script chosen for the tryout. Selected out of scores of others because of its adaptability to the experimental venture, the play centered about the underground movement in conquered France.

Claire Luce, international stage star, headed an impressive cast. Opposite Miss Luce, Myron McCormick, of Broadway, Hollywood, and radio, shared the lead with Frank Lovejoy, long a favorite of radio listeners. Other members of the cast were Selena Royle, Ethel Owen, Jean McCoy, John Brown and Santos Ortega.

Tucked away in a different studio from the actual production unit, were about 100 guests, especially invited from the ranks of radio and drama critics, and celebrities of stage, screen, and air.

During the intermission and after the broadcast, which took an hour and a half, Dowling invited critics to the microphone and interviewed them on their opinions of the new tryout plan.

Still sifting the comment on his idea, Fritz Blocki is amazed at the similarity between professional criticism and that from laymen. Among the letters from radio listeners, received by the BLUE Network, are constructive suggestions and high praise, according to Blocki.

When Blocki, who is now in the radio production staff of Benton and Bowles, conceived the idea, he insisted that the plays selected would not be adapted to radio. Carrying out his new method of production, Blocki employed sound effects and music in the drama, blending radio technique with that of the stage.

NBC Leads in Poll

NBC programs and personalities again swept the annual poll of radio editors of the United States and Canada conducted by *Motion Picture Daily*. In the thirty-four classifications, NBC took eighteen first places. The remaining sixteen were shared by the other networks and unaffiliated performers. NBC took eighteen second places and twenty-one third places.

Visit Ordnance Plant

War production workers in the RCA Victor Division plant at Camden gained a sharper understanding of the actual part their output plays on the far-flung fighting fronts of the nation as a result of a trip taken by a dozen of their leaders through the Army's Ordnance Replacement Training Center at Aberdeen, Md. The trip was made under the auspices of the Division's Labor-Management War Production Drive Committee to Beat the Promise on war production schedules, with the cooperation of the Army Ordnance Department.



Sings at 300 Rallies

One of 1942's real war effort personalities was Lucy Monroe, the RCA Victor Division's Director of Patriotic Music. Known as the "Star Spangled Soprano," she travelled close to 50,000 miles, visiting twenty-four States. She made more than 300 appearances at Army camps, naval bases, industrial plants, and before patriotic rallies. Her present work, she says, is the most satisfying of her career, which includes singing for radio, the concert stage, musical comedy, operetta, and opera.

NBC Chimes Exclusive

The three musical notes which, for more than fifteen years, identified programs broadcast by the Red (now NBC) and Blue networks, became the exclusive property of the National Broadcasting Company on December 1 and now is used only on the NBC network. The Blue Network ended its use of a musical signature and announces itself now as, "This is the Blue Network".

BUILDS NEW TIME CONTROL

Electric Clock System Designed by NBC Engineers Does Not Vary Third of Second in Day; Problem of Deviation Eliminated.



O. B. HANSON AT THE PANEL BOARD OF NBC'S NEW TIME CONTROL SYSTEM.

A PRECISION electric clock control system that does not vary more than one-third second a day, is now in operation in National Broadcasting Company's Radio City headquarters. The system was developed by the NBC engineering staff under the direction of O. B. Hanson, vice president in charge



of engineering. Similar installations are being made at the network's division offices in Chicago, Hollywood, San Francisco, Washington, Cleveland and Denver.

Need for a highly accurate time clock control has been increasing since war time activities commenced to add heavy loads to commercial power lines. As a result of these huge power demands, many of NBC's operating divisions, particularly New York, have encountered deviations in the frequency of the alternating current supply lines. Ordinarily of small magnitude, these variations, nevertheless, were sufficient at times to become a serious problem in network operation where programs must be switched on a split second basis. The new system, with its accuracy of better than one part in 205,000, eliminates this trouble.

NBC's time control is based on the use of a special tuning fork vibrating at the rate of 60 cycles a second within a vacuum chamber. The fork's movement creates infinitesimal impulses which are amplified millions of times by a series of vacuum tubes, until sufficient power is generated to operate the required number of clocks. In Radio City alone, 200 clocks must be synchronized.

To check the absolute accuracy of the system, the master clock is compared daily with the extremely accurate time signals transmitted by radio from the U. S. Naval Observatory, Washington, D. C.

U. S. Leases Short Waves

(continued from page 23)

British audiences and some should be equally acceptable to any English-speaking listener.

NBC's English program schedule is patterned in such a way that the best War Department, OWI and NBC programs are included in the schedule. Letters from service men show a strong preference for news, dance music and sports, so naturally the schedule includes many such shows.

Currently, the English Section is transmitting 14 sports programs each week. Variety shows are highlighted by "Service Serenade," "Fashions in Jazz" and "Command Performance." World wide interest in news from America is fulfilled by four news broadcasts a day.

Before the leasing of private short-wave facilities by the Government, NBC's English Section carried more than 20 commercial programs originated by NBC's domestic network or by the English Section. At the present time, all commercials have been cancelled but it is hoped that these broadcasts may be resumed with the commercials deleted.

Mr. Royal pointed out that the OWI "is eager to continue the competitive programming policy which has been the foundation of the American system of broadcasting and which has made the short-wave programs from the United States the most eagerly listened to of any country in the world."



STANDARD TIME INDICATED
 RECEIVED AT
 160 W 48TH ST
 NEW YORK CITY
 BR 9 1269 LD 5 6064
 TELEPHONE YOUR TELEGRAMS
 TO POSTAL TELEGRAPH

Postal Telegraph
 Making Radio Commercial Cables
 Off America Cables
 Canadian Pacific Telegraphs

THIS IS A FULL RATE TELEGRAM. CABLES
 CANNOT BE RECEIVED UNLESS OTHERWISE
 INDICATED BY SYMBOLS IN THE MESSAGE
 OR IN THE RECORDS OF THE MESSAGE.
 SYMBOLS INDICATING SPECIAL SERVICES
 ARE OBTAINED IN THE COMPANY'S TARIPS
 ON HAND AT EACH OFFICE AND ON FILE WITH
 REGULATORY AUTHORITIES.

FROM: 10
 N. WA444 (TWO) GOVT TWS PD 3 MINS=PG WASHINGTON DC 21 356P
 TO THE MEN AND WOMEN OF RADIO CORPN OF AMERICA=
 (NEWYORK NY)=
 DEC 21 PM 10

ON THIS SACRED DAY OF OUR LORD WE, THE SOLDIERS ON THE FIRING
 LINE, GIVE THANKS TO YOU SOLDIERS ON THE PRODUCTION LINE FOR
 THE SINews OF WAR THAT MAKE VICTORY POSSIBLE. WE ARE DEDICATING
 THIS CHRISTMAS DAY TO THE DEFEAT OF OUR ENEMIES--YES,
 THIS CHRISTMAS DAY, THE DAY AFTER AND EVERY DAY THEREAFTER
 UNTIL WE ESTABLISH PEACE ON EARTH AND GOOD WILL TO MEN=
 MACARTHUR.

THIS CHRISTMAS MESSAGE TO RCA'S "SOLDIERS ON THE PRODUCTION LINE" FROM GENERAL DOUGLAS MACARTHUR (LEFT) WAS RECEIVED BY RADIO CORPORATION OF AMERICA IN NEW YORK ON DECEMBER 21.

Sarnoff Lauds Radio
(continued from page 5)

programs have been directed to the service men, while many other shows have originated in training camps.

Supplementing nation-wide broadcasting on an international scale, America has continued to develop short-wave stations which have proved their great worth during the past year. Through these stations news and information have been broadcast. Short waves have linked the United Nations; they have actually "poured" news into invaded countries. An outstanding example of the usefulness of short

THIS SAILOR IS STANDING RADIO WATCH ABOARD A U. S. BATTLESHIP.
 —(Official U. S. Navy Photo.)



waves is found in President Roosevelt's broadcast in French to the French people, on November 7, when he assured France in connection with the AEF invasion of French Africa, that the United States aimed to free it from the Nazi yoke.

Radiophotos are on the wing from more points on the map than were possible a year ago. RCA, New York, now receives and sends pictures from London, Stockholm, Cairo, Moscow and Buenos Aires, while the terminal at San Francisco plucks pictures from space from Melbourne and Honolulu.

Only the end of the war can reveal the great part the communications men have played, and how fortunate America is in having a world-wide radio system second to none in coverage and efficiency. It is a thrill to see messages from across the seas roll out of the automatic tape recorder at many times the rate before the war. In World War I, reception at 30 words a minute on an overseas circuit was considered fast.

The bulwark of all this achievement in radio communications is scientific research. An all-important center of this research is the new RCA Laboratories opened in 1942—dedicated to help win the war by giving America's fighting men the

greatest resources of science, engineering and production. When peace returns, the same men of science will devote the results of their wartime research to develop new and useful products and services for the post-war era. Radio serves the nation in peace as well as in war.

THE FAMED RADIO "WALKIE-TALKIE" USED BY U. S. ARMY IN THE FIELD.
 —(U. S. Signal Corps Photo.)



a very thin positive of the original surface. This positive was mounted on the normal specimen screen and placed in the microscope for study. This procedure was lengthy and complicated but produced excellent results. It was considerably improved by the so called Formvar replica method wherein the surface to be studied was merely dipped into a very dilute Formvar solution, stripped from the specimen and placed in the microscope for study. This simplified the process and gave good results. One of the decided advantages was the extreme strength of the film. Of recent date, a new method has been developed wherein polystyrene and silica have been utilized to form a silica replica of the surface to be studied. This process, which is as complicated as the former silver collodion method, has shown great advantage in contrast. This latter process, when photographed stereoscopically, has given remarkably good results in surface structures of all types and may well result in great new developments relating to surface studies. It will definitely permit the investigator to carry his work into realms far beyond that of the ordinary microscope not only in metals, but other bulk materials as glass, ceramics, etc.

The most interesting application of the replica process has been the use of the Formvar process for copying diffraction grating, the copy in turn being accurately calibrated by light of known wave length and then placed in the electron microscope. The resulting micrographs are then used as a standard for calibration of the magnification of the instrument. Such calibrations are easily obtainable within 2 per cent, which is far beyond accuracy ever before obtained in microscope calibration.

By far the most difficult study with the electron microscope has been that of the thin sections. Even though the instrument has a depth of focus of ten or more microns, its

Microscope Users

Users of the RCA Electron Microscope follow, in the order in which the instruments have been delivered:

1. American Cyanamid Company.
2. University of Michigan.
3. Institute of Paper Chemistry.
4. University of Illinois.
5. United States Bureau of Standards.
6. Massachusetts Institute of Technology.
7. A large Eastern Corporation.
8. Inter-Chemical Corporation.
9. Aluminum Corporation of America.
10. A Midwestern Chemical Corporation.
11. General Electric Company.
12. Eli Lilly & Company.
13. Duke University Hospital.
14. University of Pennsylvania, Johnson Foundation.
15. Celanese Corporation.
16. University of Pittsburgh.
17. Export to England.
18. RCA Laboratories, Princeton.
19. Export to England.
20. Monsanto Chemical Company.
21. Export to England.
22. Mt. Sinai Hospital, New York.
23. A Chemical Corporation.
24. Export to England.
25. Export to England.
26. B. F. Goodrich Company.
27. Carnegie Institute of Technology.
28. Export to England.
29. Export to England.
30. Republic of Guatemala.
31. University of California.
32. Standard Oil Company of New Jersey.
33. United States Rubber Company.
34. A large Eastern University.
35. Westinghouse Electric and Manufacturing Company.
36. Illinois Institute of Technology.
37. Hercules Powder Company.
38. University of Missouri.
39. Export.
40. National Naval Medical Center.
41. United States Naval Research Laboratories.
42. A large Eastern University.
43. Export.
44. United States Department of Agriculture.
45. Goodyear Tire and Rubber Company.
46. New Jersey Zinc Company.

penetrating power operating at 60 kv. is less than one micron (1 25,000 inches). This imposes a severe restriction upon the thickness of the specimen to be studied, at the same time adding considerable complications in its preparation. Present methods of slicing thin sections, such as the microtome have been limited to a minimum thickness of one micron or more, which is beyond the maximum thickness which the instrument is able to penetrate

at normal voltages of 60,000 volts or less. This has been increased by building an electron microscope that has been adapted for use with high voltages up to 300,000 volts. The penetration of matter by the electrons increases rapidly with their kinetic energy, consequently the higher voltage permits resolving details in larger objects. The high voltage instrument is not practical for the smaller laboratories so that other means had to be found for the study of thin sections. The only answer, therefore, was to find methods of producing thinner sections. This has been accomplished by mechanical improvement of the microtome. Further improvement has resulted by advances in the method of supporting the specimen to be cut, such as the latest method of using a special resin. Other methods are being improved rapidly to the point where the electron microscope will soon be as busily engaged in the field of thin sections as in other work.

The microscope was designed to fulfill all of the needs of microscopy where depth of focus and higher resolving power were the prerequisites. These factors gave us size, shape and distribution of materials under observation. With the available power supply and lenses built into the machine, it was only a small step further to designing an attachment known as the electron diffraction unit permitting the study of the crystal structure and chemistry of the surface of particles which increased the usefulness of the instrument many times.

Recently, there was formed a society called The National Conference on Electron Microscopy for the purpose of discussing and exchanging ideas on application and techniques along with the accomplishments of the electron microscope, to further this new science and art which is now growing at an amazing rate.

The Blue Network finished its first year "in the black," being the first network to make a profit in its first year of operation.



GUGLIELMO MARCONI, PHOTOGRAPHED FOR THE FIRST TIME IN AMERICA ON THE YACHT "PONCE."

REPORTING BY RADIO

Marconi Carried Out First American Wireless Communication at 1899 Yacht Races.

By George Clark

FORTY-THREE years ago, the first wireless communication in America was carried on, under the direction of Guglielmo Marconi, who came to this country at the request of the New York *Herald* to report by the "new communication" the international yacht races.

The yacht *Ponce* was used for the marine end of the wireless link, and its shore counterpart was a temporary installation at the Highlands of Navesink, N. J. The mast used for the antenna is still standing and, after the war, will be marked as a permanent monument.

The yacht is still in service, and its type of propulsion, the reciprocating steam engine, may be found on many other ships today, which is more than can be said of the wireless apparatus which it carried. This form of steam drive may be likened to the Marconi spark set of that early test, in that it used intermittent power, while today there are many steam-turbine installa-

tions on ships, whose smooth, continuous power is quite the equivalent of the modern vacuum-tube transmitter.

2 Honored by President

(continued from page 21)

The RCA workers were included in a group of ten production "heroes" who were honored by the President. The other eight are employees of as many different war plants throughout the country. RCA is the only plant in the group to place two winners.

To emphasize the fact that the distinction given them was without precedent in American history, the winners were guests of honor at ceremonies similar to those held for returning war heroes. For an entire day they were, in effect, guests of the Nation. Actual presentation of the citations and certificates by the President occurred at the White House.

The program also included an official luncheon with Donald Nelson, receptions, entertainment and other activities.

It was in recognition of the fact that his calipers broke a production bottleneck that Donald Nelson, Chief of the WPB, awarded the Certificate of Individual Production Merit to Crawford. The calipers make it possible to determine the wall thickness dimensions of certain castings essential to war equipment. These castings are costly and utilize critical materials.

Crawford, who is 50 years old and is a civilian fireman reserve in his home town, started with RCA in 1928 as a packer in the shipping department. He soon moved into inspection, testing and checking incoming parts and material.

Tracy started with RCA Victor in New York in 1939, in the service department. He is 31 years old and married. His father was a missionary to Turkey, and he was born in that country. While still a boy he caught the "radio bug."

Tracy's suggestion grew out of the need for speeding up testing of aircraft radio equipment. Formerly, before a plane went into action, it was necessary to disconnect all or nearly all the radio equipment, remove it from the plane, set it up in

the testing equipment and put it through the tests. This required an average of eight man-hours for every plane. A relatively simple oscillator was devised by Tracy. It is set up on an air field and gets the same or better results in three minutes.

These oscillators are now installed or on their way to every American flying field, particularly those on the fighting fronts.

Radiomarine Wins "E"

(continued from page 10)

"We have in our organization a crew of men and women that you can count on to give everything that is in them for the war effort. You have made us very proud to be a part of the war machinery, and we thank you from the bottom of our hearts."

Acceptance of the "E" pins was by a plant committee made up of James E. McDowell, Engineering Department; Johan G. Schott, Shop; G. P. Shandy, M.R.I. Department; Anthony Krause, Shipping Department, and Mrs. E. P. Schnabel, General Office.

John Szpak, representing the entire employee group, responded to presentation by handing Rear Admiral Watts a scroll which bore the signatures of all his co-workers to a "pledge of service in the war effort and in the cause of victory."

"We are proud that the work we have done, so far, entitles us, as individuals, to wear the Army-Navy 'E' emblem," said Szpak. "Good teamwork wins battles, both in the front lines and in the production lines. We have all of that in this happy plant.

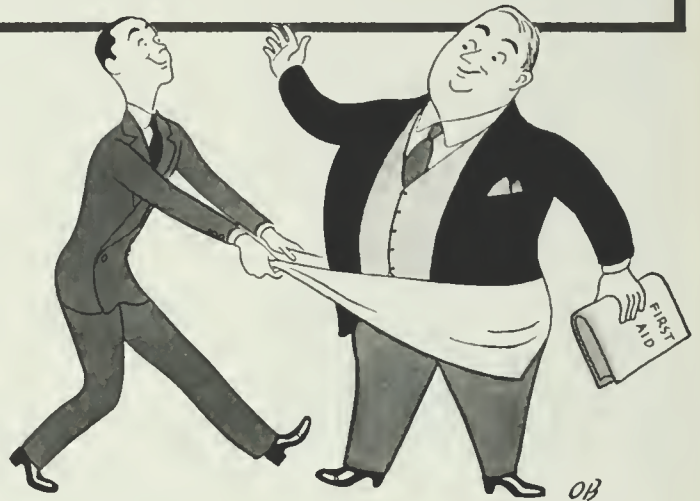
"As we look ahead we can see even greater opportunities to serve our country. We pledge our best efforts to make the most of those opportunities, and to show you later that we are entitled to the star. You may count on us to continue to be worthy of the high honor which the Army and Navy have bestowed upon us."

Miss Lucy Monroe, singing star of radio and stage, completed the ceremony by singing "The Star Spangled Banner."

FIRST AID FOR WARTIME ADVERTISERS

COVER THE FATTEST MARKET →

Even though your budget's short, you can still make ends meet to cover the fattest market in the U. S. Use WJZ's thrifty coverage of Greater New York. (WJZ recently pulled nearly 10,000 requests from four low-cost announcements on "The Woman of Tomorrow".)



← KEEP TRADE NAMES ALIVE

Keep your trade name alive for the duration by the WJZ "respiration" method. You're the one who'll be rickled. Because you'll keep that name alive and kicking in the minds of Greater New York's millions *at lower cost* over WJZ.

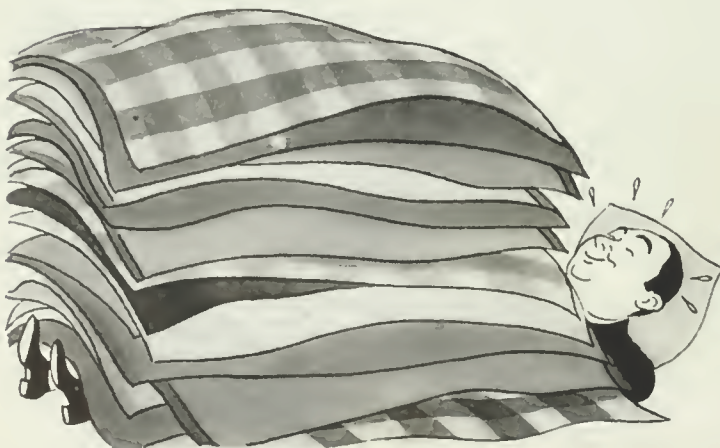
FINGERS ON PULSE →

Keep your fingers on the pulse of what really counts in wartime advertising. WJZ advertising is up 37% for 1942. And there's a reason. For example, when WJZ and a competitor recently carried the same announcement 22 and 21 times respectively, WJZ pulled 20% better!



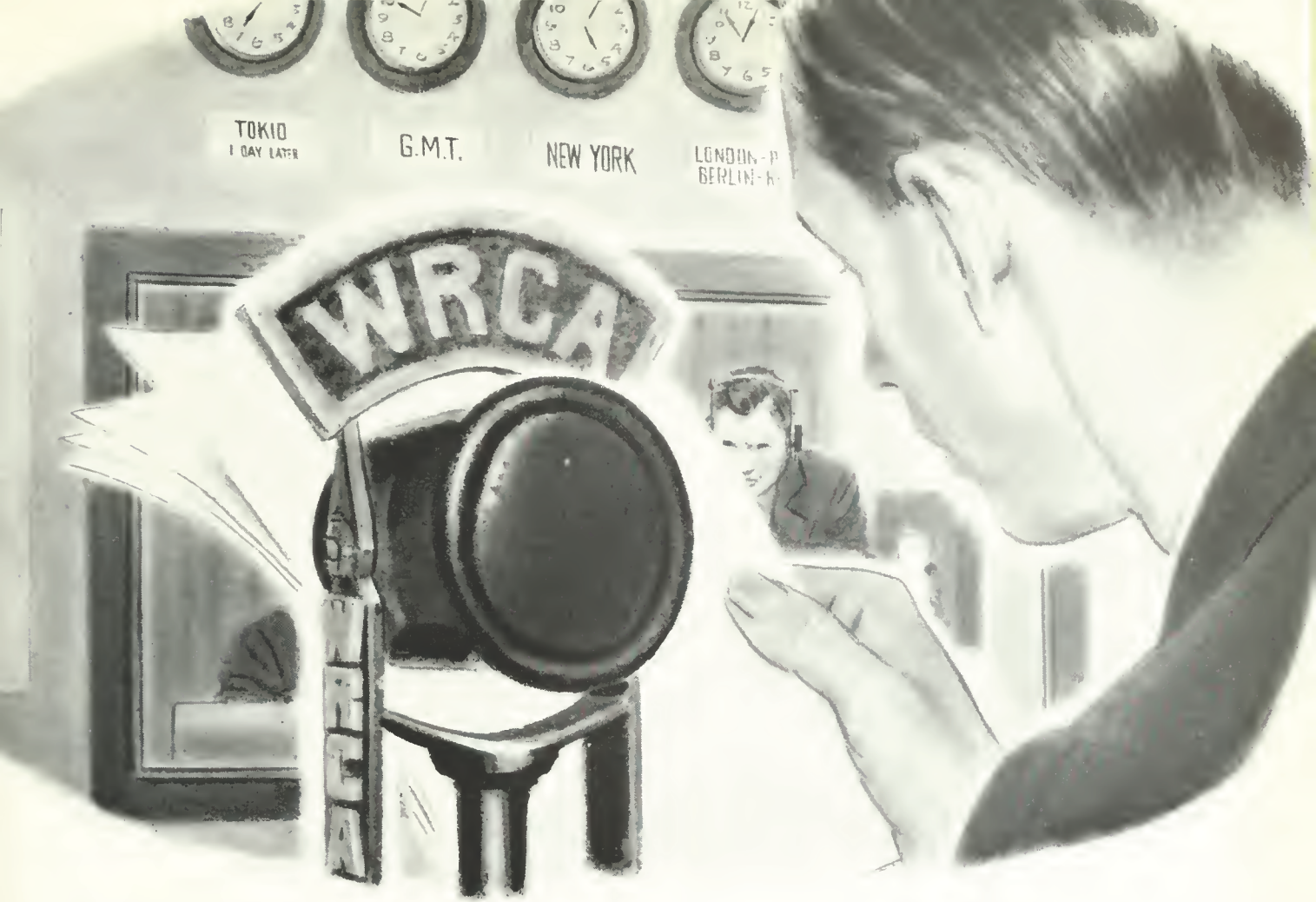
← KEEP MESSAGE WARM

You'll find your advertising message getting hot with the help of WJZ's *extra* coverage... 5,336,253 radio homes in the Greater New York Market—658,253 more than its closest competitor. It's the lowest cost coverage of the world's greatest market!



WJZ 50,000 WATTS
77 ON YOUR DIAL

New York's First Station and
Key Station of the BLUE NETWORK



This is a machine to help Germans remember

It works very simply. An American steps before it and calmly reads a script in German. Powerful short-wave transmitters beam the words to Axis Europe. That's all there is to it.

Yet to the Fascist dictators, this simple process is a thorn in their sides, a threat to their power, a danger to the success of their bloody schemes.

Why? Because these American short-wave broadcasts are often devoted to waking up German memories—on a subject Der Fuehrer would prefer to be forgotten. That subject is: *What America's might and manpower will mean to the cause of the United Nations.*

Hitler wants the Germans to forget what happened in the last war when America swung in its full strength. He wants them to forget the boatloads of ammunition, the fleets of soldier-packed transports, the food and the weapons. He

wants them to forget the Yanks ever came, because memories like that are not good for Fascist morale.

That's why American short-wave stations WRCA and WNBI are so busy nowadays giving a memory course to the German people. RCA is proud that its equipment, used by these stations, can help remind Axis-dominated Europe that America is again on the march, that America's factories are rolling out the tanks and the planes and the guns, that America's shipyards are sending out an armada of transports and freighters and battle-ships, that America's manpower is moving . . . moving fast . . . moving with all its might.

Yes, you Fascists who fight for Hitler, this is something to remember: the Yanks are coming—*again!*



RCA BROADCAST EQUIPMENT



RADIO... NERVE-CENTER OF VICTORY!

This is a war of science. Radio tubes add speed, precision and safety to hundreds of industrial operations, as well as to the performance of planes, ships and tanks. *Radio science is in the fight on every battlefield.*

This is a war of mobility and speed. Mobility on land, sea and in the air is made possible by speed of communication. *Radio carries voice, code and pictures at the speed of light.*

This is a war of morale. Soldiers, sailors and home folks must be informed and entertained. Understanding must be maintained with allied peoples. Courage and hope must be brought to those awaiting liberation. *Radio broadcasting builds morale.*

For more than two decades, the Radio Corporation of America has pioneered in the progressive development of radio, electronics and television. In the present crisis, those developments in communications, broadcasting, research, engineering and manufacturing are performing services of vital importance to the United Nations. Out of RCA's war experience will come new and finer products and services for industry, the home, and the nation to help make life more than ever worth living.



RADIO CORPORATION OF AMERICA

RCA LEADS THE WAY IN RADIO, ELECTRONICS, TELEVISION

The Services of RCA: RCA Victor Division • R.C.A. Communications, Inc.
 Radiomarine Corporation of America • RCA Laboratories • National Broadcasting Co., Inc.
 Blue Network Co., Inc. • RCA Institutes, Inc.

For outstanding achievement in the production of vital radio equipment, these awards have been given to RCA plants:



Army-Navy "E" to an RCA Instrument plant



Army-Navy "E" to an RCA Tube plant



Army-Navy "E" to the RCA Radiomarine Service

BUY WAR BONDS EVERY PAYDAY